The Institute for Solid State Physics
The University of Tokyo

Activity Report
2016

ISSP

Activity Report 2016

Contents

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Preface

We are pleased to present the annual ISSP Activity Report for the academic year 2016. ISSP (Institute for Solid State Physics) was established in 1957 as a joint-use research institution attached to the University of Tokyo. Since then both in-house research and collaboration with external users have been essential elements of the activities of ISSP.

The research at ISSP has been pursued along two major directions. Synthesis of new materials and nano-structures in search for novel phenomena and functions, as well as their theoretical understanding, by advanced and original methods are at the core of modern condensed matter science. Such activities are being conducted by relatively small independent groups at ISSP and their collaborators. In 2016, we launched two new research groups, the functional materials research group and the quantum materials research group, in order to explore interdisciplinary fields. At the same time, importance of large experimental and computational facilities in materials science has been rapidly increasing in recent years. ISSP has been actively involved in development and operation of some of those large facilities that are difficult to maintain for typical university faculties. Notable achievements in this direction are summarized below.

(1) ISSP has been operating supercomputers dedicated to materials science. In addition, the Center of Computational Materials Science provides technical supports to facilitate use of massively parallel computational resources such as the K and the post K computers. (2) The International MegaGauss Science Laboratory continues to develop both the destructive ultrahigh magnetic field by electromagnetic compression aimed at 1000 tesla and the non-destructive long-pulse magnetic field by a flywheel generator. (3) ISSP has been providing external users access to advanced spectroscopies that use quantum beams such as neutron and synchrotron light sources. It is a pity for the neutron scattering society that the JRR-3 reactor at Tokai has been shut down after the earthquake in 2011 but we are expecting reopening in near future. The pulsed neutron spectrometer at J-PARC developed jointly by ISSP and KEK is now in operation. At the Laser and Synchrotron Research Center, we explore frontier of advanced spectroscopy in ultraviolet and soft X-ray region by combining high power laser being developed in Kashiwa and synchrotron beamline installed in SPring-8.

June, 2017

Masashi Takigawa
Director
Institute for Solid State Physics
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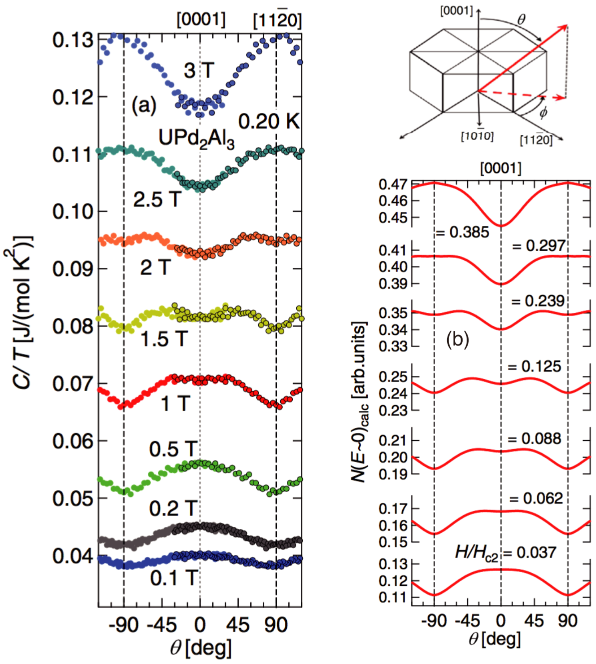
Research Highlights

Identification of the Superconducting Gap Structure of the Heavy-Fermion Antiferromagnet UPd_2Al_3 by Angle-Resolved Heat Capacity Measurements

Sakakibara Group

The hexagonal heavy-fermion compound UPd_2Al_3 exhibits superconductivity below $T_c = 2$ K, which coexists with an antiferromagnetic ordering that sets in at $T_N = 14.5$ K [1]. Various experiments including inelastic neutron scattering [2] and thermal conductivity [3] measurements have inferred that the superconducting gap function is of nodal A_{1g} type, $\Delta(k) = \Delta_0\cos(k_z c)$, having horizontal line nodes. Up to present, however, no thermodynamic evidence for the horizontal line node has been obtained.

In order to examine the pairing symmetry of UPd_2Al_3 in the light of quasiparticle density of states, we performed angle-resolved heat capacity (C) measurements on a high quality single crystal of UPd_2Al_3 in rotating magnetic fields (H) [4]. When H is rotated in the basal plane, no angular variation of $C(H,\phi)$ that could be ascribed to vertical line nodes is observed. To probe the horizontal line node, we examined the polar-angle (θ) dependence $C(H,\theta)$ and the results are shown in Fig. 1(a). Below 0.5 T, a twofold oscillation is clearly observed with a maximum at $\theta = 0^\circ$ (H||[0001]) and a minimum at $\theta = 90^\circ$ (H||[11$\bar{2}$0]). Above 2.5 T, the twofold angular oscillation is reversed and the maximum appears along [11$\bar{2}$0], reflecting the underlying nodal structure as well as the anisotropy of the upper critical field H_{c2}. Very interestingly, in the field range from 1 to 2 T, a new feature appears in $C(H,\theta)$ in an intermediate angle region; at 1 T, a shoulder or a hump appears at $\theta \sim 30^\circ$, and moves to the higher angle side $\theta \sim 45^\circ$-60° with increasing H to 2 T. Above 2.5 T, it finally merges into the maximum at $\theta = 90^\circ$ arising from the H_{c2} anisotropy. Remarkably, the maximum of $C(H,\theta)/T$ at 1.5 T occurs near 45°.



(a) Field-angle variation of $C(H,\theta)/T$ of UPd_2Al_3 with H rotated in the ac plane measured at 0.2 K. (b) Calculated results of the field-angle dependence of ZEDOS in magnetic fields normalized by H_{c2} for a linear horizontal line node. The inset shows the definition of angles for the hexagonal structure.

The observed field evolution of $C(H,\theta)$, in particular the shoulder/hump structure in the intermediate angular region, provides strong evidence that a horizontal line node exists on the Fermi surface. We performed microscopic calculations of the zero-energy density of states (ZEDOS) by means of the quasiclassical Eilenberger theory within the Kramer-Pesch approximation [4]. Figure 1(b) shows the calculated angular dependence of ZEDOS, assuming a spherical Fermi surface and a model gap function $\Delta(\boldsymbol{k}) = \Delta_0 k_z$ that has a horizontal line node at the equator. The results clearly demonstrate that the anisotropy inversion occurs in the ZEDOS as H increases. What is more important is that the calculated results successfully reproduce the shoulder/hump anomaly around 30-60° in $C(H,\theta)$ at the intermediate fields. The polar angle dependence of $C(H,\theta)$, therefore, possesses sufficiently high resolution to detect the horizontal line node.

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Improved Stability of a Metallic State in Benzothienobenzothiophene (BTBT)-based Molecular Conductors: an Effective Increase of Dimensionality with Hydrogen Bonds

Mori Group

One of the merits in organic conductors based upon molecules is the designability and variety of molecular components [1], which lead a wide range of electronic states such as exotic metallic [2], superconducting [3], Dirac Fermion, quantum spin liquid [4], and electron glass states. These curious solid states [2-6] have been given a birth based upon newly designed and synthesized molecules, usually tetrathiafulvalene (TTF) and its derivatives with 7 π system. Recently, another donor molecule benzothienobenzothiophene (BTBT) with 6 π system has been synthesized to be a superior semiconductor for field-effect-transistor. Although this BTBT is poor electron donor, it is realized to afford one-dimensional molecular conductor, $(BTBT)_2PF_6$. In this article, the successfully improved stability of a metallic state in newly synthesized BTBT derivative-based molecular conductor, β-$[BTBT(OH)_2]_2ClO_4$, by the increase of dimensionality with hydrogen (H)-bonds is reported [6].

The novel donor molecule $BTBT(OH)_2$ was synthesized by 7 steps with utilizing Sonogashira coupling method. Surprisingly, our newly synthesized $BTBT(OH)_2$ functionalized at the 2,3-positions has been unknown, although a lot of BTBT derivatives have been designed and synthesized so far. Therefore, our present synthetic strategy will be effective in exploring a new class of functionalized BTBT derivatives. The electrocrystallization of $BTBT(OH)_2$ in the presence of tetra-*n*-butylammonium perchlorate gave the molecular conductor, needle-like black crystals of the ClO_4 salt, namely β-$[BTBT(OH)_2]_2ClO_4$. The $BTBT(OH)_2$ is partially oxidized state with a +0.5e charge and expected to form a 3/4-filled band structure. The $BTBT(OH)_2$ molecule is almost planar and forms a head-to-tail-type uniform stack along the *b*-axis with an inter-planar spacing of 3.326 Å. It is noteworthy that two kinds of [O–H..O]-type H-bonding interactions were observed between the hydroxy groups of the donor and the ClO_4 anion. Consequently, an infinite 1D H-bond-chain structure is formed along the *c*-axis. In this arrangement, very weak C–H..S interactions are also found in the side-by-side direction of the donor molecule. As a result of these intermolecular interactions, $BTBT(OH)_2$ produces a sheet type molecular arrangement (Fig. 1). The transfer integrals, which correspond to inter-molecular interactions between the neighbouring molecules, are largest in the stacking direction b (91.0 meV) and relatively smaller in the diagonal directions p (2.77 meV), q (13.6 meV), and r (13.1 meV). The effect of the H-bond interactions in the crystal of β-$[BTBT(OH)_2]_2ClO_4$ is further disclosed by comparing the crystal structures of β-$[BTBT(OH)_2]_2ClO_4$ and the parent salt $(BTBT)_2PF_6$. As shown in Fig. 1, the BTBT molecules in $(BTBT)_2PF_6$ form windmill-type columnar structures with effective π–π interactions. There are, however, no effective interactions between the columns, due to the existence of C–H..F contacts between the donor molecule and the PF_6 anion. As a result, the columnar arrangement produces a typical 1D electronic structure with a flat Fermi surface. On the other hand, the π-stacking columns in the present salt β-$[BTBT(OH)_2]_2ClO_4$ (Fig. 1) are connected with the O–H..O H-bonding interactions through the ClO_4 anions. The resultant Fermi surface is warped in the 3/4-filled band structure, which means the formation of a quasi-one-dimensional (Q1D) electronic structure in β-$[BTBT(OH)_2]_2ClO_4$. This enhancement of the electronic structure from 1D to Q1D is also evidenced by comparing the anisotropy of the transfer integrals. $(BTBT)_2PF_6$ has a strong interaction within the π-stacking column (87 meV); however, the interstack interaction is negligibly small (1.4 meV). On the other hand, the present β-$[BTBT(OH)_2]_2ClO_4$ has the substantial interstack interactions (q, r ~ 13 meV), in addition to the strong intrastack one (b = 91 meV), as described before. Thus, the intrastack/interstack anisotropy is significantly decreased from 60 (= 87/1.4) in $(BTBT)_2PF_6$ to 7 (= 91/13) in β-$[BTBT(OH)_2]_2ClO_4$.

The increase of the dimensionality of the electronic struc-ture significantly influenced the electrical conducting properties. The crystal of β-$[BTBT(OH)_2]_2ClO_4$ shows a relatively low room temperature electrical resistivity (ρ_{300K} = 5.5 × 10^{-3} ohm cm), which decreases with decreasing temperature down to 135 K. This temperature dependence indicates that this salt is metallic above 135 K, and more importantly, this metallic state is more stable than that of $(BTBT)_2PF_6$. This is because this salt does not show an abrupt resistivity jump, as seen in $(BTBT)_2PF_6$ at 150 K. Therefore, we have proved that the increase of the dimensionality caused by the H-bond interactions brings about the stabilization of the metallic state in BTBT-based conductors. On further cooling, this salt finally undergoes a metal–insulator-like transition around 60 K, after entering the semiconducting state at 135 K. A similar transition without hysteresis has also been observed in $(BTBT)_2PF_6$ at around 50 K.

In conclusion, we have successfully synthesized novel organic donor with 6 π system and the introduction of hydrogen bond, benzothienobenzothiophene (BTBT) derivative, $BTBT(OH)_2$, and realized a stable metallic state in a quasi-one dimensional charge-transfer salt, β-$[BTBT(OH)_2]_2ClO_4$. The strong H-bonding ability of the catechol-type hydroxyl groups has played a crucial role in the formation of an infinite one-dimensional H-bonded chain structure, which leads to the increase of the dimensionality of the electronic structure and the stable metallic state. These results demonstrate that functionalized BTBT derivatives are promising electron donors in molecular conductors. We believe that this study will pave a new way for designing and developing high-dimensional BTBT-based materials/devices with interesting conducting properties (e.g. superconductivity and high carrier mobility).

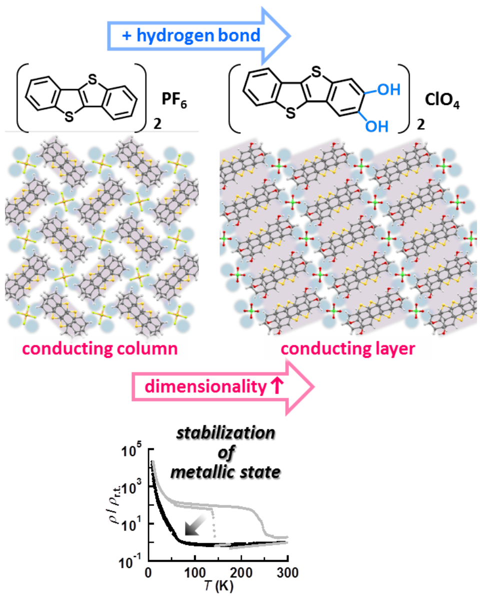

Fig. 1. We have proved that hydrogen-bonding interaction can increase the dimensionality and stabilize a metallic state for the newly synthesized benzothienobenzothiophene (BTBT)-based molecular conductor, β-$[BTBT(OH)_2]_2ClO_4$. This charge-transfer complex offers a new promising strategy for designing and developing next generation organic electronic materials/devices.

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Double Carrier Transport in Electron-Doped Region in High-Mobility Thin-Film Black Phosphorus FET

Osada Group

Black phosphorus (BP) is a layered material which was extensively studied in the 1980s because it was a single-element semiconductor with higher mobility than silicon or germanium. In the past a few years, BP has again attracted a great deal of attention as one of post-graphene atomic layer materials. It shows high performance as a field effect transistor (FET) material; much larger on/off ratio than graphene and higher mobility than transition metal dichalcogenides. It is known that thin-film BP is degraded by photochemical reaction under oxygen and water atmosphere, so that techniques to avoid the degradation are important to obtain high quality thin films. Using high quality samples, the Shubnikov-de Haas (SdH) oscillations and the quantum Hall effect of two dimensional (2D) carriers have been studied. However, most of preceding studies were performed in negatively gated (hole-doped) region. In this work, we have achieved the highest Hall mobility ever reported in thin-film BP, and observed clear SdH oscillations, which indicate double carrier transport in positively gated (electron-doped) region.

The samples were prepared by the mechanical exfoliation and dry transfer techniques in the grove box to avoid degradation. First, a thin-film BP flake with the thickness of 15-20 nm is fixed on an atomically-flat hexagonal boron nitride (h-BN) flake on the SiO_2/n^+-Si substrate. Next, it is partially covered by a smaller h-BN flake. Electrodes are formed on the edge of this top h-BN flake by the lithography process in the atmosphere. Since the measured region in BP layer is sandwiched by two h-BN layers, we can avoid the degradation and improve carrier mobility. Using this simple method, we have achieved the Hall mobility of 6,000 cm^2/Vs and 5,800 cm^2/Vs at 4.2 K for holes and electrons, respectively. These values are comparable to the reported highest mobility.

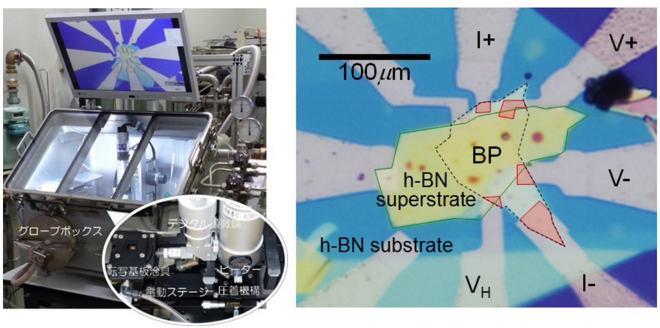

Fig. 1. (left) Exfoliation and transfer system for building atomic layer heterostructures. (right) Microscope image of thin-film BP FET device.

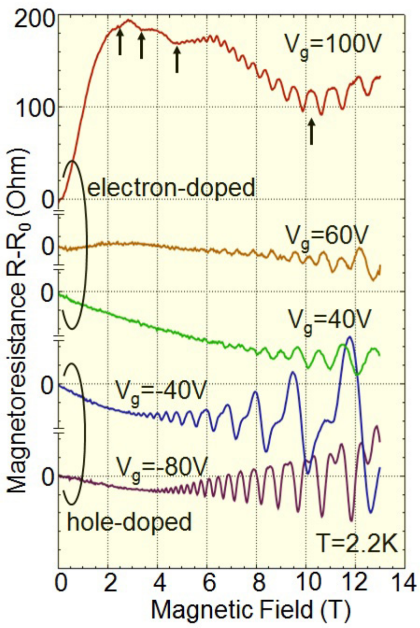

Fig. 2. Magnetoresistance of thin-film BP FET under several gate voltages.

In the negatively-gated (hole-doped) side, we have observed negative magnetoresistance (MR) due to weak localization and SdH oscillations with clear spin splitting. The carrier density estimated from the SdH period is well proportional to the gate voltage with small correction of charge neutrality. This fact indicates that a single 2D hole gas is formed in the inversion layer.

In contrast, anomalous transport behaviors have been observed in the positively gated (electron-doped) side. The gate voltage dependence of conductance showed an anomalous shoulder structure. In the gate voltages below it, normal behaviors, the negative MR and single SdH oscillation, were observed like the hole-doped side. In the gate voltages above it, the MR turned to positive and saturated accompanied by slow and fast SdH oscillations. The summation of carrier densities estimated from two SdH periods coincides with the density expected from the gate voltage. These facts clearly suggest the existence of two closed Fermi surfaces. In addition, the overall shape of MR can be qualitatively explained by the two carrier model.

The appearance of the second Fermi surface in high positive gate voltages is explained by the carrier population onto the second subband. In thin-film BP FETs, the 3D conduction band splits into 2D subbands due to finite thickness and strong gate electric field. Since the present BP sample is rather thick (15-20 nm), the subband separation is considered to be small, so that electrons easily populate on the second subband. The present result demonstrates to control the subband configuration by the gate voltage in BP FETs.

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Spin Singlet Orders in Breathing Pyrochlores

Tsunetsugu Group

Geometrically frustrated magnets are a good playground in the quest for new quantum phases of matter, and kagome and pyrochlore magnets are their representatives. A few years ago, Okamoto *et al.* [1] discovered an unidentified phase transition in the spinel variety Li(Ga,In)Cr_4O_8, in which the magnetic Cr ions form a breathing pyrochlore lattice, and this has motivated a theoretical investigation of its origin.

The breathing pyrochlore lattice is a staggered network of corner-sharing tetrahedrons with two sizes, and increasing In concentration enhances the size difference. The antiferromagnetic Heisenberg Hamiltonian is a minimal model to study magnetic properties in this compound, and this requires two values of nearest-neighbor exchange coupling $J' \ll J$ corresponding to different tetrahedron units. This model was theoretically studied for the case of spin $S = 1/2$ [2] and it was predicted that the spin gap is finite and the ground state exhibits a complicated spatial modulation without breaking spin rotation symmetry. Among the four sublattices of small tetrahedra, three of them show dimer-pair orders of different pairing combination, and the remaining sublattice shows either a dimer-pair order or a tetramer order. Considering Cr^{3+} ions have a spin $S = 3/2$, the important issue is if this larger spin changes an order in the ground state.

To study this problem, I have developed a systematic scheme of degenerate perturbation theory for the breathing pyrochlore Heisenberg model with general spin S, and derived an effective Hamiltonian for describing dynamics in the spin singlet subspace. The effective Hamiltonian is in the order of $(J'/J)^3$ and represented in terms of spin-pair operators $\boldsymbol{\tau}$, and we have studied its ground state by a mean field approximation [3]. The operators are defined in the local singlet space with dimension $2S + 1$ at each small tetrahedron, and we have solved the challenge of calculating their matrix elements for general S. It turns out that an essential difference from the $S = 1/2$ case is the presence of Z_3 anisotropy in the internal $\boldsymbol{\tau}$ space, and this stabilizes a different order. The anisotropy grows for larger S and inherits the cubic symmetry of the lattice structure. Two sublattices of small tetrahedrons now show an identical tetramer order, and the other two sublattices show another tetramer order with a small distortion. We have analyzed the spin correlations in this new ordered state in detail for $S = 3/2$ and 1, and calculated the equal-time spin structure factor $S(\boldsymbol{q})$. The amplitudes of the components breaking the cubic lattice symmetry in $S(\boldsymbol{q})$ are calculated and they can be used to determine the value of J'/J. It shall be interesting to verify this scenario by carrying out a neutron scattering experiment and compare its results with this prediction.

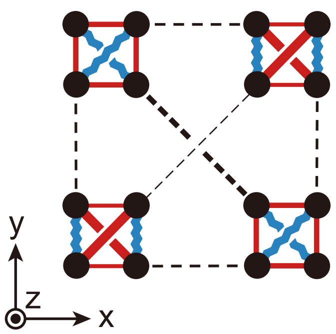

Fig. 1. Nearest-neighbor spin correlations in the breathing-pyrochlore Heisenberg model with $S = 3/2$. Four squares depict small tetrahedron units in the cubic unit cell projected onto the *xy* plane. In each unit, antiferromagnetic correlations are shown by red bonds and their width schematically shows $|\boldsymbol{S}_i \cdot \boldsymbol{S}_j|$, while blue bonds show ferromagnetic correlations. Dashed lines show weak antiferromagnetic correlations between neighboring units.

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H. Tsunetsugu

Supercurrent in a Ferromagnetic Semiconductor

Katsumoto Group

The origin of superconductivity is the pairing of two electrons (Cooper pairing). In conventional superconductors such a pairing occurs between electrons with opposite spins and momentums at the Fermi surface. The total spin of a conventional Cooper pair is, thus zero (spin-singlet pairing). There may exist, however, another type of pairing with total spin one, that is, spin-triplet pairing. A solid example is the pairing of two helium-3 atoms in the state of superfluidity. Many exotic properties are predicted for spin-triplet (odd parity) superconductivity though few of them have been experimentally confirmed. Spin-triplet superconductivity may appear in non-uniform superconductivities such as proximity driven superconductivity in a half-metallic ferromagnetic material, in which only a single spin state exists at the Fermi level. In this study, we have made a diluted ferromagnetic semiconductor (In, Fe)As [1] superconducting by placing Nb split electrodes with gaps around 1 µm. The magnetic field dependence of the critical current suggests that the spin-triplet pairing is presumably realized in (In, Fe) As.

The (In, Fe)As film was grown in Tanaka laboratory in Department of Electrical Engineering and Communication Technology, University of Tokyo by molecular beam epitaxy.

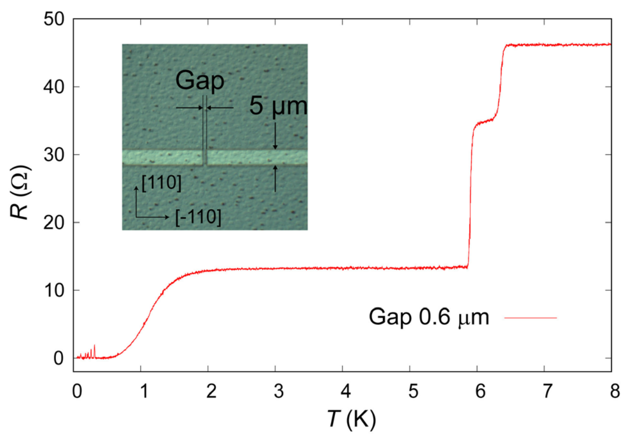

Fig. 1. Two-terminal resistance of a Nb-(In, Fe)As-Nb junction as a function of the temperature. The inset shows optical micrographs of the sample, which consists of 5 µm wide Nb strips and 0.6 µm width gap of (In, Fe)As.

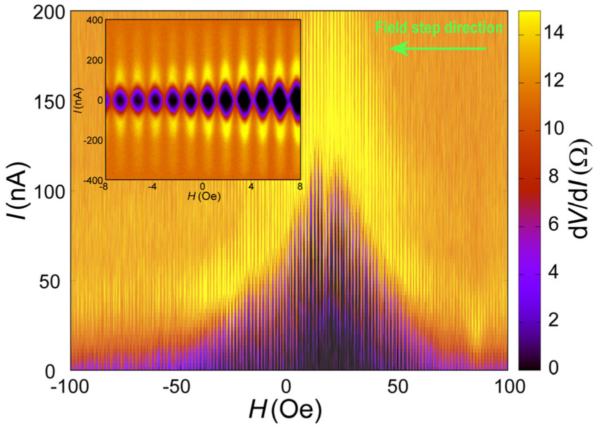

Fig. 2. Differential resistance of the sample shown in Fig.1 is plotted in color as a function of the perpendicular magnetic field and the device current. The inset is a blowup around the origin, which shows clear diamond-like zero-resistance regions. The green arrow indicates the direction of the field sweep.

As shown in the inset, Nb strips with the width 5 μm were deposited leaving the gap of 0.6 μm as shown in the inset of Fig. 1. Figure 1 displays the temperature dependence of the sample resistance, which have a two-step drop at the transition temperature of Nb. Below 1.5 K, the resistance decreases again with decreasing temperature and reaches zero around 0.5 K. In Fig. 2, we plot the differential resistance in color as a function of the perpendicular magnetic field and the device current. A Fraunhofer-like interference pattern with a very short period in magnetic field appears with a shifted broad peak. The period much shorter than that for single flux quantum in the junction area comes from flux concentration by the Nb electrodes.

A peculiar point is that the peak position exists on the positive side of zero magnetic field while the field is swept from positive to negative. For the opposite sweep direction, the peak position appears on the negative side. This means the critical current is affected by hysteretic magnetization of the ferromagnet. Then why the peak is formed for high magnetic flux position? The key is magnetic disorder at the interface between (In, Fe)As and Nb. The peak always exists when the disorder is maximized, which fact suggests the spin-triplet pairing is realized in ferromagnetic (In,Fe)As.

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Tuning the Spin Hall Effect of Pt from the Moderately Dirty to the Superclean Regime

Otani Group

Spintronics research relies on the techniques of spin currents generation and detection. Therefore the discovery of the spin Hall effect was one of the most important breakthrough in this area, which enabled us to interconvert between charge and spin currents without using ferromagnets. Thanks to the discovery, spin Seebeck effect [1] and spin pumping [2] have been demonstrated successfully.

The SHE was theoretically predicted by Dyakonov and Perel in 1971 [3] and revisited by Hirsch in 1999 [4]. It is widely recognized that the SHE in nonmagnetic materials shares the same mechanism with the anomalous Hall effect (AHE) in ferromagnets; either intrinsic or extrinsic mechanism. In case of the AHE, experiments with changing the longitudinal conductivity of ferromagnetic metals have been performed, showing that the intrinsic and extrinsic contributions scale differently with the longitudinal conductivity. In contrast to the AHE, however, a systematic experimental study on the SHE has been still lacking.

We have studied on the spin diffusion length λ_{Pt} and the spin Hall angle $\theta_{SH,Pt}$ (conversion yield between spin and charge currents) of platinum in a wide range of conductivities σ_{Pt} by means of the spin absorption method using lateral spin valve devices [5]. Pt was chosen because it is a prototypical SHE metal so that our results can be compared with many reported values. Also there have been a discussion on the vales of λ_{Pt} and $\theta_{SH,Pt}$ because the value differ in each report where λ_{Pt} ranges from 1~10 nm and $\theta_{SH,Pt}$ from 1~10 % [6]. A linear relation between λ_{Pt} and σ_{Pt} was firstly observed as shown in Fig. 1, evidencing that the spin relaxation in Pt is governed by the Elliott-Yafet (EY) mechanism. Also, we decomposed intrinsic and extrinsic contri-

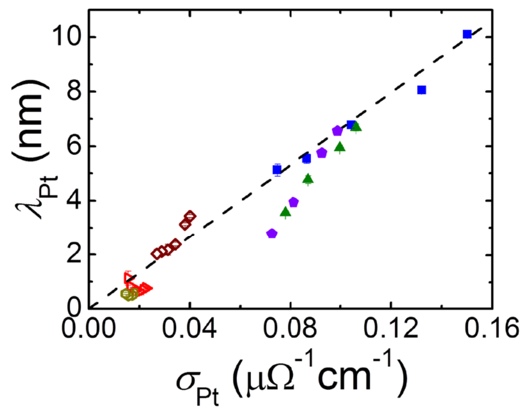

Fig. 1. Spin diffusion length λ_{Pt} of Pt depending on the longitudinal conductivity σ_{Pt}. Each symbol shows a different sample which is measured in various temperatures. The black dashed line is the linear fitting. This linearity is evidencing that the spin relaxation mechanism in Pt is governed by Elliot-Yafet mechanism. The obtained variation of the spin diffusion length λ_{Pt} covers the values in the previous researches.

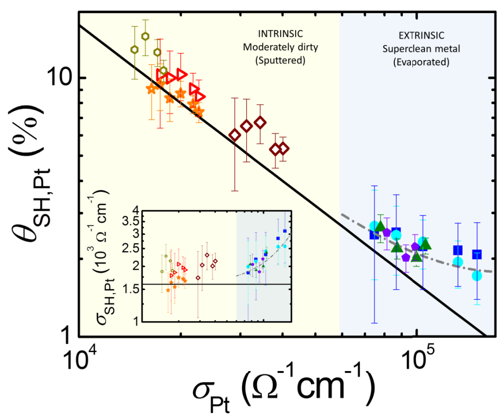

Fig. 2. Spin Hall angle $\theta_{SH,Pt}$ of Pt depending on the longitudinal conductivity σ_{Pt}. The inset shows the Spin Hall conductivity $\sigma_{SH,Pt}$ of Pt depending on the longitudinal conductivity σ_{Pt}. Each symbol shows a different sample which is measured in various temperatures. The black solid line is a guide to the eye which express the inverse proportional relation between $\theta_{SH,Pt}$ and σ_{Pt} when you consider only intrinsic mechanism. The purple dashed line is the corrected line from the black solid one with considering extrinsic contribution. On the left part (Moderately dirty region) the behavior of the $\theta_{SH,Pt}$ is well explained only by intrinsic contribution. On the other hand on the right part (Superclean region) $\theta_{SH,Pt}$ gradually differ from the black line and extrinsic contribution become more dominant.

butions for each sample by analyzing the data measured in different temperatures. We found a single intrinsic spin Hall conductivity (σ_{SH}^{int} = 1540 ± 100 $\Omega^{-1}\mathrm{cm}^{-1}$), that is the material's characteristic value, for Pt in all the studied range of σ_{Pt}, being in good agreement with the theoretical value [7]. By collecting all the data in our study, we have obtained for the first time the crossover from the intrinsic regime (moderately dirty) to the extrinsic one (superclean) in the SHE by changing the quality of Pt as shown in Fig. 2, equivalent to that for the AHE. Our results explain the wide dispersion in previously reported values of λ_{Pt} and $\theta_{\mathrm{SH,Pt}}$, and show a route to maximize the spin Hall angle. The smaller is σ_{Pt} (dirtier Pt), the larger will be $\theta_{\mathrm{SH,Pt}}$.

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Epitaxial Fcc Iron Thin Film Stabilized via Strain Relief from Steps

Komori Group

In hetero-epitaxially grown thin films where designed electronic and magnetic properties can be sustained, an appropriate choice of the substrate is crucial to keep the matching of the lattice symmetry and constant. However, transformation of the crystal structure from the epitaxial one

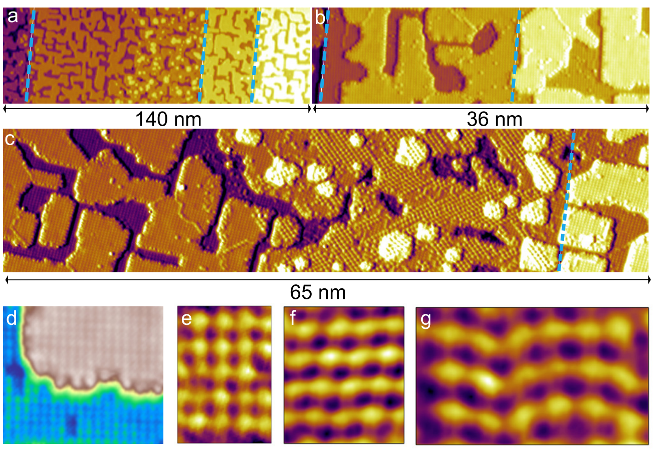

Fig. 1. STM images of the surface of an Fe film grown on a vicinal Cu(001) surface. Dotted lines indicate substrate step edges. (a) Image including three steps. (b) High-resolution image indicating growth of an fcc Fe film with a square surface lattice on a narrow terrace. Large protrusions on the terrace are adsorbed CO atoms. (c) High-resolution image indicating growth of both the fcc Fe film and an Fe film with complicated surface structure on a wide terrace. On the surface of lower terrace, the right region has a square lattice, and the left complicated lattices. About 80 % of the latter surface is covered by CO atoms forming local 2 × 2 structures. (d) Magnified image of the fcc Fe surface. (e-g) Magnified images of the left region in (c) with adsorbed CO atoms. Square (e), *p2mg*(2 × 1) (f) and, nano-martensitic (g) lattices are recognized.

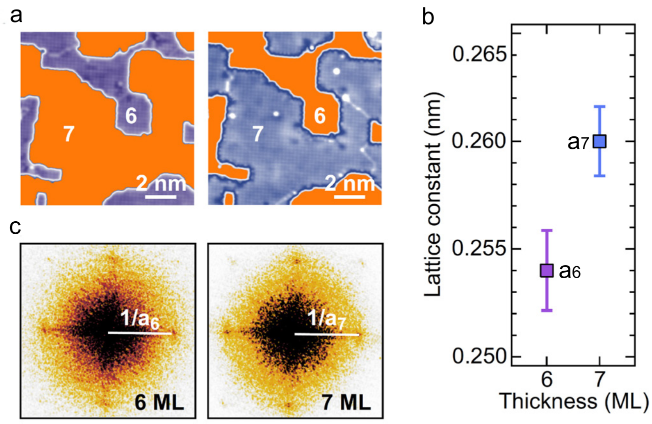

Fig. 2. (a) Atomically-resolved STM images in the fcc region with masked (left) 7 and (right) 6 ML thick Fe films. (b) FFTs of the images in (a). (c) The values of the surface lattice constant, a_6 and a_7, extracted from different STM images of the 6 and 7 ML fcc Fe films. The error bars represent the standard deviations.

to the bulk stable one with increasing the film thickness often disturbs the characterization and uses of intrinsic electronic and magnetic properties of the epitaxially-stabilized phases. We have found that high-density steps on a vicinal Cu(001) substrate can stabilize the epitaxial fcc Fe overlayer against transformation towards the bulk stable bcc phase with increasing the coverage [1]. Here, the steps serve as strain relievers for stabilizing the epitaxial film. The fcc Fe phase has experimentally and theoretically attracted a great interest over two decades because of its complex magnetic structures. The growth on a flat Cu(001) substrate are well defined in previous studies [2], and the structural transformation from fcc to bcc Fe is implied by the appearance of the surface reconstruction [3].

Figure 1 shows STM images of the surface of a Fe film on the Cu(001) surface. The average Fe thickness is 6.9 ML. The narrow terrace consists of 6 and 7 ML thick films and the surface atoms make a square lattice as in Figs. 1(a,b,d), indicating growth of the fcc Fe film. Each wide terrace has two regions; one is the same as the narrow terrace, and the other consists of 6, 7 and 8 ML thick films with complicated surface lattices with ~ 80 % coverage of adsorbed CO atoms as in Figs. 1(a,c,e,f,g). The latter region, where small areas of fcc(001), *p2mg*(2 × 1), nano-martensitic and bcc(110) lattices are seen, is found always at the lower side terrace of the atomic step. The width of the fcc Fe region increases with increasing the terrace width. This suggests the strain-relief due to the step edge stabilizes the fcc film even 7 ML thick.

The strain relief due to the step edge was directly confirmed using surface atomic images as in Fig. 2. On the fcc region, the surface lattice constant of the 7 ML film is ~ 2.4 % larger than that of the 6 ML film. The difference of the local electronic states observed by atomic-layer resolved scanning tunneling spectroscopy was attributed to that of the lattice constant [1].

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Step Conductivity Measured with the Proximity-Induced Superconducting Pair Correlation

Hasegawa and Kato Groups

The recent discovery of monolayer (ML) superconductivity revived the research on one-atom-thick metal layers formed on semiconductor surfaces. Electronically decoupled from the substrate, the metallic overlayers hold an ultimately-thin two-dimensional (2D) electron system, and combined with the broken inversion symmetry, they exhibit various fascinating features, such as Rashba spin-split surface states and valley spin polarized states. For these 2D systems, atomic steps on the substrate, whose presence is ubiquitous and unavoidable, play a significant role in the transport. Usually, for the characterization of electrical conductivity, an electrical current is injected from one side of the object and the transmitted one is detected in the other side. It is, however, technically very difficult to measure transport on such nano-scale structures. Here, we report on microscopic measurements of the electrical conductivity through a single ML-high step on a 2D metallic layer by inducing the superconducting pair correlation through the proximity effect, and by detecting its signal in tunneling spectra measured by scanning tunneling microscopy and spectroscopy (STM/STS).

The propagation of the pair correlation from a superconductor / normal metal (SN) interface into the normal metal has been investigated by using STM/STS. Near the interface in the normal metal, the single particle spectrum shows a dip at the Fermi energy (E_F), which is a good measure of the superconducting pair correlation. Through spatial mapping of the density of states (DOS) at E_F with nanometer spatial resolution, one can learn how the pair correlation is distributed in the normal metal. In general, the pair correlation decays with distance from the SN interface. By placing a surface step within the decaying area we can investigate how the superconducting coherence is affected by the presence of steps and through the comparison with theoretical analysis we can estimate the conductivity through that.

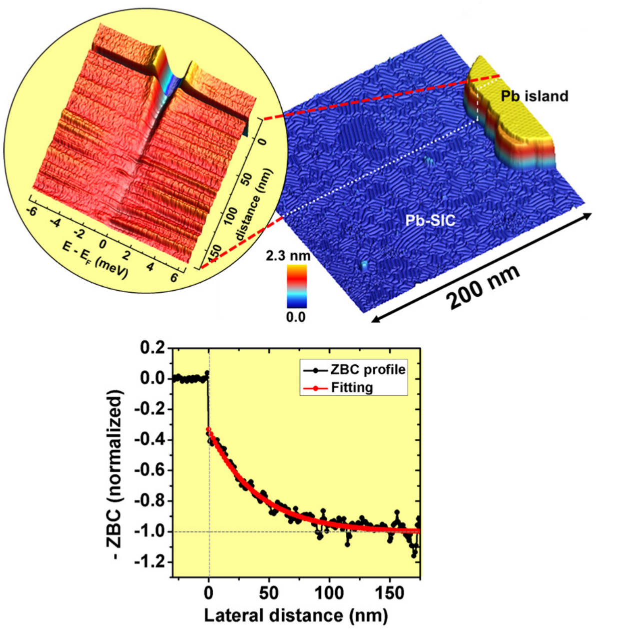

Fig. 1. (upper panel) 3D-rendered STM image showing an interface between an 8-ML Pb island and a SIC phase formed on a Si(111) substrate. A characteristic striped pattern can be seen in the SIC phase. (inset) Color-coded 200 tunneling spectra taken along the line from the Pb island to the SIC phase. (lower panel) ZBC profile around the SN interface. The red line is a fitted exponential function with the decay length of 40.5 nm.

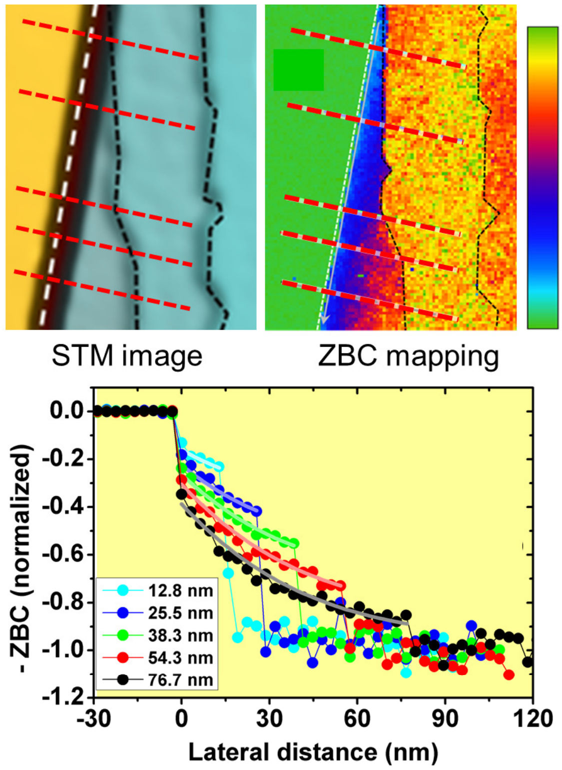

Fig. 2. (upper left) STM image of a Pb island formed on a SIC-phase-covered Si(111) substrate. The edges of the Pb islands and the steps of the SIC phase are highlighted with white and black dashed lines, respectively. (upper right) ZBC color map of the same area. (lower) ZBC profiles across the SN interface and the step edges measured along the red lines drawn in the STM and ZBC images. The length written on each plot is the terrace width measured along the corresponding line. The whitish-colored lines are theoretical curves calculated with the Usadel equation.

We investigated the conductivity of a striped incommensurate (SIC) phase, a ML Pb-induced structure formed on Si(111) surface, which is a 2D normal metal at our measurement temperature (2.15 K). Figure 1 is an STM image showing an 8 ML Pb island on an SIC phase. Tunneling spectra taken along the line, shown in the inset, indicate a superconducting gap in the Pb island and no gap in the SIC phase far from the island. In the SIC phase near the island a suppressed gap, induced by the proximity effect, can be seen. The depth in the DOS at E_F, which corresponds to zero-bias conductance (ZBC), decays exponentially with distance from the interface (the decay length ~ 40 nm), as shown in the lower panel of Fig. 1. From the decay length, the conductivity through the SIC phase was estimated using the Einstein relation as 1.87 mS/□ . The estimated conductivity is larger than the one measured by 4-probe method (0.77 mS/□). The larger conductivity is reasonable since the separation of the 4-probe method (20 μm) is much larger than the step separation and therefore the measured area includes the steps whereas ours do not.

To measure the step conductivity, we investigated the spatial distribution of the pair correlation around steps of the normal-metal layer close to superconducting islands. The left panel of Fig. 2 is an STM image showing 22 ML high Pb island (yellow) formed on a stepped SIC phase (light blue). The ML-high steps on the SIC phase are marked with black-dashed lines. The spatial mapping of ZBC taken in the same area is presented in the right panel of Fig. 2. In the conductance map the Pb island is colored green, which indicates zero ZBC and fully gapped superconductivity there. The 2D metallic layer far from the Pb islands is colored yellow, indicating no gap. The area surrounding the Pb islands is colored blue to red, implying a reduced DOS at E_F due to the proximity effect. Since a downward step edge is close to the island and the terrace width of the SIC area is less than the decay length, the decaying behavior of the proximity effect is strongly modified by the presence of the step edge. The bottom panel of Fig. 2 displays several cross-sectional ZBC profiles taken in the areas with various terrace widths.

In order to obtain the conductivity through the surface step we calculated the ZBC profiles using the Usadel equation and compared them with experimental results. For the calculation we considered a model composed of three regions: superconductor / normal metal / normal metal. In the model, we introduced the conductivity ratio through a step and metallic layer as a parameter. From the fitting the ratio was estimated as 10.9 ± 3.9 μm^{-1}. The ratio indicates that the contribution of the step resistance to the total surface resistance is quite significant. In the case of the stepped area shown in Fig. 2 (~90 nm step separation corresponding to the tilting of 0.20°), which was observed on a nominally (111)-oriented substrate, the step resistance contributed almost 50% of the total resistance in the direction perpendicular to the step edges.

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Stability of Titania-Terminated Surfaces in Water

Lippmaa Group

Photoelectrochemical water splitting can be used to collect solar energy and generate hydrogen gas from water. While this process offers an attractive pathway to a clean energy supply, the low energy conversion efficiency presents several challenging unsolved materials science problems. One of the requirements for a suitable photoelectrode material is long-term stability in water during an electrochemical reaction. Titanium oxides such TiO_2 and $SrTiO_3$ are two examples of water-stable oxide semiconductors that have been widely studied in this context. However, even for well-ordered single crystal surfaces, it is difficult to determine to what extent the electrochemical reaction affects the composition or structure of the photoelectrode surface.

The purpose of this work was to analyze the oxide electrode surface stability and the oxide-water interface structure by numerical simulations and the measurement of surface hydrophilicity, atomic-scale surface morphology, and the local water density. $SrTiO_3$ (001) single crystals with a $(\sqrt{13} \times \sqrt{13})$-R33.7° surface reconstruction were used for the experimental work. This surface is terminated by a partial TiO_2 double layer (Fig. 1a) that is chemically stable in water and the presence of the reconstruction pattern can

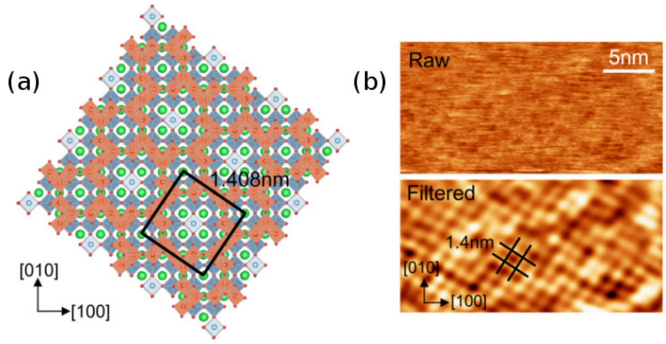

Fig. 1. (a) Surface model of the $SrTiO_3$ $(\sqrt{13} \times \sqrt{13})$ surface. Top layer Ti is shown in orange, second layer Ti in blue, Sr in green and O in red. (b) Raw and filtered FM-AFM images of the reconstructed surface measured in water.

be observed either by scanning probe or electron diffraction. The reconstructed $(\sqrt{13} \times \sqrt{13})$ surface can thus function as a stability marker when a crystal is subjected to various surface treatments. If the reconstruction remains detectable after a process step, we can be sure that the surface has not been structurally altered or etched. For a typical (1 × 1) $SrTiO_3$ surface, it would be much harder to detect structural alterations in the topmost unit cell of the crystal. A high-resolution atomic force microscope (AFM) image of the $(\sqrt{13} \times \sqrt{13})$ surface measured in water is shown in Fig. 1b. The presence of the expected periodicity shows that the surface structure is not damaged when exposed to water.

The hydration layer structure on the $(\sqrt{13} \times \sqrt{13})$ surface was simulated by density functional theory molecular dynamics to evaluate the surface stability of various crystal surface terminations. The simulation result shown in Fig. 2a indicates that a layered water molecule configuration may be expected to exist at the surface. The presence of a structured hydration layer was verified by frequency-modulation AFM in an electrolyte solution (Fig. 2b). The AFM tip was scanned laterally over the crystal surface a height scan was recorded at each lateral point, forming a depth map of water density at the surface. Two dark bands can be seen in the AFM frequency shift map in Fig. 2b, marked with M1 and M2. The density variation matches the simulation result, indicating that a stable hydration layer forms on the reconstructed $SrTiO_3$ surface and no chemical etching, even on a single atomic layer scale, could be observed. The presence of the reconstructed surface was verified after water exposure by high-energy electron diffraction.

Titania surfaces are known to exhibit photoinduced hydrophilicity, where the water contact angle drops dramatically upon ultraviolet illumination of a crystal surface. The

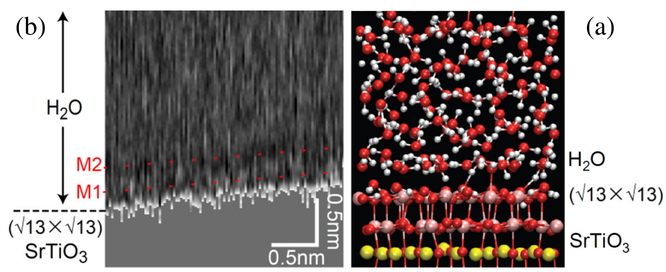

Fig. 2. (a) MD simulation of the water structure in the hydration layer above the $SrTiO_3$ $(\sqrt{13} \times \sqrt{13})$ surface. Sr is yellow, Ti is pink, O is red, and H is gray. (b) FM-AFM frequency shift map as a function of lateral position and distance from the surface. The local water density minima are marked M1 and M2.

hydrophilicity of the reconstructed $SrTiO_3$ surface was measured immediately after surface preparation in a vacuum chamber, showing that the surface is intrinsically superhydrophilic. A gradual contact angle increase occurs during several minutes of air exposure, but the superhydrophilic surface character can be regained by vacuum heating without the loss of the reconstructed surface structure. This indicates that the photoinduced hydrophilicity of the surface is related to surface contamination, rather than photoinduced structural degradation of the crystal. The work thus shows that $SrTiO_3$ surfaces terminated with a double TiO_2 layer are highly stable in water, even under ultraviolet exposure and can thus be used in photoelectrochemical water splitting cells that require long term electrode stability.

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Material Design of Luminescence from First-Principles

Sugino Group

Many-body Green's function methods have attracted considerable attention as emerging computational methods to allow prediction of excited states of a material from first-principles. Breakthrough was achieved by the algorithms developed for massively parallel supercomputers and by the approximations made for balancing the computational cost and accuracy. The software package developed by this group, for example, is now able to handle up to 200 atoms in a cell, sufficiently large for many applications, and provide in addition the wave function of the electron-hole pair (exciton) containing rich information of the excited states. The utilization of the exciton wave function, however, has been done infrequently, and in this context, this group proposed a method to obtain from the wave function a number of quantities that can characterize the excitons. The obtained quantities are found particularly useful in classifying the excitons into the local, charge-transfer (CT), Rydberg excitons [1], so that one may predict the luminescence dynamics induced by photoabsorption. This novel method opens possibility of a computational material design toward efficient luminescence.

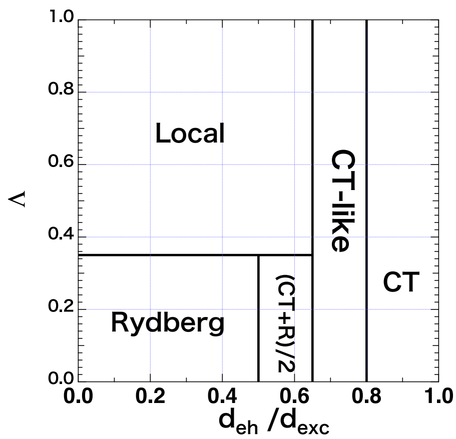

Fig. 1. Λ- d_{eh}/d_{exc} map proposed in Ref. [1] to classify excitons into local, charge-transfer (CT), Rydberg, and others such as CT-like excitons. This map has enabled to relate the exciton wave function with the characteristics of excitons, and thus relate the characteristics with the structure of a material, making it significantly easier to computationally design a luminescent material.

The exciton wave function is a six-dimensional quantity, which has been considered to carry too prodigious amounts of information. With increasing ability of modern supercomputers, however, it has become easy to use the wave function to obtain various quantities; for example, one can calculate the exciton binding energy by taking expectation value of the electron-hole interaction operator, the electron-hole separation d_{eh} from the distance between the electron and hole, and the exciton size from the square root of the distance. When using (a) a quantity characterizing the range of the exciton Λ and (b) the electron-hole separation distance d_{eh} relative to the exciton size d_{exc}, one can plot each excited state in a two-dimensional Λ- d_{eh}/d_{exc} map (Fig. 1), wherein excitons with different type are let distribute in a different region. This method was proven useful in our subsequent study on the photoabsorption spectra of the recently synthesized cycloparaphenylene molecules [2] and on the singlet-triplet splitting of the thermally activated delayed fluorescence (TADF) molecules [3].

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Giant Anomalous Hall Effect in the Chiral Antiferromagnet Mn_3Ge

Nakatsuji Group

Generally, the anomalous Hall effect is known to appear in ferromagnetic conductors and is proportional to its magnetization. Recently, however, the non-collinear antiferromagnet (AFM) Mn_3Sn is found to exhibit a large anomalous Hall effect despite its vanishingly small magnetization [1]. The observation indicates that a large fictitious field or Berry curvature exists in the momentum space. The anomalous Hall effect shows a sign change upon reversal of a small magnetic field less than 0.1 T. The soft response of the

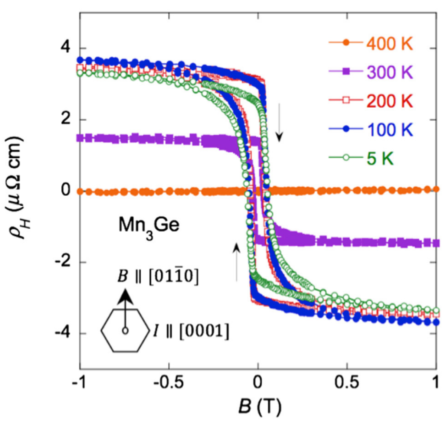

Fig. 1. Magnetic field dependence of the Hall resistivity in Mn_3Ge measured in B//[0110].

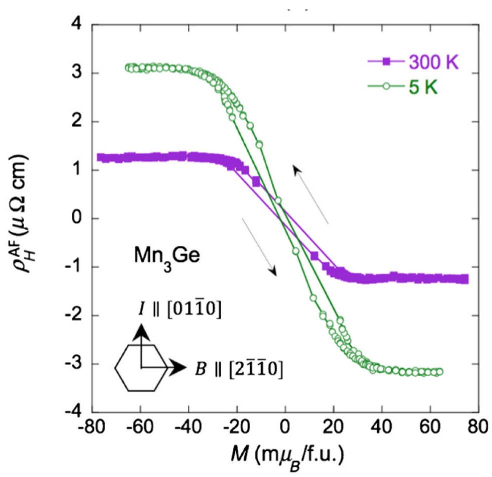

Fig. 2. Magnetization dependence of the field- and magnetization-independent part of the anomalous Hall resistivity $\rho^{AF}{}_H = \rho_H - R_0B - R_s\mu_0M$ at 5 and 300 K.

AHE to magnetic field should be useful for applications, for example, to develop switching and memory devices based on antiferromagnets. In addition, an antiferromagnetic Weyl semimetal state is theoretically predicted by a band calculation [2]. The large AHE may well come from a significantly enhanced Berry curvature associated with the formation of Weyl points nearby the Fermi energy E_F.

Here we report another example of the AHE in a related antiferromagnet, namely, in the hexagonal chiral antiferromagnet Mn_3Ge [3]. Our single-crystal study also reveals that Mn_3Ge exhibits a giant anomalous Hall resistivity ρ_{xz} ~ 4 μΩ cm, corresponding to a large Hall conductivity σ_{xz} ~ 60 Ω^{-1} cm^{-1}, at room temperature (See Fig. 1 and 2) [4]. The advantage of the measurements for Mn_3Ge allows us to observe a giant AHE at low temperatures since Mn_3Sn has a low-temperature noncoplanar magnetic phase observed at T < 50 K, where the in-plane AHE is strongly suppressed. As shown in Fig. 3, the conductivity in Mn_3Ge is enhanced with decreasing temperature without any phase transition at low temperature and shows the approximately 380 Ω^{-1} cm^{-1} at 5 K in zero field, reaching nearly half of the value expected for the quantum Hall effect per atomic layer with Chern number of unity (Fig. 3). The low temperature conductivity σ_{xz} is estimated to be three times larger than the maximum of the conductivity found in Mn_3Sn.

The observed giant AHE in the chiral antiferromagnet Mn_3Ge with a very small magnetization indicates that the material has a large fictitious field (equivalent to be > 200 T) in the momentum space without producing almost any perturbing stray fields in the real space. The fact that the large fictitious field may be readily controlled by the application of a low external field indicates that the antiferromagnet will be useful, for example, to develop various switching and memory devices.

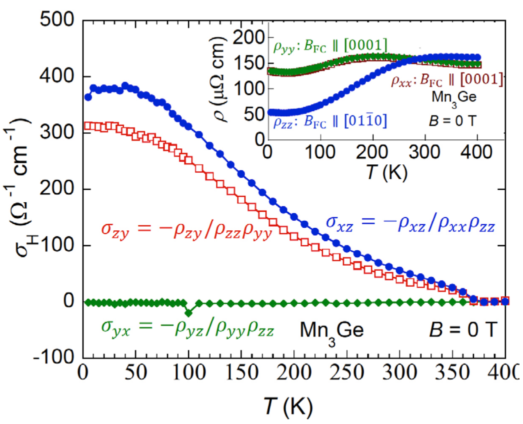

Fig. 3. Temperature dependence of the anomalous Hall effect under zero field. All the data are obtained at zero field after the field-cooling (FC) procedures made in the magnetic field B_{FC}. Directions of the field B_{FC} and electric current I used for the Hall resistivity measurements are shown in each figure.

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Geometrically Frustrated Magnetism in the Heisenberg Pyrochlore Antiferromagnets AYb_2X_4 (A = Cd and Mg, X = S and Se)

Nakatsuji Group

Quantum magnetism in geometrically frustrated magnets has recently attracted great interest. In 3D systems, one of the most prominent examples is the spin ice [1], which is based on Ising spins with ferromagnetic (FM) coupling on the pyrochlore lattice. Recent studies have found that quantum melting of spin ice may lead to the formation of a quantum spin liquid state with emergent topological excitations [2]. On the other hand, various types of quantum magnetism have been discovered in the pyrochlore oxides having the non-Ising type ground Kramers doublet. An antiferromagnetic (AF) pyrochlore magnet with isotropic bilinear exchange coupling between nearest neighbor

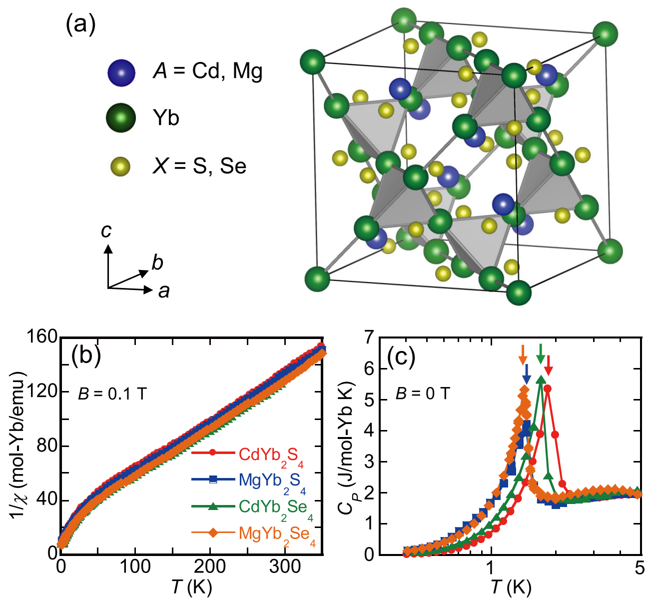

Fig. 1. (a) Crystal structure of the chalcogenide spinels AYb_2X_4 (A = Cd and Mg, X = S and Se). While the tetrahedrally coordinated nonmagnetic A sites form a diamond cubic sublattice, the magnetic Yb sites form a pyrochlore lattice with corner-sharing tetrahedra. Temperature dependence of (b) the inverse magnetic susceptibility $1/\chi$ measured under 0.1 T and (c) the total specific heat C_P at 0 T of the chalcogenide spinels AYb_2X_4.

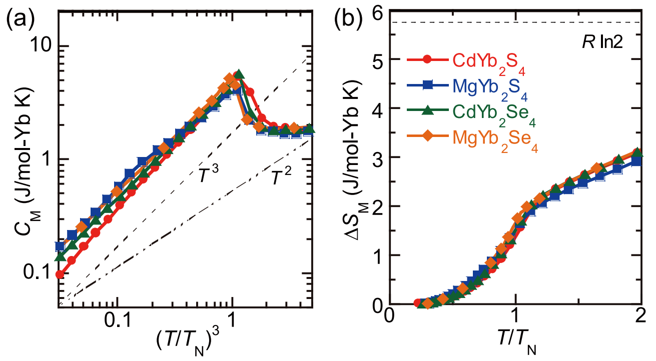

Fig. 2. (a) Full logarithmic plot of the magnetic specific heat C_M vs. $(T/T_N)^3$ of the chalcogenide spinels AYb_2X_4 (A = Cd and Mg, X = S and Se). The dashed and two dot-dashed lines indicate the slopes for the T^3 and T^2 laws, respectively. (c) T/T_N dependence of the magnetic entropy ΔS_M of the chalcogenide spinels AYb_2X_4.

Heisenberg spins has been predicted to host an equally exotic magnetic ground state [3]. As one of the archetypes, $Gd_2Ti_2O_7$ has attracted much attention and extensive studies have revealed frustrated magnetism with unconventional AF ordering [4].

However, other than Gd, most of the rare earth ions in the pyrochlore oxides are known to have a strong trigonal crystal electric field (CEF) that stabilizes either Ising or *XY* planar local symmetry. To develop a deep understanding of frustrated magnetism in Heisenberg pyrochlore antiferromagnets, we have focused on spinel type AF materials AR_2X_4, where the rare earth R forms the pyrochlore lattice with different coordination from the oxides and possesses a nearly cubic site symmetry that can lead to Heisenberg spins.

Experimental studies on polycrystalline samples of the Yb-based chalcogenide spinels AYb_2X_4 (A = Cd and Mg, X = S and Se) [5] have revealed frustrated quantum magnetism due to antiferromagnetically coupled Heisenberg spins on the pyrochlore lattice [6]. As shown in Fig. 1(a), the AYb_2X_4 families have the spinel structure with the space group $Fd\bar{3}m$. The Yb^{3+} forms the pyrochlore lattice with the six-fold chalcogen X^{2-} coordination and the point symmetry is D_{3d}. The CEF analysis indicates the Yb ground state has nearly Heisenberg spins with a strong quantum character of the ground-state doublet due to the mixing of important components including $\pm J_z = 1/2$. Our low-temperature susceptibility (Fig. 1(b)) and specific heat (Fig. 1(c)) measurements have revealed that all the materials exhibit AF order at T_N = 1.4 – 1.8 K, much lower temperatures than the AF exchange coupling scale of ~ 10 K. The magnetic specific heat C_M shows a T^3 dependence, indicating the gapless feature expected for a linearly dispersive Nambu-Goldstone mode in 3D systems [Fig. 2(a)]. Figure 2(b) indicates the temperature dependence of the entropy $\Delta S_M = S_M(T) - S_M(0.4\text{ K})$. The ΔS_M at T_N is strongly suppressed to ~30% of Rln2 due to the geometrical frustration. Muon spin rotation/relaxation (μSR) measurements have confirmed the commensurate and incommensurate ordered states in $CdYb_2S_4$ and $MgYb_2S_4$, respectively, and a small local field at the muon site, which indicate the significantly reduced size of the ordered moment in comparison with the bare moment size 1.33 μ_B/Yb, suggesting strong quantum fluctuations in the Yb-based chalcogenide spinels AYb_2X_4.

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Disordered Route to the Coulomb Quantum Spin Liquid: Random Transverse Fields on Spin Ice in $Pr_2Zr_2O_7$

Nakatsuji Group

As water freezes into ice, ordinal magnets become "solid" (magnetic ordered state), where all the spins are aligned along certain directions, by decreasing temperature. On the other hand, spins are fluctuating like in a liquid state even at very low temperatures in the theoretically predicted exotic state, quantum spin liquid. $Pr_2Zr_2O_7$ is a rare example of such quantum spin liquids, so-called quantum spin ice, where the 2-in 2-out ice rule is partially melted.

The research groups of Prof. Collin Broholm at Johns Hopkins University and Prof. Satoru Nakatsuji at ISSP have been collaborating on the study of the quantum spin ice material $Pr_2Zr_2O_7$. The research team has recently performed the inelastic neutron scattering experiments in $Pr_2Zr_2O_7$ to reveal the origin of the strong quantum fluctuations [1]. The momentum transfer, $\boldsymbol{q}$, dependent inelastic pattern at low energy region as shown in Fig.1 (a) indicates the spin ice correlations, which is consistent with the previous work [2]. On the other hand, $\boldsymbol{q}$ independent pattern appears at high energy region as shown in Fig.1 (c). The latter was found attributable to the splitting of the non-Kramers ground doublet of Pr^{3+} due to the crystal disorder. In fact, all of the

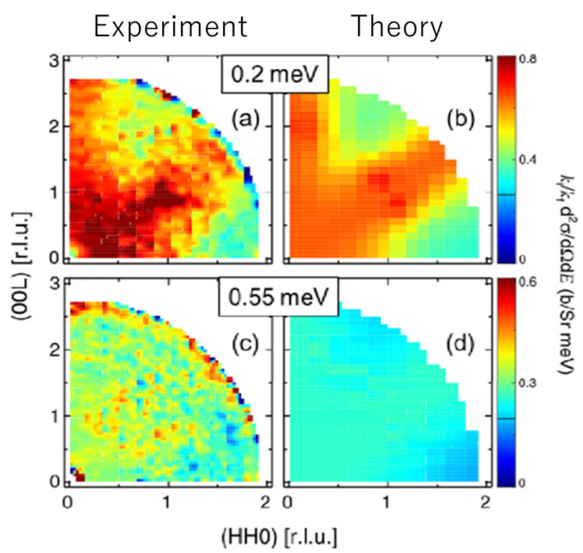

Fig. 1. Inelastic neutron scattering $\boldsymbol{q}$-map obtained from the experiment at 50 mK for (a) low energy (0.2 meV) region and (c) high energy region (0.55 meV) and the calculation for (b) 0.2 meV and (d) 0.55 meV.

results are well reproduced by the calculation assuming the classical spin ice in the transverse field coming from the structural disorder, which in fact stabilizes the quantum spin ice state.

It has long been known that the crystal disorder disturbs the spin liquid state by forming a spin glass state. This study causes the stir in this wisdom and provides key information to discover new quantum spin liquid materials, which can lead to the future applications such as quantum computer and spintronic devices using the entangled state of quantum spin ice.

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Pressure-Induced Magnetic Transition Exceeding 30 K in the Yb-based Heavy-Fermion β-$YbAlB_4$

Nakatsuji and Uwatoko Groups

Intermetallic heavy-fermion (HF) compounds, based mostly on Ce, Yb, or U, undergo a quantum phase transition at zero temperature induced by the competition between Kondo effects and intersite magnetic RKKY (Ruderman-Kittel-Kasuya-Yosida) interaction. In these materials, various types of exotic phenomena such as non-Fermi-liquid behaviors and unconventional superconductivity (SC) have been observed near a quantum critical point (QCP). The delicate balance associated with the QCP can be tuned by varying control parameters such as magnetic field, chemical doping, and external pressure. In particular, for the Yb-based HF systems, long-range magnetic order is expected to be stabilized at high pressure. This is because the 4f moments are generally known to become more localized by reducing volume, in sharp contrast to their Ce-based counterparts. For β-$YbAlB_4$, in which recently observed HF superconductivity at 80 mK and the QCP at zero field at ambient pressure [1-3], of interest is how unconventional quantum criticality observed without tuning, associated with magnetic order that is expected to emerge under high pressure.

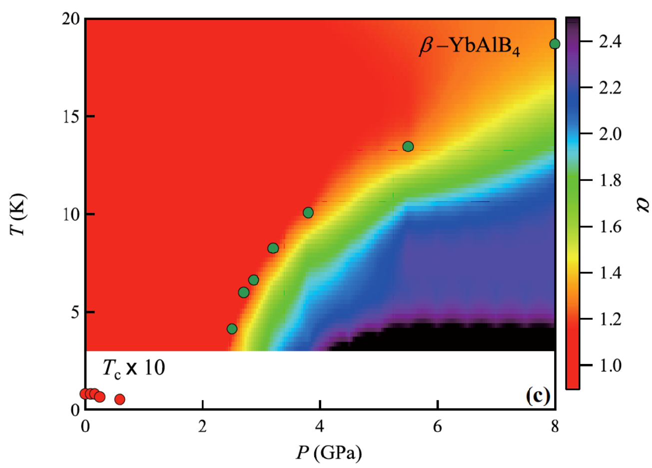

Fig. 1. Pressure-temperature phase diagram for β-$YbAlB_4$ with a contour plot of the power-law exponent α, which is defined using $\rho = \rho_0 + AT^{\alpha}$.

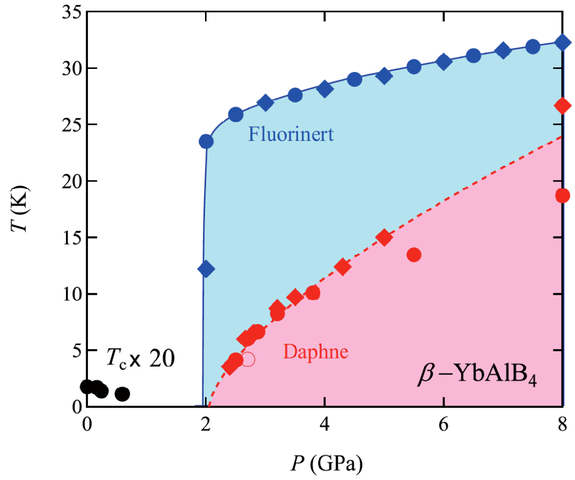

Fig. 2. Pressure-temperature phase diagram for β-$YbAlB_4$ using two different pressure-transmitting media, Daphne 7373 (red symbols) and Fluorinert (blue symbols), respectively. The phase-transition temperature T_M is determined from the anomalies in the temperature derivative of the resistivities, $d\rho_{ab}/dT$. Solid and open circles mark the transitions determined by the electrical resistance obtained from the cubic-anvil and piston cylinder- type pressure measurements, respectively. The blue solid line is a guide for the eye. The red dashed line is a fit of our data to the function of $(P - P_{c0})^{2/3}$ expected for a 3D antiferromagnetic ordering.

Here we report the results of our recent transport study on the HF superconductor $YbAlB_4$ under pressure [4]. Measurements of the electric resistivity $\rho(T)$ under pressure up to 8 GPa were performed on high-quality single crystals of the Yb-based heavy-fermion system β-$YbAlB_4$ in the temperature range $2 < T < 300$ K. In the resistivity data, we observed pressure-induced magnetic ordering above the critical pressure $P_c \sim 2$ GPa. (See Fig. 1) Moreover, the clear difference in the phase diagram of Fig. 2 under pressure using two types of pressure media indicates that the transition temperature may be further enhanced under application of uniaxial pressure. With pressure, this phase-transition temperature T_M is enhanced, reaching 32 K at 8 GPa, which is the highest transition temperature so far recorded for the Yb-based heavy-fermion compounds. The power-law exponent α in $\rho = \rho_0 + AT^{\alpha}$ below T_M gradually changes from 3/2 to 5/2 with increasing pressure from 2 to 8 GPa (See Fig. 1). In contrast, the resistivity exhibits a T - linear behavior in the temperature range $2 < T < 20$ K and is insensitive to pressure below P_c. In this pressure regime, the magnetization is also nearly independent of pressure and shows no anomaly above 2 K. Our results indicate that a QCP for β-$YbAlB_4$ is also located near P_c in addition to the strange metal region near the ambient pressure. While almost pressure independent resistivity and magnetization are observed in the pressure range $0 < P < 2$ GPa, the magnetic phase transition of β-$YbAlB_4$ was suddenly found at $P > 2$ GPa.

Significantly, the phase transition T_M of β-$YbAlB_4$ reaches 32 K under 8 GPa and is expected to be further enhanced at higher pressure. Such high magnetic transition temperatures over 10 K have never been achieved in Yb-based HF materials. Generally, because the *f*-electron moment is sufficiently localized, the magnetic ordering temperatures in HF compounds is often observed below around 10 K. In particular, that of Yb-based HF should be lower than that of Ce-based HF because the Yb *f*-electron is usufally more localized than that for Ce.

In previous work for β-$YbAlB_4$, it is reported that the state showing unconventional critical behavior (the SC phase and ambient-pressure quantum criticality) is separated from this magnetically ordered state by the Fermi-liquid phase [5]. Of high interest is the fact that the non-Fermi-liquid state at ambient pressure robustly persists up to a critical pressure of around 0.4 GPa. Generally, the HF compounds display quantum criticality at the border of magnetism. Thus, these are not features that are expected for magnetically mediated superconductivity. The Yb-based heavy-fermion with non-integer valence may exhibit critical phenomena with not only spin fluctuations but also valence fluctuations at quantum criticality. This valence fluctuation is presumably the key to understanding the origin of the extensive region of the quantum criticality found near ambient pressure and the extremely high ordering temperature of around 30 K found under high pressure.

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Orthogonal Magnetization and Symmetry Breaking in Pyrochlore Iridate $Eu_2Ir_2O_7$

Nakatsuji Group

It has long been known that magnets are magnetized along the external magnetic field. However, magnetization perpendicular to the field is also expected according to thermodynamic theory. This orthogonal magnetization is so tiny that no study so far had been able to detect it experimentally.

Tian Liang and their collaborators in Princeton University and the Massachusetts Institute of Technology in the U.S. and the research group led by Professor Satoru Nakatsuji noticed slight changes in magnetization in the pyrochlore iridate $Eu_2Ir_2O_7$ following metal-insulator transition accompanied by the all-in all-out magnetic order (Fig 1 (a)). Usually, only the magnetic component parallel to the field is detected when measuring magnetization; the researchers thus attempted to detect magnetization perpendicular to the field by measuring the torque magnetometry, or force producing the tendency of magnets to rotate in a magnetic field, by cantilever and found that orthogonal magnetization abruptly increases below the metal-insulator transition temperature. The group determined that orthogonal magnetization derives

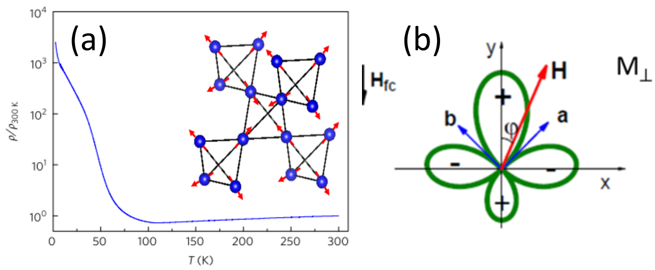

Fig. 1 (a) Metal insulator transition observed in the temperature dependence of the resistivity for $Eu_2Ir_2O_7$ (main panel) and all-in all-out magnetic order (inset). (b) Octupole moment obtained from the orthogonal magnetization.

from the special spatial distribution of the magnetic charge (magnetic octupole, Fig. 1 (b)), and that this is the origin (order parameter) of the metal-insulator transition.

This tiny orthogonal magnetization is instrumental in initiating the transition of metal into insulator, and carries the potential for use in such applications as magnetic memory and magnetic sensors. This work also gives a hint how to control the transport properties in Pyrochlore iridate, where the mysterious spontaneous anomalous Hall effect in nonmagnetic metallic phase with topological band structure is observed [2].

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Helical Magnetism in the Vicinity of the Superconducting State in MnP

Uwatoko, Kato, and Sugino Groups

MnP exhibits superconductivity under pressure with a maximum transition temperature of ~1 K at 8 GPa [1]. Since Mn has the spin degree of freedom, elucidating the magnetic contribution to the superconductivity is crucial to understand the pairing mechanism. In particular, the magnetic state in the vicinity of the superconducting phase needed to be clarified. In order to study the pressure dependence of the magnetic ground state in MnP, high pressure neutron diffraction measurements were performed up to 3.8 GPa [2]. The high pressures below and above 2 GPa were generated with a self-clamped piston-cylinder cell and a palm cubic anvil cell, respectively.

MnP shows a ferromagnetic order below T_c ~ 290 K followed by a helical order (helical-*c*, Fig. 1a) with the spins lying in the *ab* plane and the helical rotation propagating along the *c* axis below T_s ~ 50 K at ambient pressure [3,4]. With increasing pressure, we found that both T_c and T_s are gradually suppressed and the helical order disappears at ~1.2 GPa. At intermediate pressures of 1.8 and 2.0 GPa, the ferromagnetic order first develops and then is suppressed at a lower temperature (T*). New incommensurate magnetic peaks split along the *b* axis appear below T*. The new

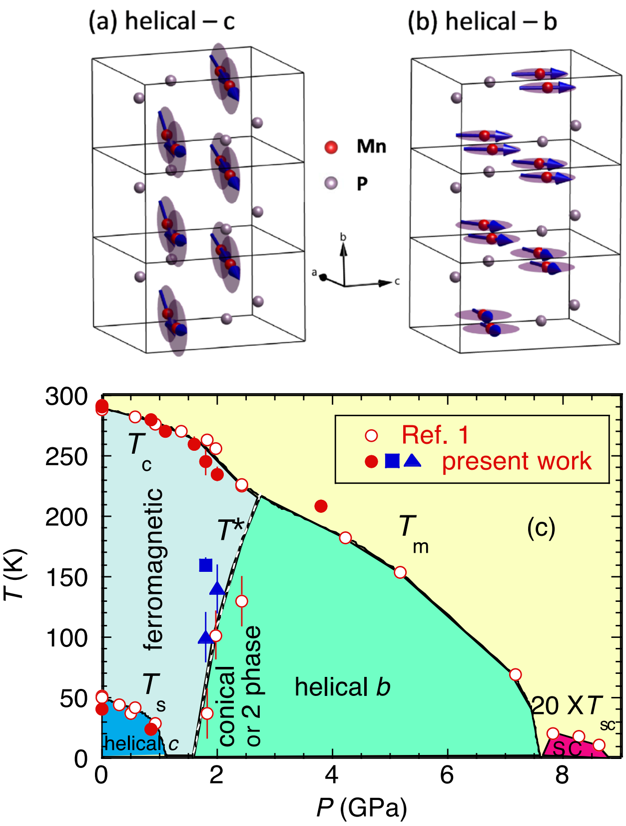

Fig. 1. Helical spin structures under low (helical-c) (a) and high pressures (helical-b) (b). (c) Temperature-pressure phase diagram. The open and filled symbols represent the data in Ref. 1 and the present results, respectively. The filled square is the temperature where the incommensurate magnetic peaks start to develop. The filled triangles are the temperatures where the commensurate magnetic signal starts to decrease.

magnetic peaks originate from another helical structure, which hosts the spins in the *ac* plane and the propagation along the *b* axis (helical-*b*, Fig. 1b). Since the ferromagnetic component still remains, the magnetic ground state is a conical or two-phase (ferromagnetic and helical-*b*) structure. Above 2 GPa, a magnetic transition from paramagnetic directly to the helical-*b* states appears below T_m. The magnetic phase diagram is shown in Fig. 1c. The magnetic state close to the superconducting phase was found to be the helical-*b* structure.

In the helical-*b* phase, the helical transition temperature and the ordered moment decrease with increasing pressure. On the other hand, the magnetic incommensurability becomes larger with increasing pressure, indicating that antiferromagnetic interactions become more dominant than ferromagnetic ones, which are influential at low pressures. This suggests that antiferromagnetic fluctuations might be connected to the superconducting pairing mechanism in MnP.

At ambient pressure, MnP is considered to be a localized *d* electron spin system of Mn, interacting with itinerant *s* electrons of P, which is reproduced by the *s*-*d* model. Applying pressure causes more enhanced orbital overlap between Mn atoms, which gives rise to more itinerancy. The density-functional theory (DFT) calculation shows that the pressure gradually reduces the Mn moments and finally leads to a nonmagnetic state [5]. The Mn moment estimated at 3.8 GPa and 5 K is $0.84(14)\mu_B$, which suggests that the lattice compression is very close to the critical regime where the large *d*-*d* overlapping makes the system more itinerant and the spontaneous magnetization does not occur [5]. In Ref. 5, only collinear spin structures (one ferromagnetic and three antiferromagnetic structures) are considered as potential ground states. The ferromagnetic structure was found to be most stable in MnP until the magnetic moment disappears with compression. This result does not exclude the possibility of a noncollinear magnetic state between ferromagnetic and itinerant nonmagnetic states. Further theoretical studies on the magnetic state in the vicinity of the itinerant nonmagnetic state are desirable.

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Mechanism of High-Temperature Superconductivity in FeSe Unveiled via the Magneto-Transport Measurements under High Pressures

Uwatoko and Yamashita Groups

Recently, the layered β-FeSe has aroused tremendous research interest due to the observations of many intriguing physical properties. At ambient pressure, FeSe develops an electronic nematicity below T_s = 90 K, which, however, is not accompanied by any long-range magnetic order. The absence of static magnetism in FeSe is in strikingly contrast with the majority of parent compounds of FeAs-based superconductors. Interestingly, it was found that a static magnetic order emerges at pressures above 1 GPa and the transition temperature T_m increase concomitantly with the

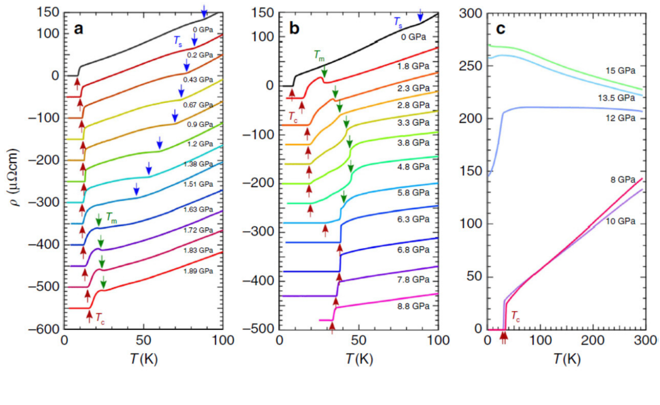

Fig. 1. Temperature dependence of resistivity ρ(T) in FeSe single crystals under high pressure. (a) ρ(T) curves below 100 K at different pressures up to 1.9 GPa measured in the PCC. (b) ρ(T) up to 8.8 GPa measured with the CAC. (c) ρ(T) up to 15 GPa measured with a smaller CAC. Except for (c) the ρ(T) curves are vertically shifted for clarity. The resistive anomalies at transition temperatures T_s, T_m, and T_c are indicated by the arrows.

superconducting transition temperature T_c up to 2.5 GPa. The relatively low $T_c \approx 9$ K of FeSe at ambient pressure can be enhanced significantly to $T_c^{max} \sim 40$ K at about 7 GPa, however, the evolution of $T_m(P)$ and its relationship with T_c remains largely unknown for P > 2.5 GPa due to the constrains of high-pressure techniques.

Thus, a comprehensive T-P phase diagram of FeSe is highly desirable in order to achieve a better understanding on the interplay of high-T_c superconductivity with magnetism and/or nematicity, which is commonly believed as an essential issue for the iron-based superconductors. For this purpose, we have carried out a detailed magneto-transport study on the FeSe single crystals up to 15 GPa by using the piston-cylinder cell (PCC) and the cubic-anvil-cell (CAC) apparatus; the latter has the merits of good hydrostaticity and large pressure capability.

Figure 1(a) displays the temperature dependence of resistivity ρ(T) for FeSe single crystal under pressures up to 1.9 GPa measured with PCC. We can see clearly that the nematic order at T_s manifested as an upturn in ρ(T) is suppressed gradually by pressure and smears out above 1.5 GPa. Nearly at the same pressure, another upturn anomaly appears at $T_m = 20$ K corresponding to the emergence of static magnetic order, and T_m increases gradually with pressure. In this pressure range, T_c defined as the zero-resistivity temperature first increases, and then decreases slightly before raising again. ρ(T) data shown in Fig. 1(b) measured with CAC can further track the evolutions of T_c and T_m. As can be seen, T_m increases gradually with pressure, but the upturn anomaly becomes weaker, and changes to a downward anomaly at 2.8 GPa. T_m reaches the maximum of 45 K at ~5 GPa, above which T_m disappears quickly and merges with T_c. Within the pressure range where T_m increases, T_c keeps nearly unchanged at ~20K, and then the suppression of T_m is accompanied with a sudden enhancement of T_c. The maximum T_c of 38.3 K is achieved at 6.3 GPa where the magnetic order just collapses. Above 6.3 GPa, T_c decreases slowly with pressure until ~ 12 GPa, above which FeSe adopts a three-dimensional NiAs-type structure and becomes semiconducting.

We have further performed measurements of ρ(T) under various magnetic fields for each pressure. The insensitivity of T_m to external magnetic field rules out the possible cause of resistivity drop at T_m due to the onset of superconductivity. In addition, we also measured the ac magnetic susceptibility χ(T) up to 8.8 GPa to determine T_c and obtained nearly consistent results with resistivity.

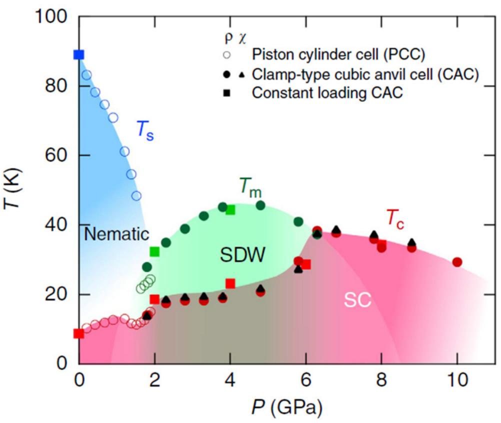

Fig. 2. T-P phase diagram of bulk FeSe. The structural (T_s, blue), magnetic (T_m, green), and superconducting transition temperatures (T_c, red and black) as a function of hydrostatic pressure in high-quality single crystals are determined by anomalies in resistivity ρ(T) and ac magnetic susceptibility χ(T) measured in the PCC and CAC.

Based on these above results, we constructed the most comprehensive T-P phase diagram of FeSe as shown in Fig. 2, from which we can see explicitly how the three competing orders evolve under pressure. The application of high-pressure destabilizes the nematic order and then induces the long-range magnetic order, confirming the competing nature of these two electronic orders. When T_s is completely suppressed around 2 GPa, T_c experiences the first step increase to ~20 K. But T_c keeps nearly constant when T_m increases with pressure, which demonstrates the competing nature of magnetic order with superconductivity. The magnetic order is finally destabilized upon further increasing pressure to around 6 GPa when T_c undergoes a sudden jump to ~40 K.

For the first time, we uncover the dome shape of magnetic phase superseding the nematic order, and demonstrate that the high-T_c superconductivity in FeSe is achieved by suppressing the long-range magnetic order. This is quite similar with the situations seen in the FeAs-based superconductors. To achieve a better understanding on the importance of magnetic fluctuations, further studies on the electronic structure of FeSe under high pressures are needed. It is also interesting to note that the obtained phase diagram highlights unique features of FeSe among the iron-based superconductors, but bears some resemblance to that of high-T_c cuprates.

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Absence of Superconductivity in the Collapsed Tetragonal Phase of KFe_2As_2 under Hydrostatic Pressures

Uwatoko Group

High pressure phase diagram of the tetragonal KFe_2As_2 remains controversial because of the strong sensitivity of superconducting transition temperature (T_c) depending on the type of the pressure cells and the pressure transmitting medium. Specially, the superconductivity of the collapsed tetragonal KFe_2As_2 is an open question since there are no zero resistivity state in the previous studies [1-3], presumably due to the pressure inhomogeneity or the non-hydrostaticity. To resolve these issues pertaining to this intriguing compound, we studied the temperature dependence of resistivity on KFe_2As_2 single crystals down to 20 mK under various much improved hydrostatic pressures up to 17.5 GPa generated in a cubic anvil cell.

Figure 1 shows the superconducting phase diagram and the superconducting transition widths of KFe_2As_2 under pressure with the previous data for comparison.

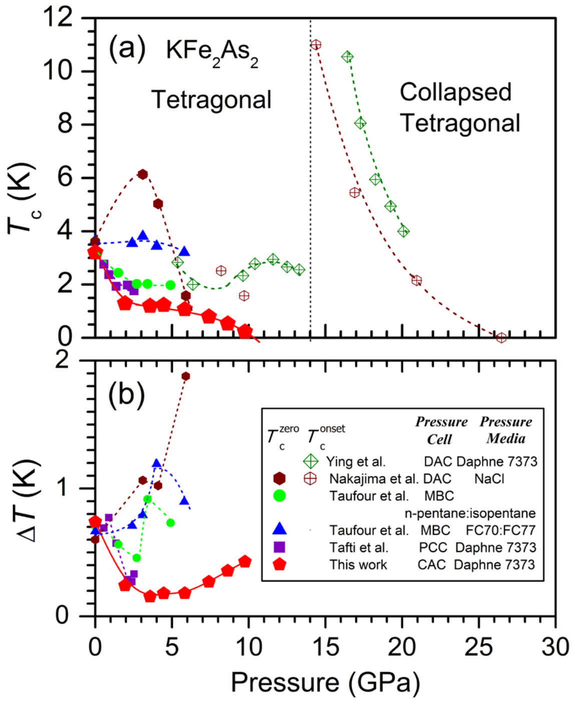

Fig. 1. (a) Temperature-Pressure phase diagram of KFe_2As_2 a. The solid and open symbols represent the zero resistivity state temperature T_c^{zero} and the onset temperature T_c^{onset} of superconducting transition, respectively. (b). ΔT_c (= T_c^{onset} - T_c^{zero}) as a function of pressure. "DAC", "MBC", "PCC", "CAC" represent diamond anvil cell, modified Bridgeman method, piston cylinder cell, and cubic anvil cell, respectively.

Pressure dependence of T_c has several distinct features: firstly, superconducting transition width ΔT_c becomes much narrower in the same pressure region. As the pressure increases, ΔT_c decreases and is ~ 0.2 K for $1.9 < P < 5.8$ GPa; and zero resistivity state retains up to 11 GPa where the superconducting state disappears. While in other reports, the superconducting transition becomes broad evidently as the pressure increases and ΔT increases to ~ 0.5-2 K depending on the pressure apparatus; zero resistivity state cannot be achieved above 7 GPa. Secondly, T_c obtained is lower than others in the same pressure regions in Fig. 1(a). As proposed, T_c of tetragonal KFe_2As_2 depends sensitively on pressure conditions and was enhanced if under a less hydrostatic condition [3]. These characteristic suggests a much improved hydrostatic pressure condition in a cubic anvil cell in comparison with the piston cylinder cell (PCC) or diamond anvil cell (DAC) under higher pressure. We examined the resistivity of KFe_2As_2 in the pressure region of $14 < P < 17.5$ GPa, however, superconductivity does not appear down to 2 K, which are contrary to the previous results using DAC [1,2]. In striking contrast to previous reports in Fig. 1, no superconducting phase emerges upon further increasing pressures until the collapsed tetragonal KFe_2As_2 forms and it was argued that such a discrepancy can be attributed to the different pressure apparatus or homogeneity.

We studied the temperature dependence of resistivity $\rho(T)$ under pressures by adopting an empirical formula $\rho = \rho_0 + A_1T + A_2T^2$ to construct a qualitative relation between the evolution of temperature coefficient and the T_c. Here, the T^2 term is to describe the Fermi liquid state and the T-linear term is associated with the electronic correlations and scattering process such as the electron-boson interaction and/or critical fluctuations near QCP. The parameters were presented Fig. 2. The residual resistivity ρ_0 decreases monotonically, and starts to increases at 14 GPa, then jumps to nearly three times with the pressure increasing up to 17.5 GPa, which is sharply different from the reports by using DAC [1]. As the pressure increases, A_1 decreases linearly and becomes almost zero around 11 GPa, coinciding with the suppression of T_c. This close connection between T_c and A_1 suggests that the scattering mechanism leading to the T-linear term play an important role for the appearance of SC in KFe_2As_2. On the other hand, A_2 decreases rapidly with approaching P_{c1}, and then gradually decreases with further increasing pressure. Furthermore, this observation is in agreement with a magnetic quantum critical point located at a negative pressure [4]. Incidentally, the shallow minimum of T_c near ~ 2 GPa is not explicable in terms of the pressure dependence of A_1 and A_2. Other factors such as pressure variation of the density of state at the Fermi level, balance between intra- and inter-Fermi-surface-pockets scattering affect T_c. The combined interplays of those factors would be important to fully understand the evolution of T_c under pressure.

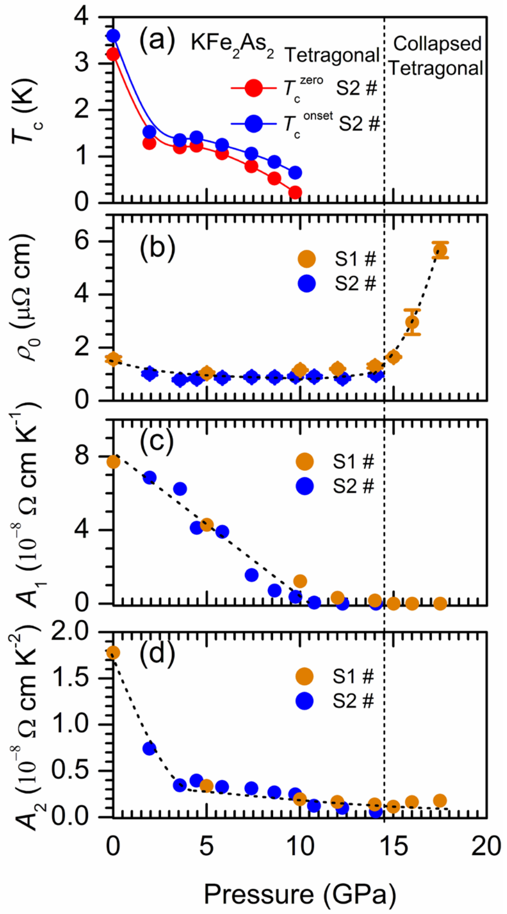

Fig. 2. The evolutions of parameters under pressure: (a) T_c^{onset} and T_c^{zero}; (b) ρ_0; (c) A_1; (d) A_2. The dashed line indicated phase transformation at lower temperature.

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Morphology of High-Genus Fluid Vesicles

Noguchi Group

The nucleus of a eukaryotic cell is surrounded by a nuclear envelope. The nuclear envelope consists of two bilayer membranes connected by many lipidic pores, which are supported by a protein complex called nuclear pore complex (NPC). Nuclear pores have an approximately uniform distribution in the nuclear envelope. Hence, the nuclear envelope is a spherical stomatocyte with a high genus. In order to clarify the formation mechanism of the nuclear envelope, we simulated the morphology of high-genus vesicles by dynamically triangulated membrane methods.

First, we investigated the vesicle morphology of genus $0 \leqq g \leqq 8$ in the absence of NPCs (see Fig. 1(a)–(f)) [1]. For $g \geqq 3$, bending-energy minimization without volume or other constraints produces a circular-cage stomatocyte, where the pores are aligned in a circular line on an oblate bud (see Fig. 1(a)). As osmotic pressure is imposed to reduce the vesicle (perinuclear) volume, the vesicle transforms to the spherical stomatocyte (nuclear envelope shape) (see Fig. 1(d)). In the lipid vesicles, the area difference ΔA of two monolayers of the bilayer is different from the preferred value ΔA_0 determined by the lipid number of both monolayers. This effect is taken into account by the area-difference elasticity (ADE) energy: $K_{\rm ade}(\Delta A - \Delta A_0)^2/2$. With increasing ΔA_0, the vesicle transforms from the circular-cage stomatocyte into discocyte continuously via pore opening (see Fig. 1(b)) at the large volume as seen in genus-0 vesicles. Surprisingly, however, at the small volume, the vesicle exhibits a discrete transition from polyhedron to discocyte (see Figs. 1(e) and (f)). Thus, the pore arrangements change the character of shape transitions.

Next, we modeled the pore size constraint by the NPC as a ring which the membrane cannot penetrate [2]. When the pore is restricted as a small size, the aligned pores move to the end of the vesicle under the bending-energy minimization as shown in Fig. 1(g).

Interestingly, the pore-constraint itself rather presents the formation of the spherical stomatocyte. We found that the spherical stomatocyte is formed by a small perinuclear volume, osmotic pressure within nucleoplasm, and/or repulsion between the pores (see Fig. 1(h)). We consider the osmotic pressure by nucleosomes and nuclear proteins in nucleoplasm is the main source to stabilize the nuclear shape. When the ADE energy is accounted, the endoplasmic-reticulum-like tubules can grow from the spherical stomatocyte (see Fig. 1(i)).

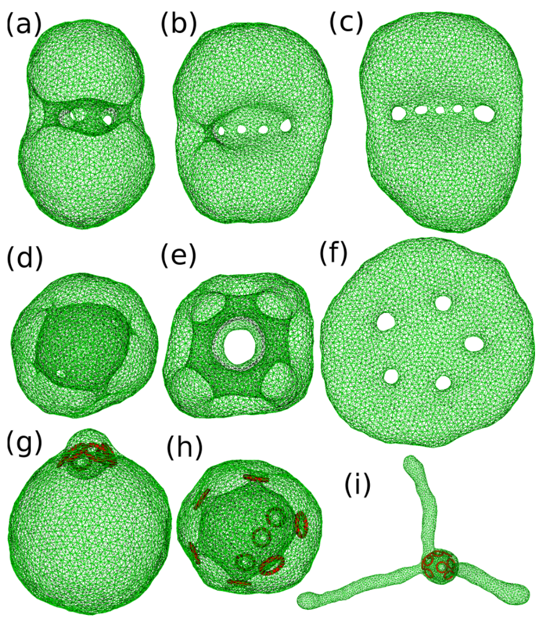

Fig. 1. Snapshots of high-genus vesicles (a–f) with no pore-size constraint and (g–h) with pore-size constraint. (a–g) g = 5. (h,i) g = 8.

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H. Noguchi

Dynamics of Hydrogen Atoms in Nanocrystalline Palladium Hydride

Yamamuro Group

Palladium hydride (PdH_x) is the most popular metal hydride which has been investigated by many physicists and chemists. It has been remarked also from industrial points of view, *e.g.*, hydrogen storage, filters, sensors, catalysts, etc. The physical and chemical properties of nanometer-sized materials have also been actively studied since they are often different from bulk properties owing to their size and/or surface effects. We have performed calorimetric [1] and neutron diffraction [2] studies on nanocrystalline PdH_x and PdD_x. In bulk samples, H atoms are located at the octahedral (O) sites in an fcc lattice (see the inset of Fig. 1). We found that H atoms occupy not only the O sites but also the tetrahedral (T) sites in the subsurface region of nanoparticles.

Recently, we conducted the quasielastic neutron scattering (QENS) and inelastic neutron scattering (INS) works on bulk and nanocrystalline PdH_x [3,4]. These neutron scattering methods are very powerful to explore the dynamics of hydrogen atoms owing to a large incoherent scattering cross section for a H atom. The QENS experiments were performed on HFBS, DCS and NSE at NCNR, NIST (USA) and TOFTOF at FRM II, TUM (Germany), and the INS experiment on 4SEASONS at MLF, J-PARC (Japan).

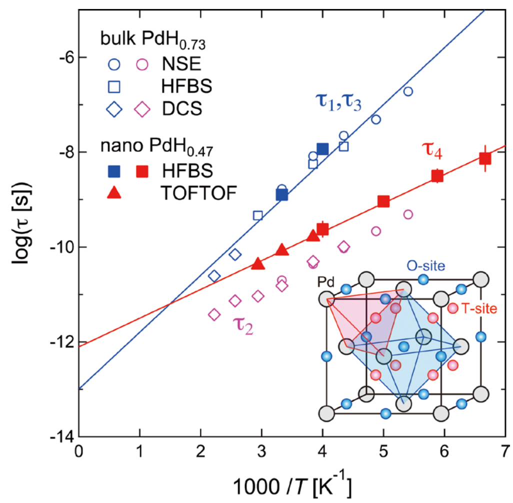

Fig. 1. Arrhenius plots of the relaxation times for the hydrogen motions in nanocrystalline $PdH_{0.47}$ and bulk $PdH_{0.73}$. All of the plotted data are the values at Q = 0.8 Å^{-1}. The solid lines represent the results of the fits assuming the Arrhenius law. The inset shows the locations of interstitial hydrogen atoms in an fcc Pd lattice; octahedral (O) sites (1/2,1/2,1/2) and tetrahedral (T) sites (1/4,1/4,1/4).

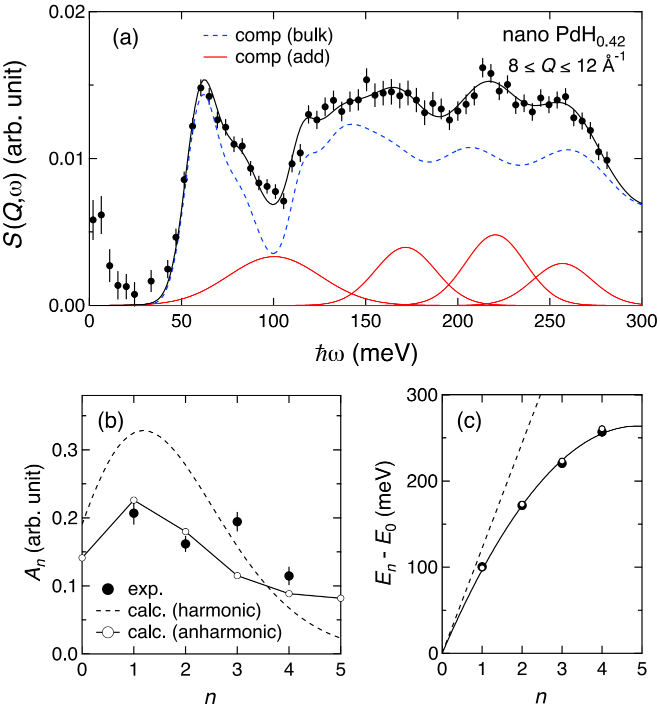

Fig. 2. (a) Inelastic neutron scattering spectrum for nanocrystalline $PdH_{0.42}$ at 10 K. (b) Intensity and (c) excitation energy against a quantum number n.

Figure 1 shows the temperature dependence of the relaxation times of the hydrogen motions in bulk and nanocrystalline PdH_x [3]. These values were obtained by fitting the QENS spectra to Lorentz functions (τ is an inverse of half width at half maximum) or exponential functions (for NSE data). In the bulk sample, τ_1 and τ_2 are associated with the O-O jump motions among the ground states and among the first excited states, respectively. In the nanocrystalline sample, τ_3, which is comparable with τ_1, may be due to the O-O jumps in the interior region of the nanocrystals. On the other hand, τ_4, which is a novel relaxation, may be due to the T-T jumps at around the subsurface of the nanocrystals taking the previous structural information [2] into consideration.

Figure 2(a) presents the INS spectrum of nanocrystalline $PdH_{0.42}$ [4]. The spectrum was fitted with the combination of the spectrum of the bulk $PdH_{0.73}$ (dashed curve) and the additional excitations (solid curves). The additional component was represented by multiple Gaussians taking peak positions, intensities and widths as fitting parameters. The estimated intensities and averaged excitation energies are displayed in Fig. 2(b) and (c). Dashed curves represent the expectation from the quantum harmonic oscillator model (QHO) with $h\nu_0$ = 122 meV. Obviously, the QHO model does not reproduce the experimental results; the data were roughly reproduced by a highly anharmonic trumpet-like potential. The additional excitations are attributed to the H vibrations at the T sites in the subsurface region. Thus, by using neutron scattering techniques, we have obtained structural, diffusion, and vibrational data which are consistent with each other.

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Novel Quantum State in a Breathing Pyrochlore Antiferromagnet

Masuda Group

In geometrically frustrated magnet, a macroscopic degeneracy remains even at zero temperature as long as the geometry is preserved. Such a situation contradicts the third law of thermodynamics and small perturbations, which can induce non-trivial quantum states, play an important role in avoiding the breakdown of the basic law. A classic example of the violation of the third law is given by a regular tetrahedron of S = 1/2 Heisenberg spins; this has a nonmagnetic ground state with a two-fold degeneracy. In nature, however, neither perfect isolation nor absence of coupling to other degrees of freedom is achieved and a non-degenerate state is induced by a perturbation. The search for a simple and isolated system is a challenge to the third law, leading to discovery of new state of matter at very low temperatures. $Ba_3Yb_2Zn_5O_{11}$ is a rare experimental realization of non-distorted regular tetrahedron spin system as shown in Fig. 1. Magnetic Yb^{3+} ions form breathing pyrochlore lattice, and no phase transition was reported at T > 0.38 K [1]. Crystal field excitation measured by using HRC spectrometer in the energy range of $\hbar\omega$ < 150 meV exhibited that the Yb^{3+} ion is regarded as an effective spin S = 1/2 with small easy-plane anisotropy [2]. We, then, study low energy excitations to identify the ground state of the spin tetrahedra in the real world [3].

The INS spectrum at the base temperature in Fig. 2(a) shows four flat peaks; the excitations are sharp and the system is regarded as isolated. The spectrum is reproduced by the spin tetrahedron model with J_x = -0.57 meV, J_z = -0.56 meV, J_{DM} = 0.11 meV as shown in Fig. 2(b), and the system includes large Dzyaloshinskii-Moriya (DM) interaction. The DM interaction hybridizes the ground state with the excited ones, leading to the change of selection rule of INS spectrum, but it does not lift the two-fold degeneracy of the ground state in the isolated spin tetrahedron. To observe the real ground state, we measured heat capacity down to very low temperature and estimated the change of the entropy. As shown in Fig. 2(c) the entropy gradually decreases with the temperature and reaches almost zero,

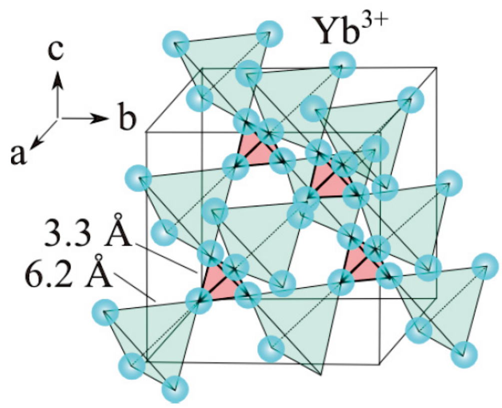

Fig. 1. Crystal structure of $Ba_3Yb_2Zn_5O_{11}$. Regular tetrahedra of Yb^{3+} ions form breathing pyrochlore lattice.

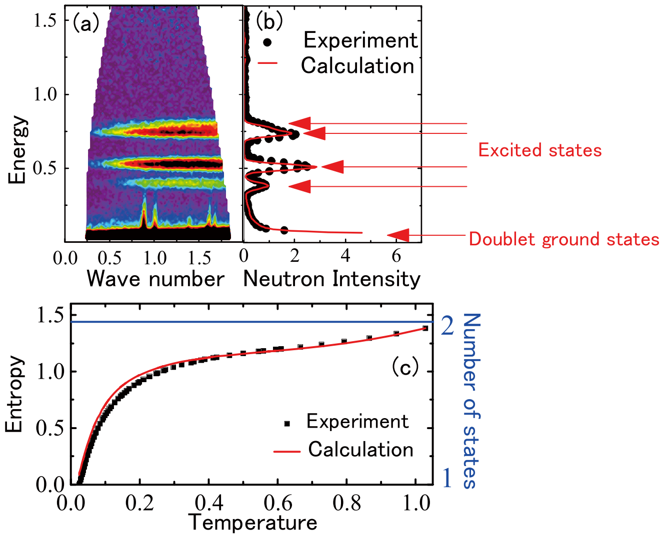

Fig. 2. Neutron spectrum and entropy change of $Ba_3Yb_2Zn_5O_{11}$. (a) Spectrum measured at 1.5 K. (b) Neutron intensity of the experiment and that of the calculation of the spin tetrahedron model (see the text in detail). (c) Entropy change. Selection of the ground state is observed.

meaning that a unique ground state is selected. Nature, thus, realizes a novel spin liquid state thorough a perturbative term. As a candidate state, a spin liquid having partial dimer order or chiral order is theoretically predicted in weakly coupled spin tetrahedra. For the further understanding ultra-high-resolution INS experiment at ultra-low temperature is important.

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Unveiled Multiferroic Properties in $BiFeO_3$

Tokunaga Group

Recent extensive studies on multiferroic materials were motivated not only by the interest in basic science, but also by their possible application to magnetic memory devices writable by electric fields with low power consumption. Among various multiferroic materials, $BiFeO_3$ is perhaps the most extensively studied because of its huge spontaneous electric polarization (P_S) as well as high ordering temperatures. Our recent careful studies of magnetoelectric effects revealed existence of novel electric polarization (P_T) normal to the P_S that can be controlled by magnetic fields in a non-volatile way [1].

The novel P_T is found to couple with magnetic domains of the cycloidal spin order (Q-domains). Owing to the C_3 symmetry of the crystal, there are three equivalent directions

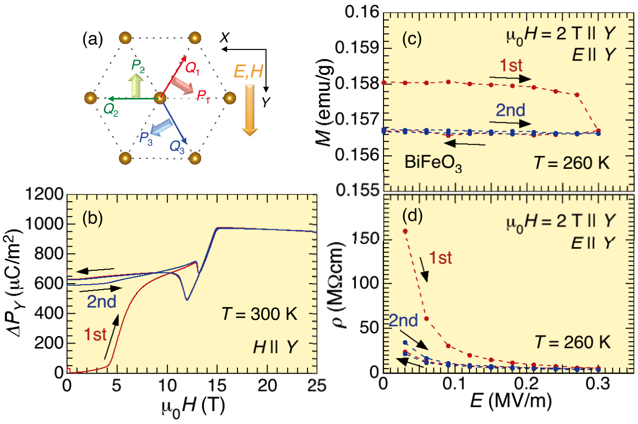

Fig. 1(a) Schematics of $BiFeO_3$ within the *ab*-plane. Brown circles represent Fe ions. Thin and thick arrows show propagation vectors of the cycloidal spin order and transverse electric polarization, respectively. (b) Magnetic field dependence of electric polarization measured at 300 K for first and second field cycles. The prominent hysteresis below 10 T in the first field scan corresponds to the reorientation of the magnetoelectric domains. Electric field dependence of (c) magnetization and (d) resistance of $BiFeO_3$ in the first and second field cycles.

for the spin modulation vector. Thereby, the Q-domains are specified by the vectors Q_1, Q_2, and Q_3 shown in Fig. 1(a). Here, each Q-domain contains P_T normal to its Q-vector as illustrated in Fig. 1(a) as P_1, P_2, and P_3. Application of high magnetic field can realize the single Q-domain state. The reorientation process appears as an irreversible change in the electric polarization below 10 T in the first magnetic field cycle as shown in Fig. 1(b).

As a counter effect of this phenomenon, we can expect control of the Q-domains by external electric fields. Such electric control of Q-domains is resolved through magnetization measurements as a function of electric field. In the reorientation process of the Q-domain in the first electric field scan, we observed irreversible change in magnetization as shown in Fig. 1(a) [2]. Simultaneous measurement of the resistance also shows irreversible change only in the first field scan: the resistance at a certain electric field becomes small after application of E = + 0.3 MV/m [Fig. 1(b)]. Interestingly, this low resistance state can be switched back to the high resistance one by applying E = – 0.3 MV/m. This switching between high and low resistance states, in other words the bipolar RRAM effects, appears repeatedly at least 20,000 cycles at room temperature [2].

These experimental results revealed the unveiled multiferroic properties in $BiFeO_3$ will be useful for non-volatile memory devices writable by electric fields, readable simply by measuring their resistance, and stable against external fields at least up to 4 T.

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Metamagnetism in the Kondo Insulator YbB_{12} at Ultrahigh Magnetic Fields of up to 120 T

Y. Matsuda and Kindo Groups

Kondo insulator is a fascinating group of materials. When strong interactions between magnetic ions and itinerant band electrons exist, the metallic ground state with heavy mass of the quasi particle may appear. However, in reality, a limited number of materials exhibit insulating ground state due to yet-to-be-defined reason and are termed Kondo insulators. The energy gap opens at a low temperature and simultaneously the magnetic moments are screened most probably due to the Kondo effect. The resultant ground state of the Kondo insulator is non-magnetic insulating state. One may naturally think that the Kondo effect would be suppressed by a high enough magnetic field. Hence, high-magnetic-field experiments on the Kondo insulator is intriguing; the electronic and magnetic properties are expected to change significantly by applying the high magnetic field.

YbB_{12} is a canonical Kondo insulator and known to show clear insulator-metal (IM) transition at around 50 T [1]. At the field-induced IM phase transition, a steep increase of the magnetization also appears, and the phenomenon is often referred as metamagnetism or metamagnetic transition. The observed magnetization at 50 T, however, is smaller than half of the expected saturation magnetization. Higher magnetic fields are necessary to uncover the peculiar electronic and magnetic properties of YbB_{12}.

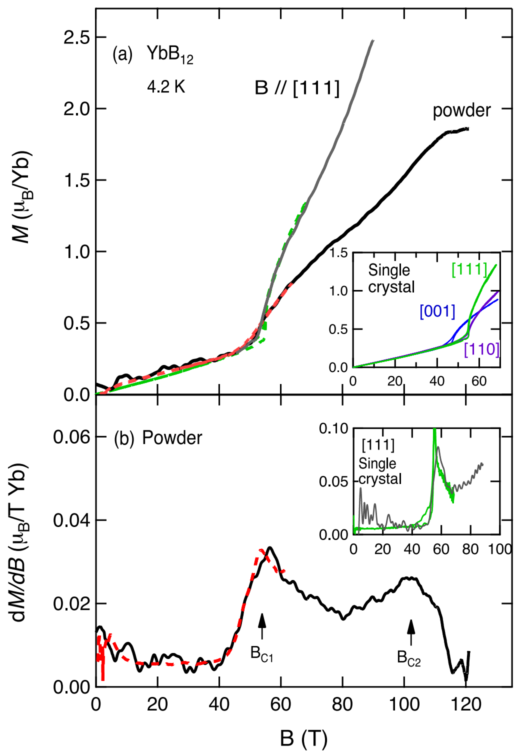

Fig. 1. (a) Magnetic field dependence of the magnetization (M) of YbB_{12}. The red-dashed and black-solid curves denote the magnetization of powder sample measured by a non-destructive pulsed magnet and that by HSTC, respectively. The green-dashed and gray-solid curves denote the M of a single crystal measured by a non-destructive pulse magnet and that using the HSTC, respectively. The inset shows the M curves of the single crystals with different magnetic field directions. (b) The field derivative of the magnetization (dM/dB) curves for the results of non-destructive pulse magnet (red-dashed curve) and that by the single-turn coil method (black solid curve). The inset shows dM/dB for the single crystal in the B//[111] direction. The green-solid curve was obtained with a non-destructive magnet and the gray-solid curve was obtained with the HSTC.

Recently, we have conducted magnetization experiments on YbB_{12} in ultrahigh fields of up to 120 T. The horizontal-type single-turn coil (HSTC) is employed for the field generation. Figure 1 (a) shows the obtained magnetization curves; the thick black line and grey thin line represent the magnetization of the powdered sample and that of a single crystal, respectively. The magnetization curves of the single crystal with different directions of the applied magnetic field are shown in the inset of Fig. 1(a). In addition to the previously known metamagnetism around 50 T, another metamagnetic transition is observed in the powder sample at around 102 T [2]. This phenomenon is seen more clearly in the field variation of dM/dB (field derivative of the magnetization) as shown in Fig. 1(b). The metamagnetic transitions are observed as peak structures; there are broad but distinct two peaks at 55 and 102 T.

The observed successive two metamagnetic transitions can be interpreted as energy gap closing process. [1,2] In terms of the band magnetism, the metamagnetic transition occurs when the density of states (DOS) takes peak structure near Fermi energy at certain magnetic field. The two metamagnetic transitions indicate that there are multi-pseudo gap structures in the electronic state of YbB_{12}. Similar multi-pseudo gap structures have been suggested to exist in the Kondo semimetal CeNiSn [3], and the Kondo effect is theoretically predicted to collapse at the second metamagnetic transition when the larger pseudo-gap closes due to the Zeeman effect. Similar phenomenon probably takes place in YbB_{12}. The insulating state transforms to metallic state at around 50 T and the heavy fermion phase appears at magnetic fields in the range from 50 to 102 T. At higher fields exceeding 102 T, it is expected that the Kondo effect eventually vanishes and a normal metal state with saturated magnetization realizes. To validate this picture, further studies with single crystals are planned to be performed.

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Solving the Mystery of the Topology of Semimetal Bismuth

I. Matsuda, Shin, and Komori Groups

Today, bismuth has become a central element in designing and in synthesizing topological materials such as $Bi_{1-x}Sb_x$, Bi_2Se_3, and Na_3Bi. However, topology of the pure bismuth crystal has been still controversial. This is because the topology identification requires a precise determination of band structure of the bulk and edge-states of a material but the very small energy gap and the sharp dispersion have prevented from it even with recent photoemission spectroscopy techniques. In order to overcome the situation, we intentionally fabricated electronic interferometry in the bismuth films and combined with the ultrahigh-resolution measurement of angle-resolved photoemission spectroscopy ARPES [1].

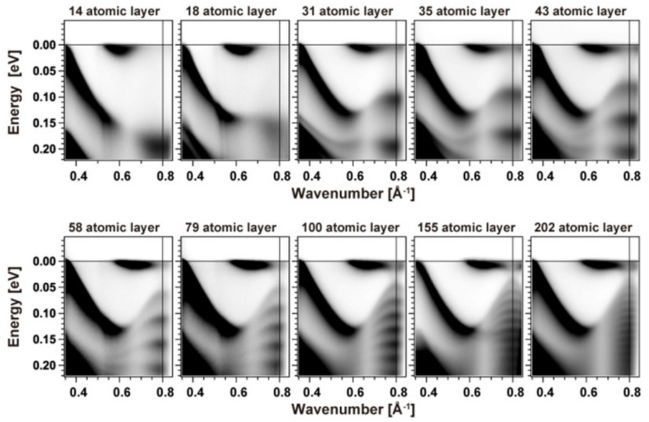

Fig. 1. Photoemission band diagrams of pure bismuth crystals measured at hν=8.437 eV. The film thickness is systematically increased from 14 to 202 atomic layer. An atomic layer corresponds to bilayer (BL), 1 BL=3.93 Å.

Figure 1 shows the ARPES results of the processed Bi crystals, normally a three-dimensional substance into an atomically thin two-dimensional film. The films was grown on the Ge(111) substrate. Electrons in a solid behave as electronic waves with a specific wavelength and energy. At all the thickness, a dispersion curve of the edge-state is observed at the Fermi level. On the other hand, at individual thickness, one can find different interference patterns of the electronic waves that are confined in the film. The systematic variation of the pattern allows us to determine the bulk band dispersion accurately. Then, from the precise electronic structures of the edge and the internal bulk, the pure bismuth crystal was unambiguously found to have the nontrivial topology, solving the long mystery [2].

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Dirac Fermions in Borophene

I. Matsuda, Sugino, and Komori Groups

Boron, the fifth element in the periodic table, has been known to be the lightest element substance that forms interatomic covalent bonds. Since the bonding states in the bulk boron ranges from two-center to multi-center bonds, boron forms varieties of allotropes that show rich physical and chemical properties. Up to now, all the allotropes of boron have been found to be semiconducting with a large band gap. Recently, the discovery of graphene has triggered great interest in the search for elemental monolayer materials and theoretical investigations have found existence of the monolayer boron, borophene, that shows metallicity.

In the present research, we synthesized a borophene by directly evaporating pure boron (99.9999%) onto a clean Ag(111) substrate. We apparently observed metallic boron-derived band by angle-resolved photoemission spectroscopy (ARPES). There are three pockets of the Fermi surfaces that are supported by the first-principles calculations [1]. Focusing onto a pair of the pockets, we discovered that the

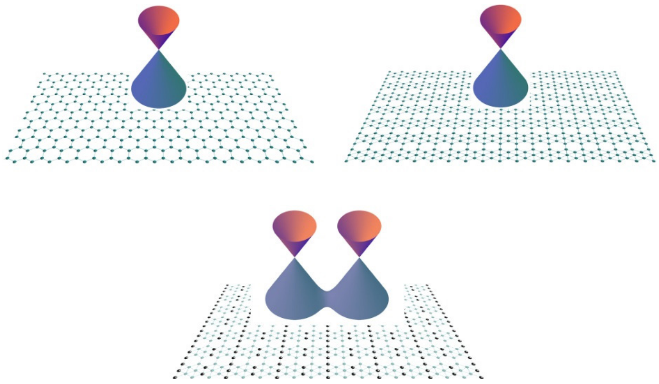

Fig. 1. (Upper)Dirac cones in the honeycomb lattice (graphene) and in the β_{12}-sheet structure (borophene). (Lower) A pair of Dirac cones in the periodically modulated β_{12}-sheet structure (borophene on Ag(111)).

band is actually forming a pair of Dirac cones by the high-resolution ARPES measurement using synchrotron radiation [2]. The borophene on Ag(111) forms the β_{12}-sheet structure and the theoretical calculations, the first principles and the tight-biding models, confirm presence of the Dirac cones. Moreover, by imposing the one-dimensional periodic potentials, the Dirac cones were found to form a pair, which completely reproduce the experimental bands. It is of note that the additional periodicity was confirmed by scanning tunneling microscope on the borophene. These results open the door to designing novel Dirac materials of the non-honeycomb structure and to make additional modification by the substrate that lead to varieties of functionalities (Fig. 1).

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Tailoring Photovoltage Responses at $SrRuO_3/SrTiO_3$ Heterostructures

I. Matsuda Group

Strontium titanate ($SrTiO_3$) has been one of the well-known transition-metal oxides and its perovskite crystal structure has enabled us to design a rich variety of metal-oxide heterostructures by epitaxial growth of oxide films. Recently, its photo-induced response has also attracted technological interests for usages of solar cells, photo diodes, photoelectrolysis, and photocatalysts. In such applications, the photovoltage effect is the most fundamental optical response and one needs to clarify the mechanism for designing and upgrading the systems. The surface photovoltage (SPV) effect is induced by photo-excitation, followed by spatial separations of carriers (holes and electrons) between the surface (interface) and the internal bulk. The effect is sensitive to the surface/interface band alignment and, thus, it is expected to improve the optical response by electronic design of the heterostructure.

By making element-selective time-resolved soft

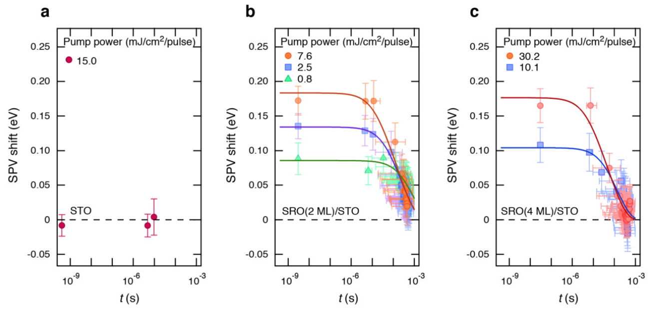

Fig. 1. Time dependence of the energy shifts of the surface photovoltage (SPV) effect after the optical pumping, traced by the time-resolved Sr 3*d* core-level photoemission measurements at a) $SrTiO_3$(STO), and b) $SrRuO_3$ (SRO)(2 ML)/ $SrTiO_3$ and c) $SrRuO_3$ (4 ML)/ $SrTiO_3$.

X-ray photoemission experiments at SPring-8 BL07LSU, we demonstrated that the photovoltage response can be enhanced in more than two orders of magnitude in $SrTiO_3$ by the epitaxial growth of 2 monolayer (ML) of $SrRuO_3$ thin film (0.8 nm), as shown in Fig.1. Moreover, we determined life-time of the photo-excited carriers in the perovskite heterostructures. Performance of the optical response matched with expectations from the band alignments. Our approach is fundamentally applicable for a variety of oxide heterojunctions and, therefore, it can be useful in fabricating the better opto-electronic devices such as high-efficient photo-detectors and solar cells.

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Photoinduced Demagnetization and Insulator-to-Metal Transition in Ferromagnetic Insulating $BaFeO_3$ Thin Films

Wadati Group

Control of magnetic states by optical excitations in magnetically ordered materials has attracted considerable attention since the demonstration of ultrafast demagnetization in Ni within 1 ps, explored by time-resolved magneto-optical Kerr effect studies by Beaurepaire *et al.* [1]. They proposed a phenomenological "three-temperature model" in order to understand the ultrafast demagnetization, which considers three interacting reservoirs of electrons, spins, and lattice, and suggested the importance of direct electron-spin interactions. Here we report on pump-probe time-resolved resonant x-ray reflectivity study of fully oxidized single crystalline $BaFeO_3$ thin films [2], which show unusual behaviors of ferromagnetic and insulating properties with saturation magnetization and a Curie temperature of 3.2 μ_B/formula unit and 115 K, respectively [3,4]. The investigation of the demagnetization dynamics of insulators allows one to relate electronic structure to magnetic dynamics.

In order to investigate the magnetic dynamics of ferromagnetic insulating $BaFeO_3$ thin films, we performed timeresolved reflectivity studies at the Femtospex slicing facility at the synchrotron radiation source BESSY II [5], using circularly polarized x-ray pulses. Our experimental method has the advantage that, in one reflectivity experiment, we can probe electronic structure as well as magnetism. The quality of the thin-film samples was confirmed by x-ray diffraction, Fe 2p x-ray absorption spectroscopy, and Fe 2p core-level hard x-ray photoemission spectroscopy measurements by comparing cluster-model calculations, which found that the formal valence of Fe was 4+ [3,4]. The experimental geometry is shown schematically in Fig. 1. We used fixed circular polarization and created magnetic contrast by switching the direction of the magnetic field (H), which was oriented along the sample surface ([010] direction). We recorded specular reflectivity data for two magnetization directions R^+ and R^-. The average reflectivity $R = (R^+ + R^-)/2$ is a measure of the electronic and structural properties, while the magnetic circular dichroism in reflectivity (MCDR) signal $DR = (R^+ - R^-)/2$ is a measure of the sample magnetization. A Ti:sapphire laser (wavelength: 800 nm, energy: 1.55 eV) with a pulse width of ~ 50 fs was employed as a pump laser with π polarization. The spot size of the pump laser was ~ 0.40 mm (horizontal) × 0.25 mm (vertical), and that of the probe x ray was ~0.1 mm × 0.1 mm. The repetition rate of the time-resolved measurement was 3 kHz, limited by the frequencies of the pump laser. The pumped and unpumped signals were obtained alternatively. The time resolution was 70 ps, corresponding to the pulse length of the probe x ray.

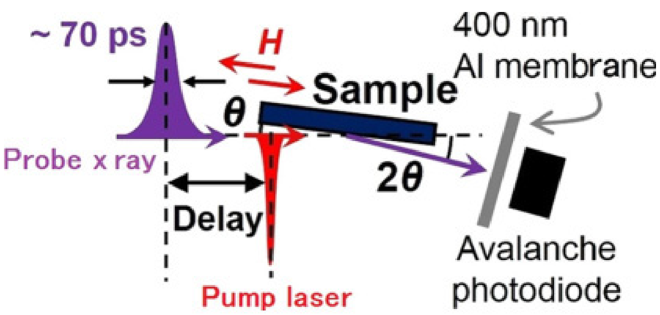

Fig. 1. Geometry of the measurements.

Figure 2(a) shows the time evolution of the MCDR intensities for different pump fluences. The vertical axis shows the excited MCDR intensities normalized by the unpumped signal (i.e., $\Delta R_{pump} / \Delta R_{no\ pump}$). Here, the subscript of pump and no pump denote the signals with and without the laser excitations, respectively. The MCDR intensities decrease after the incidence of the pump laser at t = 0. The time evolution of the MCDR intensity shows different behaviors with

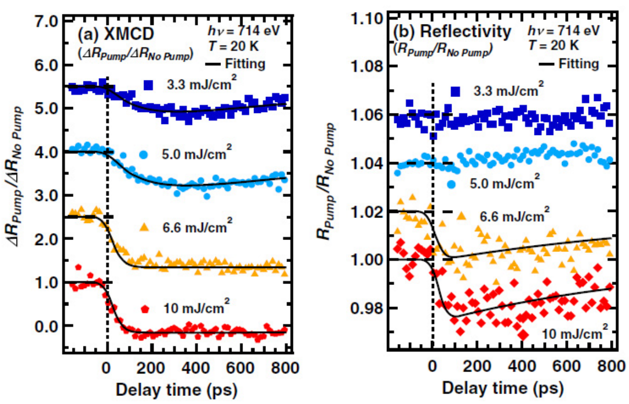

Fig. 2. Time evolution of (a) XMCD intensity and (b) reflectivity of $BaFeO_3$ thin films for various pump laser fluence. All the curves, except for the case of 10 mJ/cm^2, are shifted upward for clarity.

the change of the pump fluence (F). When F is smaller than 5.0 mJ/cm^2, the demagnetization time is relatively slow and magnetization recovery sets in after about 400 ps. When the pump F is larger than 6.6 mJ/cm^2, on the other hand, the demagnetization time is quite fast and no recovery of the magnetization can be observed within the first 800 ps. We assign the different behavior of the demagnetization dynamics to a laser-induced insulator-to-metal transition for F ≥ 6.6 mJ/cm^2, as discussed in the following. We show the time evolution of the intensity of the average reflectivity in Fig. 2(b), which allows us to investigate the electronic dynamics. The vertical axis shows the excited reflectivity intensities normalized by those without excitation (i.e., $R_{pump}/R_{no\ pump}$). No pump effects were observed for F ≤ 5.0 mJ/cm^2 with our time resolution of 70 ps. Pump effects, on the other hand, were clearly observed for F ≥ 6.6 mJ/cm^2.

Figure 3 shows the mechanism of the insulator-to-metal transition induced by the strong laser excitation. When the pump fluence is weaker than 5.0 mJ/cm^2, magnetizations in $BaFeO_3$ thin films recover with the time constant of $\tau_{recovery}$ ~ 1000 ps. The time scale of ~ 1000 ps can be assigned to heat diffusion needed to cool the sample below the magnetic ordering temperature after electron, lattice, and spin systems have reached thermal equilibrium. Remarkably, the time-resolved reflectivity change for strong pump fluence also shows a recovery on this time scale of $\tau_{recovery}$ ~ 1000 ps, indicating that also here heat diffusion is the relevant mechanism. This latter observation is quite notable, because equilibrium between the electron and lattice temperature should be reached within 1 ps. The slow reopening of the band gap on time scales of ~ 1000 ps shows that for high excitation densities we drive the system into a metastable state. As a mechanism for the long lifetime of the metallic state, we consider that hot carriers, generated by the quasi-particle scattering and closing the band gap, prevent it from opening again by reducing electron-electron and electron-phonon interactions.

In summary, we investigated the electronic and magnetic dynamics by time-resolved reflectivity and MCDR measurement on $BaFeO_3$ thin films. When the pump laser fluence is smaller than 5.0 mJ/cm^2, a relatively slow demagnetization of τ_{decay} ~ 150 ps was observed, due to the insulating properties of the ground state in $BaFeO_3$ thin films without any changes in Fe 2p x-ray reflectivity. When the pump laser fluence is stronger than 6.6 mJ/cm^2, on the other hand, rapid changes in Fe 2p x-ray reflectivity are observed, which is attributed to a transition into a metallic state, resulting in an unusually fast demagnetization with τ_{decay} < 70 ps. Since $BaFeO_3$ thin films are near the phase boundary of a metal-insulator transition, the insulating phase is quite sensitive to carrier density. Thus, the origin of the insulator-to-metal transition is a photoinduced Mott transition into a metastable state stabilized by screened electron-electron and electron-phonon interactions. Our findings indicate a mechanism for tuning magnetic dynamics in correlated materials, which resembles heat-assisted magnetic switching in metallic magnets. By creating a sufficiently high excitation density, spin-flip scattering channels open up which increase the spin system susceptibility to external manipulation.

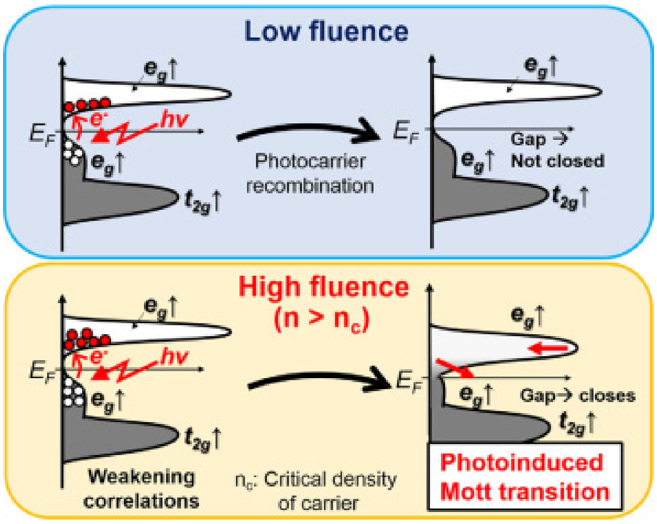

Fig. 3. Mechanism of the insulator-to-metal transition induced by the strong laser excitation.

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Thermal-Hall effect in a Spin-Liquid State in Volborthite

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A central question in condensed-matter physics is a fate of electronic states under strong quantum fluctuations which often give rise to a variety of non-trivial quantum states. A prominent example is a quantum spin liquid (QSL) [1] of frustrated quantum antiferromagnets in which highly-correlated spins keep fluctuating down to very low temperature owing to enhanced quantum fluctuations. A few candidate materials now have been reported to host a QSL in two-dimension (2D), which have been attracting enormous attention because a 2D QSL is a new class of matter characterized by unknown quasiparticles. Identifying the precise nature of elementary excitations in a 2D QSL, however, has remained entirely elusive.

To shed a new light for studying unexplored property of the elementary excitations in a QSL, we utilize thermal Hall measurements to a spin liquid state realized in a 2D kagomé insulator volborthite $Cu_3V_2O_7(OH)_2 \cdot 2H_2O$. Volborthite is a magnetic insulator in which Cu^{2+} ions form a distorted kagomé structure with inequivalent exchange interactions [2] (see the inset of Fig. 1). The temperature dependence of the magnetic susceptibility χ is typical for frustrated spin system with the effective spin interaction energy J_{eff}/k_B ~ 60 K; the peak of $\chi(T)$ at T_p ~ 18 K shows that a short-range spin correlation develops below T_p. Although the spin Hamiltonian is rather complicated [3], a geometrical

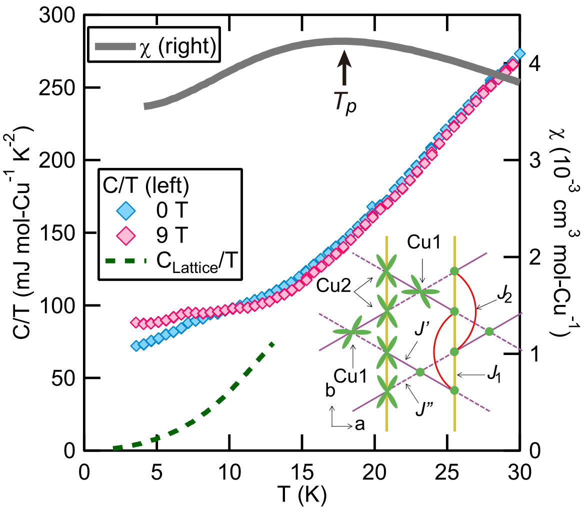

Fig. 1. Temperature dependence of the heat capacity divided by temperature C/T (diamonds, left axis) and the magnetic susceptibility χ (gray line, right axis) of a single crystal of volborthite. The peak temperature of the magnetic susceptibility is marked as T_p. The dashed line is the lattice heat capacity. The inset illustrates the arrangement of Cu ions in the ab plane. J_1 and J_2 represent the nearest-neighbor and next-nearest-neighbor interactions in the Cu2 spin chains, respectively. J' and J'' represent the nearest-neighbor interactions between Cu1 and Cu2 spins.

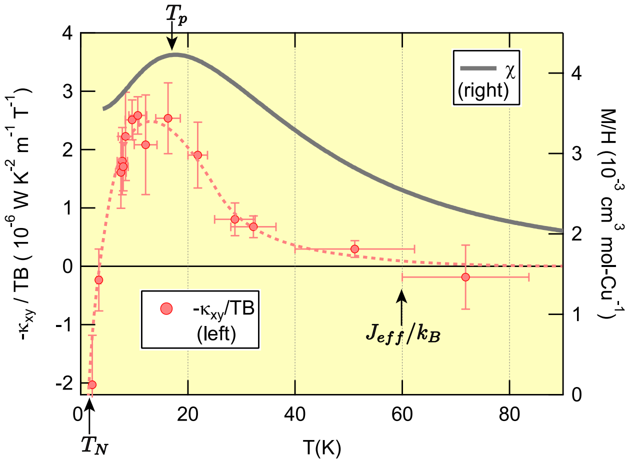

Fig. 2. Temperature dependence of $-\kappa_{xy}/TB$ at 15 T (left) and that of χ (right). The dashed line is a guide to the eyes.

frustration effect suppressed the magnetic order down to T_N ~ 1 K, showing a presence of a spin liquid state in a wide temperature range $T_N < T < J_{\mathrm{eff}}/k_B$. Extrapolating both χ and C/T above T_N results a finite value at $T = 0$ (Fig. 1), demonstrating the presence of gapless excitations in the spin liquid state.

Our central finding [4] is a negative thermal Hall conductivity κ_{xy} (Fig. 2) which develops upon entering the spin liquid state ($T < J_{\mathrm{eff}}/k_B$) from the high-temperature paramagnetic state ($T > J_{\mathrm{eff}}/k_B$). Because volborthite is a transparent insulator without conducting electrons, a finite thermal Hall effect immediately means the presence of non-trivial excitations. At lower temperatures, $|\kappa_{xy}|$ shows a peak at T ~ T_p, which is followed by a sharp decrease and a sign inversion just above T_N. These intimate correlations between the temperature dependence of χ and that of κ_{xy} lead us to conclude that the observed thermal Hall effect in volborthite arises from the magnetic excitations in the spin liquid state, not from phonons. The emergence of the thermal Hall conductivity below T ~ J_{eff}/k_B strongly suggests that the thermal Hall effect is a key signature distinguishing the highly-correlated spin liquid state from the conventional paramagnetic state. A further analysis [4] shows that an effective Lorentz force acting on the spin excitations can be estimated as ~1/100 of that for free electrons, implying that the coupling between the applied magnetic field and the spin excitations is very small.

The rapid decrease and the sign change of κ_{xy} near T_N call further studies, especially about the spin correlation effect on the thermal Hall conductivity. Possibilities for the suppression of κ_{xy} would include an instability of a fictitious gauge field acting on the spin excitations and an emergence of an additional spin excitations with opposite sign of κ_{xy}. Applying thermal Hall measurements to another frustrated spin materials should be important to clarify these nontrivial issues.

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Spin Control in Photoemission Process from Spin-Orbital Entangled Surface States

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Strongly spin-orbit coupled materials have been attracting much attention in solid-state physics. In particular, the potential gradient at the surface and interface largely enhances the interaction. In contrast to a conventional model with a single chiral spin texture of spin-polarized surface states, the spin-orbital texture, where spin is locked to the orbital texture of the bands, has recently been pointed out. [1] The spin-orbital entanglement is a general consequence of the strong spin-orbit coupling, and thus is important not only for surface/interface states but also bulk states, and is applicable to optical spin control in solids. However, the response of spin to light has not yet been understood fully on the basis of the quantum-mechanically entangled states with spin-orbital textures. Consequently, a clear and comprehensive concept is required on this subject. We have shown general description of the optical spin control using the spin-orbital entangled states, and demonstrated it in Bi_2Se_3 [2], and Bi [3] surfaces by laser-based spin- and angle-resolved photoemission spectroscopy (Laser-SARPES) [4].

In the preset concept, the final state spin direction of photo-excited electrons is determined by quantum interference due to spin-locked wave functions in the optical excitation process as schematically shown in Fig.1. On the mirror symmetry line, the spin direction of the initial state is fixed by the even-odd symmetry of the orbital wave function. In the case of SARPES measurements on the mirror symmetry line, spin direction of the photoelectron excited by linearly-polarized light depends systematically on the direction of its electric field vector, and can be expressed by the light-polarization angle (θ) from the mirror plane and a complex ratio of the dipole matrix elements from the even and odd initial states. We measured the spin direction of photoelectrons from Bi_2Se_3(111) and Bi(111) surfaces as a function of θ using Laser-SARPES. The results are well reproduced by the obtained formula as shown in Fig. 2 using appropriate complex values of the matrix element ratio.

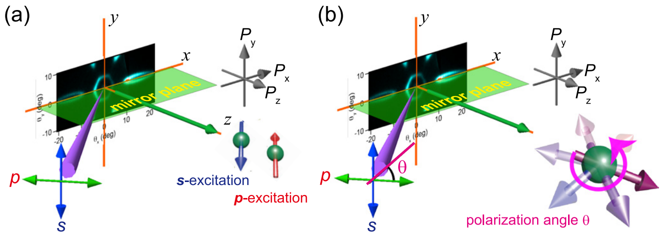

Fig. 1. Schematic illustration of photoemission processes from spin-orbital entangled surface states, where spin direction is locked in either y or –y direction, depending on the even-odd symmetry of the orbital wave functions and mirror-symmetry eigen values on the mirror-symmetry line. When the surface is irradiated by *p*(*s*)-polarized light in the mirror plane, only even(odd)-symmetry wave functions are excited, and thus, the spin direction of photoelectrons is either y or –y direction accordingly as shown in (a). When the electric field direction of light is rotated by θ from the *p*-polarization direction as in (b), both even and odd wave functions are coherently excited and the spin direction of the photoelectrons is determined by complex matrix elements of the photo-excitation process [2,3].

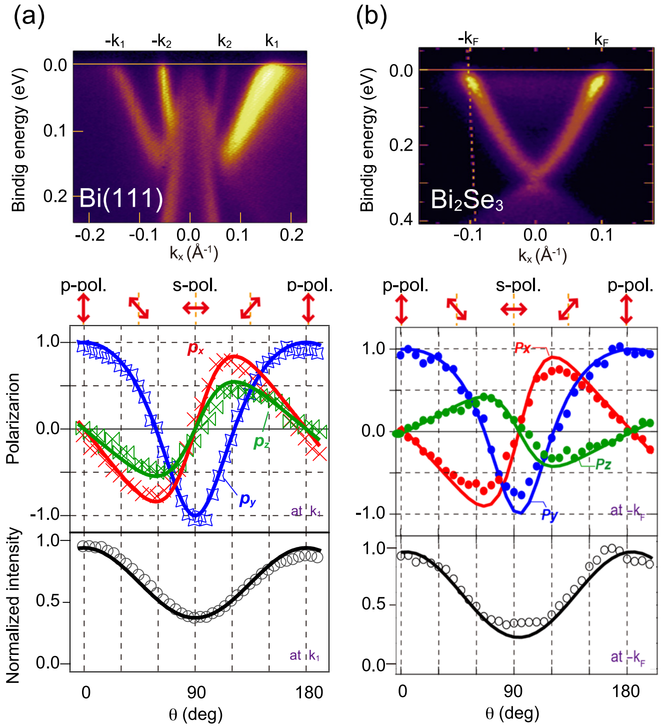

Fig. 2. ARPES of spin-orbital entangled surface states (upper), and photoelectron spin direction (middle) and normalized photoelectron intensity (lower) as a function of the angle θ of the polarization vector from the *p*-polarization direction shown in Fig.1(b) for the Bi(111) (a) [3] and Bi_2Se_3(111) (b) [2] surfaces. For Bi(111), two surface bands exist around Γ while only one band for Bi_2Se_3(111). Initial states of the photoelectrons are at k_1 and E_F for (a), and $-k_F$ for (b). The observed θ dependences are well reproduced by the formula (solid curves) using two fitting parameters of the photoemission matrix element ratio.

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Compressed Sensing in Scanning Tunneling Microscopy/Spectroscopy for Quasi-Particle Interference

Y. Nakanishi-Ohno, Y. Yoshida, and M. Okada

Interference of electrons is one of the manifestations of their particle-wave duality in quantum mechanics. When electrons are scattered by local disordered structures, such as adsorbates and step edges on surfaces, the reflected electronic wave interferes with the injected one to form a spatial modulation in local density of states (LDOS), that is,

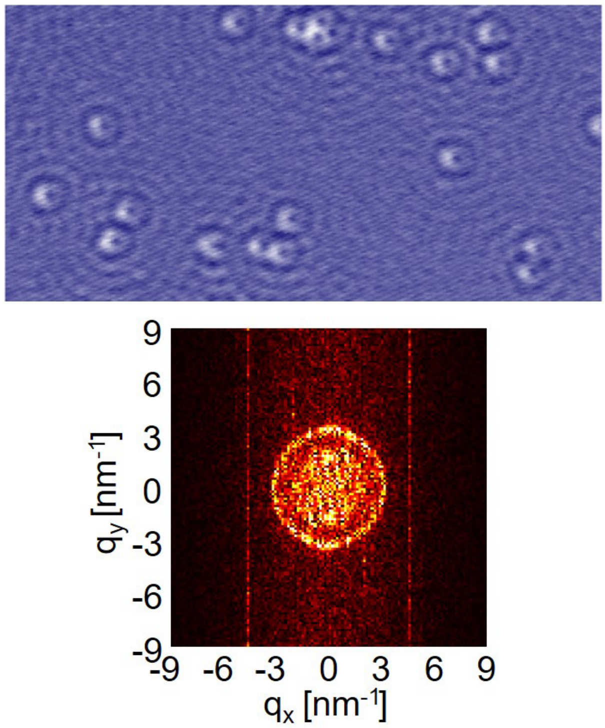

Fig. 1. (upper) *dI/dV* map taken on the Ag(111) surface. The size of the area is 70 nm × 35 nm, and the number of pixels is 360 × 180 = 64800 points. (lower) FT of the upper STM image by the conventional method.

a quasi-particle interference (QPI) pattern. The modulated LDOS can be observed in real space by using scanning tunneling microscopy and spectroscopy (STM/S) at various energies around the Fermi level, and by analyzing a QPI pattern one can obtain the momentum (k) space information on the electronic states and their energy dispersion relation. Recently, the QPI analysis has been applied to investigate electronic structures of complex materials such as unconventional superconductors and topological insulators. As the measurements can be performed at very low temperature under high magnetic fields, the method is a powerful tool in various aspects of solid state physics.

In order to obtain the energy dispersion relation of electronic states, however, the spectrum of tunneling conductance *dI/dV*, which corresponds to LDOS, has to be taken at every pixel while scanning. It is therefore quite time-consuming; sometimes it takes more than a week, which makes the QPI measurements difficult to be performed. If one can obtain the same quality of the k-space information from a reduced number of spectra, the QPI analysis will be much more convenient and widely used.

As a solution to the problem posed above, we have applied compressed sensing (CS) to the QPI observation, which is a novel statistical method for acquiring and reconstructing a signal efficiently. In the case of QPI observation, the k-space information on the electronic states is obtained by performing the Fourier transformation (FT) of the QPI pattern. If the number of *dI/dV* spectra is decreased, the FT of the *dI/dV* map becomes of too low quality to access the k-space information. In order to boldly enhance the resolution of k space, we need to solve an underdetermined problem, in which the number of variables measured is smaller than the number of variables to be determined. CS addresses this problem by utilizing the sparseness of QPI patterns; their FTs are composed of few nonzeros and many zeros. This sparseness is based on the fact that LDOS modulations are allowed only for a small number of wavelengths. Because of this sparseness, we can reduce the number of unknown variables significantly, and then obtain an FT of sufficient quality even with scarce data.

Here, we demonstrate that CS performs well by numerical simulations on a QPI pattern observed in a *dI/dV* map of the Ag(111) surface. The surface state of Ag(111) is described by a free-electron-like model, and the FT of the QPI pattern has a circular pattern whose radius corresponds to twice the wavenumber of the states. We use an analysis method of CS, called LASSO (least absolute shrinkage and selection operator), to recover the pattern from scarce data.

Figure 1 shows a *dI/dV* mapping (360 × 180 = 64800 pixels) taken on the Ag(111) surface at 4.2 K. The mapping shows a wave-like QPI pattern around adsorbates on the surface. The FT of this dI/dV map obtained by the conventional method is shown in the lower panel of Fig. 1. A ring structure can be seen centered at the origin, indicating the presence of isotropic electronic states on the surface. We also found small intensity other than the ring, supporting the assumption of sparseness. The q-space region of interest is discretized into 128 × 128 = 16384 pixels. In this case, the amount of data is enough sufficient compared to the number of unknown variables.

Let us examine whether the circle can be recovered from a reduced amount of data. Figure 2 shows FTs of 16384 pixels, which are estimated from data of 7200 points randomly chosen from the dI/dV mapping shown in Fig. 1. It should be noted that the number of unknown variables is larger than that of the measured variables. The left and right panels show the results of the conventional method and those of LASSO, respectively. Although the ring pattern can be seen in the FT by the conventional process (left panel), it has rather noisy background because of the reduced amount of data. On the other hand, the analysis with LASSO significantly reduces the background noise, and the expected pattern is more clearly seen in the result (right panel). In the ill-posed situation, LASSO provides a sparse solution; most of the noise components are automatically estimated at zero, and the signal components remain to be nonzero. Our numerical simulations demonstrated that LASSO enables us to recover the characteristic features of the electronic states of Ag(111) surface from a randomly reduced dataset. Our results indicate that CS works effectively in the analysis of QPI, saving the number of required dataset and measurement time, which improve the efficiency of the QPI analysis. Obviously the application of CS should not be limited to the QPI analysis; we expect that it will be extended more to various situations in condensed matter physics near future.

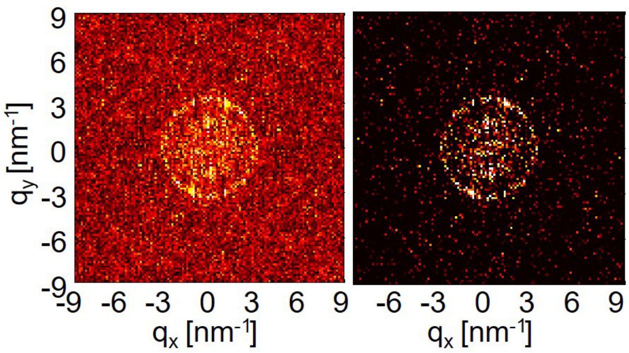

Fig. 2. FTs estimated from pixels randomly chosen from the *dI/dV* mapping shown in the upper panel of Fig. 1. The subsets of data are composed of 7200 pixels. Results of the conventional method and LASSO are shown in the left and right panels, respectively.

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Halide Perovskite Thin Films for Photovoltaics

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Structurally similar to classical perovskite oxides, organic halide perovskites have a general formula ABX_3, where the anion X can be I, Br, or Cl, the B-site is occupied by Pb, and the A-site usually holds the methylammonium ion, CH_3NH_3. Halide perovskites are studied as energy harvesting materials in photovoltaics, achieving solar cell energy conversion efficiencies of around 20%. A major technical problem with perovskite solar cells is the low structural stability of the halide perovskite material. The carrier mobility and recombination rates therefore quickly degrade after film growth. The purpose of this collaboration project was to develop a technique for quickly fabricating organic halide perovskite thin films with controlled composition and layer thickness to optimize the material characteristics. A pulsed molecular beam epitaxy system with continuous wave infrared heating (cwIR-MBE) was designed to tackle this problem. The thin film growth system is shown in Fig. 1a, showing two precursor cells containing the PbI_2 and CH_3NH_3I precursors on a rotatable target stage. The stage can be used to position either one of the sources to face directly the substrate. A cw infrared laser is used to briefly heat the source cell in front of the substrate, yielding a millisecond-scale pulsed MBE process. The amount of material evaporated can be controlled by tuning the laser power, pulse length, and the evaporation pulse count. The main benefit of the technique is that the evaporation is thermal, not ablative, which means that the organic precursor material is not decomposed in the evaporation process. Periodically evaporating either of the two sources is used to obtain the desired PbI_2 and CH_3NH_3I layer sequence. A homogeneous perovskite phase can be obtained if the individual layer thicknesses are limited to just a few unit cells and the average stoichiometry is close to the desired value.

This thin film growth system was used to fabricate arrays of perovskite solar cells, integrating several devices with slightly different precursor ratios on a single substrate to minimize statistical errors in the device characterization. A cross-sectional view of a completed solar cell device is shown in Fig. 1b. X-ray diffraction analysis was used to determine the optimal evaporated precursor ratio to obtain the perovskite phase. The total film thickness analysis was used to confirm that homogeneous phase formation occurs in multilayer films where the PbI_2 and CH_3NH_3I layer thicknesses are 1.4 nm and 1.7 nm, respectively. Characterizing a series of solar cells showed that even in the screening experiment, a device efficiency of 10 % could be achieved.

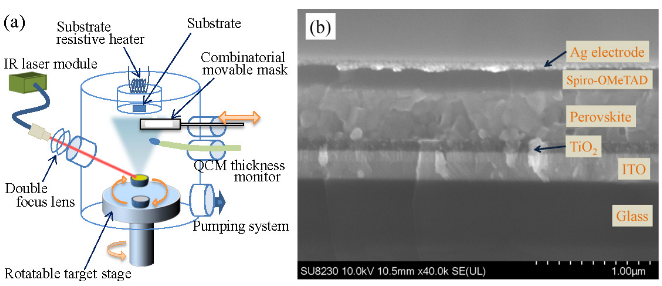

Fig. 1. (a) Schematic view of the pulse MBE deposition system. (b) A cross-sectional image of a completed organic halide perovskite solar cell.

The success of the halide perovskite synthesis by IR-MBE shows that sequential evaporation of organic precursor sources is an effective way of depositing nanometer-scale layers of volatile organics in a physical vapor vacuum process. The geometry of the evaporation process is arranged so that each target is directly facing the substrate during evaporation, which minimizes spatial layer thickness gradients on the sample surface. Additionally, only a single laser is required to evaporate several different precursor materials, while the necessary heating power and pulse length can be adjusted individually for each precursor material. The work thus shows that organic multilayer and homogeneous phase materials can be grown in a technically simple sequential MBE chamber.

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Pressure Effect on Magnetic Properties of Weak Itinerant Electron Ferromagnet CrAlGe

Y. Mitsui, Y. Uwatoko, and K. Koyama

CrAlGe with an orthorhombic $TiSi_2$-type structure shows ferromagnetism below a Curie temperature T_C of 80 K. The spontaneous magnetic moment p_s and effective magnetic moment p_{eff} of CrAlGe were reported to be 0.41 μ_B at 5 K and 1.89 μ_B, respectively [1]. The paramagnetic moment p_C was calculated to be 1.13 μ_B from p_{eff} by $p_{eff}^2 = p_C (p_C + 2)$, and the ratio p_C/p_s of CrAlGe was 2.8. Because the p_C/p_s is greater than unity, CrAlGe was classified as the weak itinerant electron ferromagnet (WIEF). The parameters of the energy scale of the spin fluctuation spectrum [2], T_0 and T_A were estimated to be 1.0×10^3 K and 4.0×10^3 K, respectively. However, the pressure effect on the magnetic properties of CrAlGe has not been clarified. In this study, we performed magnetization measurements of CrAlGe under high pressures up to 1 GPa.

The magnetization M measurements under hydrostatic pressure P up to 1.0 GPa were carried out using a superconducting quantum interference device magnetometer for $5 \le T \le 200$ K and magnetic fields $\mu_0 H$ up to 5 T in a clamp-

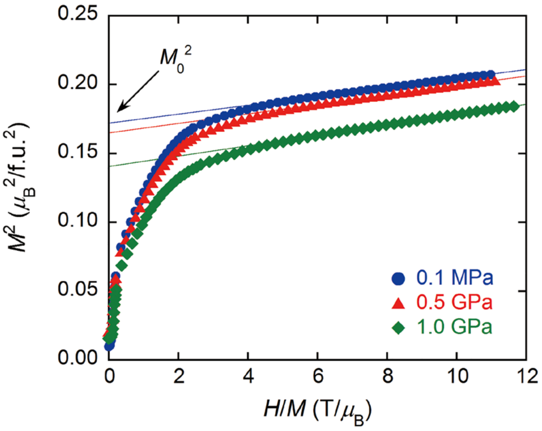

Fig. 1. Isothermal M^2 *vs.* H/M plots (Arrott plots) of CrAlGe under several pressures at 5 K. The solid lines are obtained by the least-squares calculation for the data.

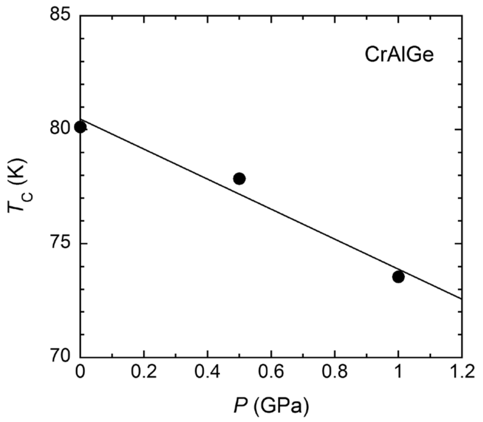

Fig. 2. Pressure dependence of T_C. The solid line is least-squares fit.

type piston cylinder pressure cell.

Figure 1 shows the isothermal M^2 *vs.* H/M plots (Arrott plots) at 5 K under several P. p_s at 0.1 MPa was determined to be 0.41 μ_B,/f.u. With increasing P, p_s decreased, and dlnp_s/dP was –9.5 × 10^{-5} /MPa. Fig. 2 shows P dependence of T_C. With increasing P, T_C decreased, and dlnT_C/dP was –8.2 × 10^{-5} /MPa. This is probably due to the increase of the 3d-bandwidth and the density of states in the vicinity of the Fermi level.

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Development of Cantilever Magnetometry Technique for Organic Samples and Its Application to TPP[Mn(Pc)(CN)$_2$]$_2$

K. Torizuka, H. Tajima, and Y. Uwatoko

We have developed the cantilever magnetometry technique to investigate magnetic properties of organic samples. A commercially available microcantilever for the atomic force microscopy (AFM) was employed. As shown in Fig. 1, our sample was situated at the tip of the cantilever

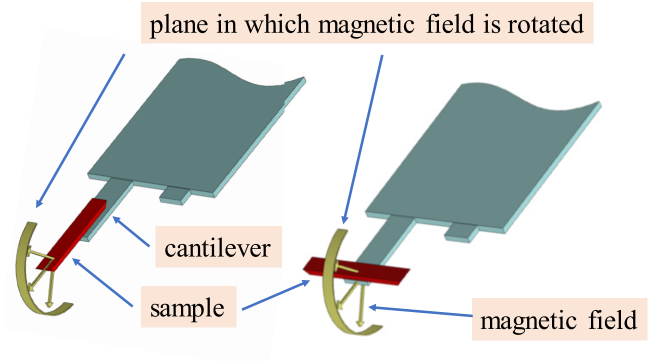

Fig. 1. Sample setup.

beam, depending on the plane in which the magnetic field is rotated. The experimental cell in which the sample was mounted was cooled by a ^{3}He refrigerator in a superconducting split-type magnet. The field direction is horizontal and the maximum field strength is 7 T. The magnet can be rotated so that the magnetic field direction can be changed by 360 degrees in a plane perpendicular to a vertical axis.

For the electrical circuit, two piezoresistors and two metal film resistors (47 kΩ) constituted a Wheatstone bridge. The signal which comes out from the electrical circuit is expressed by the quantity, $x \approx \Delta R/R_{ref}$ ($\Delta R \equiv R_{ref} - R_{cant}$, where R_{ref} and R_{canti} are piezoresistivities of the reference and the cantilever). This quantity x is proportional to the torque when x is small, but changes nonlinearly as x becomes larger [1].

The advantage of this technique is that even if the sample is very tiny, we can obtain the torque signal. In fact, the mass of our sample is approximately 1 μg. This technique is a very sensitive one.

We carried out magnetic torque measurements for TPP[Mn(Pc)(CN)$_2$]$_2$, that is isostructural to TPP[Fe(Pc)(CN)$_2$]$_2$. The latter is a well-known molecular conductor showing the negative giant magnetoresistance. Our motivation is to clarify the magnetic structure for the former sample. The sample has d^4 electrons which behave as a localized magnetic moment with spin S = 1.

The angular dependence of the torque when the magnetic field is rotated in a plane including c-axis is depicted in Fig. 2. The data shows a two-fold symmetry reflecting the crystal structure. The d electron emerges in the curve, which is characteristic for the ferromagnetism. However, since the susceptibility data exhibits the antiferromagnetic behavior, d electron should be interpreted as the canting antiferromag-

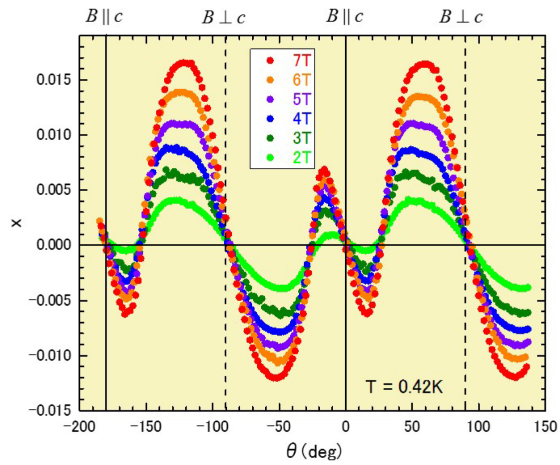

Fig. 2. Torque signal with the field rotated in the plane including c-axis.

netism [2].

On the other hand, when the magnetic field is rotated in the *ab* plane, the torque signal shows a saw-tooth wave form with a four-fold symmetry. It is characteristic for the antiferromagnetic. Considerations on magnetic properties of d electrons as well as π electrons are now in progress.

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Development of Numerical Library Kω ver. 1 and Quantum Lattice Solver HΦ ver. 2

T. Hoshi and Y. Yamaji

The two novel open-source softwares of (i) numerical library Kω ver.1 [1] and (ii) quantum lattice solver HΦ ver.2 [2] were developed in Project for advancement of software usability in materials science [3] at the fiscal year of 2016. The project name is 'shifted Krylov-subspace algorithm and novel solvers for computational condensed matter physics'. The project is an interdisciplinary one between computational material science and applied mathematics. The softwares are preinstalled on the supercomputer (sekirei) at ISSP [3]. The two softwares are closely related, because Kω is a set of numerical linear-algebraic routines and HΦ ver.2 supports the use of Kω in the optical spectrum calculations.

Kω is a general numerical library for the Green's function of $G_{ab}(\omega) = <a \mid [(E_0 + \omega + i\delta)I - H]^{-1} \mid b>$, where H is a large scale complex Hermitian or real-symmetric matrix and |a>, |b> are the input vectors. Traditionally, the problem was solved by the Lanczos-based algorithm. In the present solver, instead, the numerical solution is obtained from the linear equation of $[(E_0 + \omega + i\delta)I - H] \mid x > = \mid b >$ and the solution of $\mid x >$ is obtained by the novel iterative algorithm, called shifted Krylov subspace algorithm [4,5]. The algorithm was used for the excited spectrum of many-body states in a previous paper [5], which motivated us to the present project. The algorithm enables us to control the accuracy of the spectrum $G_{ab}(\omega)$ at a specific frequency ω, when one monitors the residual vector. The method is general and was applied also to many other computational science fields, such as QCD [4], electronic structure calculations, transport calculation with non-equilibrium Green's function theory. Kω is a general numerical library and can be called, in principle, from any material simulator, as well as HΦ ver.2. Moreover, a mini application is included in the package of Kω, so that researchers can evaluate the numerical library before the use in their real researches.

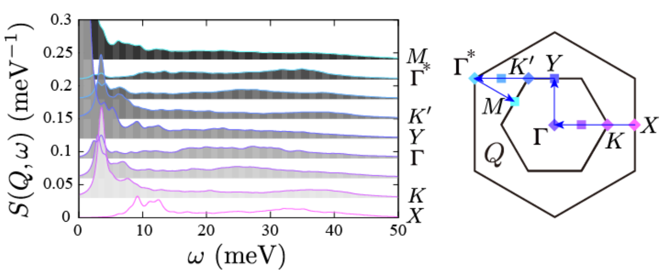

Fig. 1. Calculated dynamical structure factors $S(Q, \omega)$ of Na_2IrO_3 [8]. The spectra are vertically shifted depending on Q. The Brillouin zone of Na_2IrO_3 is shown in the right panel.

HΦ ver. 2 is the latest version of HΦ [6]. The quantum lattice solver HΦ is a program package based on exact diagonalization applicable to a broad range of quantum lattice models, including the Heisenberg model, the Kitaev model, the Hubbard model and the Kondo-lattice model. In HΦ ver. 1, the Lanczos method for calculating the ground state and a few excited states, thermal pure quantum (TPQ) states [7] for finite-temperature calculations, and full diagonalization method for checking results of Lanczos and TPQ methods are implemented with an easy-to-use and flexible user interface. The project in the 2016 fiscal year [3] has supported implementation of the Lanczos and shifted Krylov-subspace algorithm for calculating excitation spectra in the latest version HΦ ver.2. The HΦ ver.2 call subroutines for the shifted Krylov-subspace algorithm from the library Kω.

As an example tractable by HΦ ver.2, we show excitation spectra of an ab initio spin hamiltonian of an iridium oxides Na_2IrO_3 [8], which is a so-called Kitaev material and a typical example of frustrated magnets due to magnetic anisotropy. In Fig.1, dynamical spin structure factors calculated for a 24-site cluster of the ab initio spin hamiltonian of an iridium oxides Na_2IrO_3 are shown. The continuum in the spectra is the hallmark of the proximity to the Kitaev's quantum spin liquid. The controlled accuracy of the shifted Krylov-subspace algorithm safely resolves the detailed continuum spread over the wide range of frequency, where the typical exchange energy scale of Na_2IrO_3 is 30 meV.

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Structural Characterization of Module-Assembled Amphiphilic Conetwork Gels

M. Shibayama, S. Kondo, and E. P. Gilbert

Amphiphilic conetworks are composed of hydrophilic and hydrophobic polymers. Their amphiphilicity is promising for many applications because amphiphilic conetworks can absorb both polar and nonpolar solutes. This is useful for drug delivery, drug release systems, antifouling coatings, gas and biosensors, chiral separation membranes, activating carriers for biocatalysts, and soft contact lenses. We developed inhomogeneity-free amphiphilic conetworks consisting of poly(ethylene glycol)–poly(dimethylsiloxane) (PEG–PDMS) and carried out structural analysis by the complementary use of small-angle X-ray (SAXS) and neutron scattering (SANS). Figure 1 shows the preparation

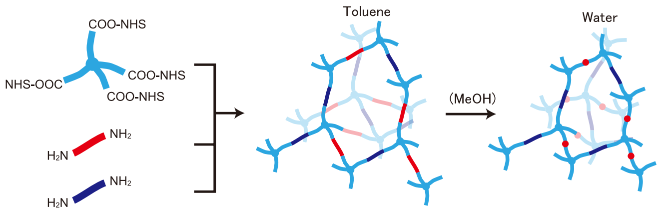

Fig. 1. Schematics of sample preparation for PEG–PDMS gels with r = 0.5. Light blue, dark blue, and red segments represent tetra-arm-PEG, linear-PEG, and linear-PDMS units, respectively. In toluene, the gels are in swollen state, while they undergo microphase separation in water due to shrinking of the PDMS chains.

scheme of PEG–PDMS gels. The main components were two types of tetra-arm PEGs; –COO-NHS terminated PEG (NHS: N-hydroxysuccinimide) and $-NH_2$ terminated PEG. In addition, the weight fraction of PDMS in the conetworks, r, was tuned by using $-NH_2$ terminated linear-PEG. By using equimolar prepolymers carrying –COO-NHS and $-NH_2$, a precise tuning of PDMS content rate was achieved. Because of the hydrophobicity of PDMS units, the PEG–PDMS gels exhibit a microphase-separated structure in water. Figure 2 shows the SANS profiles of swollen PEG–PDMS gels with various solvents. The SANS profiles exhibited marked changes depending on the solvent; from a monotonous decrease without peak for toluene to multiple peaks for water.

Depending on the volume fraction of PDMS, the microphase-separated structure varies from core–shell to lamellar. The obtained SAXS and SANS profiles are reproduced well using a core–shell model together with a Percus–Yevick structure factor when the volume fraction of PDMS is small. The domain size is much larger than the size of individual PEG and PDMS unit, and this is explained using the theory of block copolymers. Reflecting the homogeneous dispersion conditions in the as-prepared state, scattering peaks are observed even at a very low PDMS volume fraction (0.2 %). When the volume fraction of PDMS is large, the microphase-separated structure is lamellar and is demonstrated to be kinetically controlled by nonequilibrium and topological effects. The microphase separation in the PEG–PDMS gels is illustrated schematically in Figure 3. It is clarified that the microphase-separated structure is tunable by changing the molecular weight of PEG and PDMS and their proportion. This may open the door for the precise design of the mesoscopic structure of amphiphilic gels.

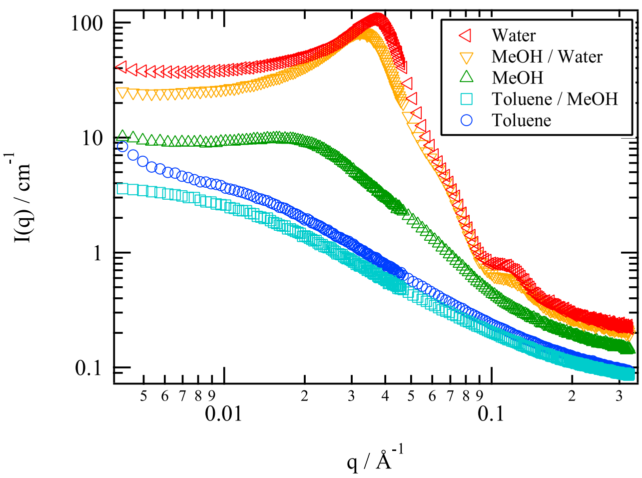

Fig. 2. SANS profiles of PEG–PDMS gels (r = 1) with different solvents. The ratios of toluene/MeOH and MeOH/water are both 1/1 (volume fraction). By decreasing the solubility of PDMS, the gels undergo microphase separation, giving rise to distinct peaks in SANS.

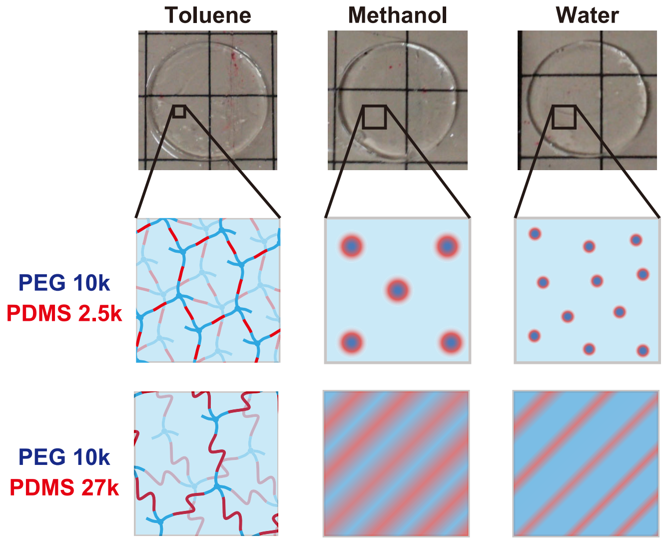

Fig. 3. Proposed phase separation mechanism during solvent substitution from toluene, methanol, to water. The morphology is dependent on the ratio of PEG and PDMS as well as their molecular weights.

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Magnetoelectric Behavior in a Chiral Antiferromagnet $Ba(TiO)Cu_4(PO_4)_4$

Y. Kato, K. Kimura, and A. Miyake

A unique asymmetric magnetic unit, square cupola (see Fig. 1), has been realized in newly synthesized magnetoelectric compounds, $A(TiO)Cu_4(PO_4)_4$ (A = Ba, Sr) [1]. Spatial asymmetry often activates the asymmetric interactions between localized spins through the relativistic spin-orbit coupling, e.g., the Dzyaloshinskii-Moriya (DM) interaction. The asymmetric interactions lead to intriguing magnetism such as spin-spiral orderings and skyrmion crystals. They have attracted growing interest as an origin of unusual magnetic and electronic properties, such as the magnetoelectric (ME) effect, that is cross-correlations between magnetism and dielectricity. The compound $Ba(TiO)Cu_4(PO_4)_4$ indeed exhibits a divergent anomaly of the dielectric constant at the Néel temperature (T_N = 9.5 K) [2].

Here we report the ME properties of this compound

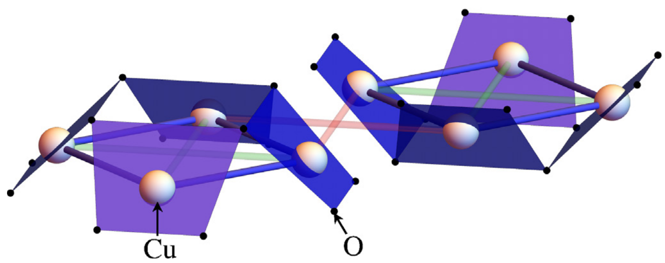

Fig. 1. Square cupolas made of Cu_4O_{12} in $A(TiO)Cu_4(PO_4)_4$ (A = Ba, Sr). The materials have a quasi-two-dimensional structure, composed of an alternating array of upward and downward Cu-cupolas.

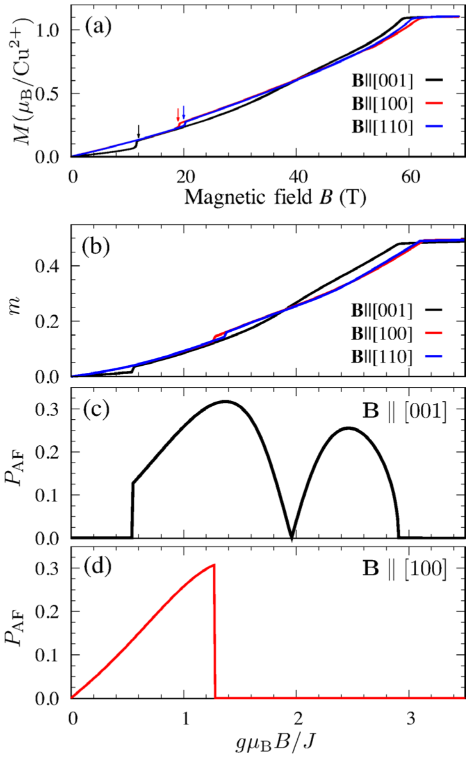

Fig. 2. (a) Magnetization curves in the experiment at T = 1.4 K. The arrows indicate the jump-like anomalies. (b) Magnetization curves of the minimal theoretical model obtained by the cluster mean-field approach. (c,d) Magnetic field dependence of the anti-ferroelectric polarization (P_{AF}) for (c) **B** || [001] and (d) **B** || [100]. The electric polarization is computed based on the exchange striction mechanism. All the data are taken from Ref. [3].

by a combined experimental and theoretical study [3]. The magnetization is measured up to the external magnetic field above the saturation at the temperature far below T_N (T = 1.4 K) at the International MegaGauss Science Laboratory of the Institute for Solid State Physics at the University of Tokyo. As shown in Fig. 2(a), the magnetization curves exhibit the field-direction dependence with several jump-like anomalies, indicating the importance of the spin-orbit coupling. For understanding the unusual behavior, we construct a minimal theoretical model and study the ground-state and finite-temperature properties of the model. In the compound, because of the loss of inversion symmetry at the centers of bonds connecting the nearest neighbor Cu cations having S = 1/2 degrees of freedom, the DM interaction between the nearest neighbor spins is activated. Taking into account the DM interaction in the model and solving it by the cluster mean-field approximation, we successfully reproduce the entire magnetization curves, as shown in Fig. 2(b), especially, the directional dependence of the saturation fields and the critical fields of the jump-like anomalies. We show that the anomalies are explained by ME phase transitions associated with the noncollinear antiferromagnetic ordering and the antiferroelectric ordering. (See Figs. 2(c) and 2(d).) Moreover, our theory also explains the scaling of the dielectric anomaly at the Néel temperature observed in the experiments.

By further analysis of the model, we elaborate the ME phase diagram of the model by changing the magnetic field and the temperature. The results clarify the crucial role of the in-plane component of the DM vector. We also predict a "hidden" phase and ME response in a nonzero magnetic field, both of which await the experimental confirmation. Our results demonstrate how the asymmetric magnetic units activate the ME responses through the DM interactions arising from the spin-orbit coupling. The present study could inspire motivation on the material design for ME-active materials composed of such asymmetric units.

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Evidence of Charge Transfer and Orbital Magnetic Moment in the Multiferroic $CuFeO_2$

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Original meaning of "multiferroics" is coexistence of "multiple" and "ferroic" ordered states. However, nowadays, multiferoics is commonly recognized as phenomena involving antiferroic properties such as antiferromagnetic. As a result, multiferroics comes to have diversity in functionality, such as magnetic-field-control of ferroelectricity. The triangular lattice antiferromagnet $CuFeO_2$ (abbreviated to CFO) shows ferroelectricity in a finite magnetic field [1]. Nominal oxidation state of Fe is Fe^{3+} ($3d^5$) with spin S = 5/2 and with orbital singlet L = 0. Therefore a classical ordered state is expected to be a noncollinear 120 degrees spin arrangement. However, in reality, CFO shows a 4-sublattice collinear magnetic ordering below 11 K by forming a scalene triangle, because of the geometrical frustration and a spin-lattice coupling. By an application of magnetic field, CFO shows successive magnetization jumps, although no magnetic anisotropy is expected. The ferroelectricity can be explained by a recently proposed mechanism, *d-p* hybridization, in which a spin-dependent charge transfer (CT) between the transition metal and the ligand is essential [2].

The aim of the present study is to clarify the local electronic state of CFO, which should play an important role

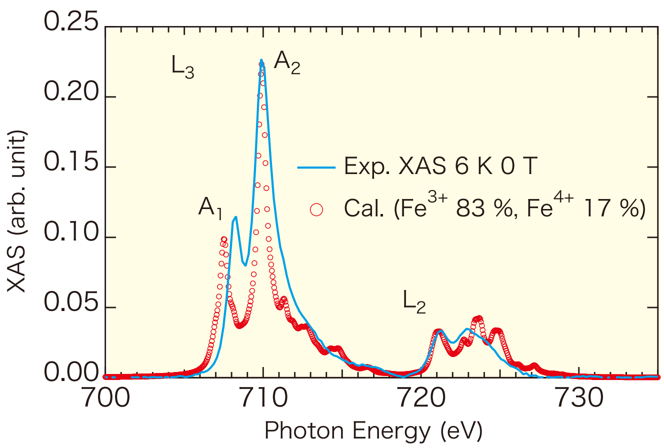

Fig. 1. Experimental (blue solid line) and theoretical (red open circle) XAS's of Fe $L_{2,3}$-edge of CFO at 6 K without magnetic field. The data are offset and amplified by a numerical factor so as to scale them at the pre-edge and the maximum of L_3-edge.

in the ferroelectricity and the magnetic anisotropy. For that reason, we performed x-ray magnetic circular dichroism (XMCD) measurements in high magnetic fields at SPring-8/BL25SU [3]. By tuning an incident energy to the absorption edge of a specific magnetic ion, XMCD gives us the spin and orbital magnetic moments of the ions independently. Moreover the x-ray absorption spectrum (XAS) is sensitive to the valence state of the ion. Therefore we are able to investigate both magnetic and electronic properties from the microscopic point of view. The ultra-high vacuum chamber equipped with a pulse magnet was developed in collaboration with Tohoku University, SPring-8, and University of Tokyo. This is the unique soft x-ray spectrometer reaching 40 T in the world.

Figure 1 shows the comparison between the experimental XAS of Fe $L_{2,3}$-edge at 6 K and the ab-initio multiplet calculation at 0 T. The broadness of the experimental XAS is not due to resolution. It is because that there is a restriction of the number of the electronic configurations in the calculations. There is unignorable discrepancy with respect to the energy split between main A_2 and satellite A_1 peaks. This is also due to the same reason as the fine structures in the theoretical calculation. Although nominal valence of Fe is Fe^{3+}, an addition of a small amount of Fe^{4+} component leads to a better agreement than the theoretical XAS of only Fe^{3+}. Figure 2 represents experimental results of Fe $L_{2,3}$-edge XMCD at 15.1 T and corresponding energy-integral. By analysis based on sum rule, the ratio of spin (m_s) to orbital (m_o) magnetic moments was determined to be m_s/m_o = -0.071. That is, the m_s and m_o point in the opposite direction to each other.

According to Hund's rules, the antiparallel configuration of the m_s and m_o leads to the fact that the 3d electronic configuration of Fe should be less than half-filled. In other words, we can say that Fe^{4+} ($3d^4$) state exists. From the viewpoint of charge compensation among ions, presence of Fe^{4+} ion needs a CT from somewhere. Accordingly, we measured XAS of Cu $L_{2,3}$-edges and related compounds for comparison. Surprisingly, it turned out that the valence state of Cu is similar to neither that of Cu^+ nor that of Cu^{2+}, but that of Cu metal. This gives a new insight that it is important to take into consideration for correlation between Fe and Cu as well as oxygen in order to fully understand ferroelectric and magnetic properties of CFO.

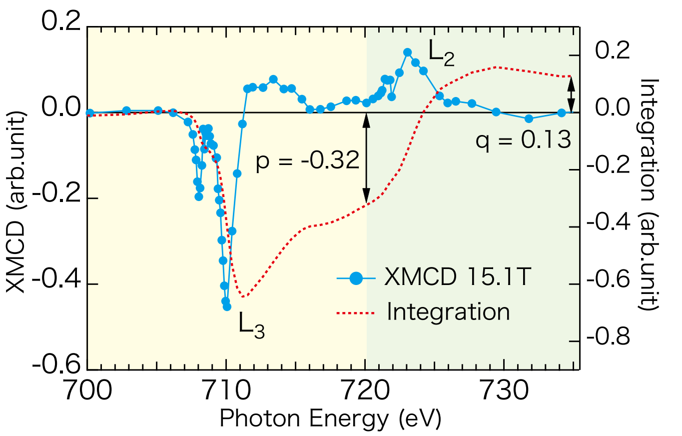

Fig. 2. Experimental XMCD of Fe $L_{2,3}$-edges at 15.1 T (blue solid line with solid circle) and integration of it (red dashed line). According to Sum rule, the ratio of spin to orbital magnetic moments is given by $m_s/m_o = 2q/(9p - 6q)$. The numerical values of p and q indicated by arrows are the integrals of the XMCD over the L_3 and the whole $L_{2,3}$ absorption regions, respectively.

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High-field Magnetization Study of the S = 1/2 Kagome Lattice Antiferromagnet $CaCu_3(OH)_6Cl_2 \cdot 0.6H_2O$

H. Yoshida, Y. Narumi, and M. Hagiwara

Seeking the quantum spin liquid state has been one of the central issues of the condensed matter physics. Various theories expected to realize the quantum spin liquid state on the Kagome lattice antiferromagnet owing to the strong frustration and the quantum fluctuation. Recently, the appearance of non-trivial magnetization plateaus at $(2n + 1)M_s/9$ for the S = 1/2 Kagome lattice antiferromagnet was predicted by the grand canonical DMRG [1] and Tensor network method [2], and thus the study of the magnetization curves of the Kagome lattice antifferomagnet has been of significant interest. However, the lack of appropriate model compounds is one of the difficulties to understand the magnetic properties of Kagome lattice antiferromagnet in the high magnetic fields.

Recently, we have succeeded to prepare the single crystal of S = 1/2 Kagome lattice antiferromagnet $CaCu_3(OH)_6Cl_2 \cdot 0.6H_2O$ which has the perfect Kagome lattice without an anti-site disorder [3]. This compound possesses magnetic interactions of the nearest neighbor interaction J_1, and the next nearest neighbor J_2, and the J_d across the hexagon as shown in the inset of Fig. 1. Thus, an emergence of a novel magnetic state on the Kagome lattice is expected by the competition of the magnetic interactions. In this study, we report on magnetic properties of the single crystal of $CaCu_3(OH)_6Cl_2 \cdot 0.6H_2O$ revealed by the magnetic susceptibility, heat capacity, and high-field magnetization measurements [3].

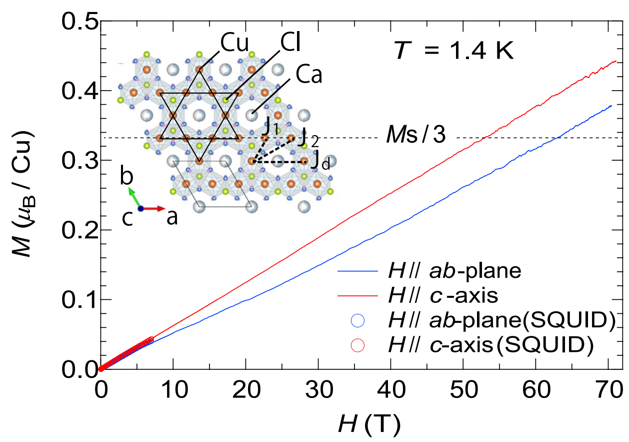

Fig. 1. The magnetization curves measured on the single crystal of $CaCu_3(OH)_6Cl_2 \cdot 0.6H_2O$ at 1.4 K up to the magnetic field of 71 T. The dashed line is the guide to the eye for the 1/3 magnetization of the saturation moment of S = 1/2. The inset shows the schematic illustration of the Kagome layer of $CaCu_3(OH)_6Cl_2 \cdot 0.6H_2O$ with the magnetic interactions J_1, J_2, and J_d.

The magnetic interactions of antiferromagnetic J_1 = 52.2 K, J_d = 11.9 K, and ferromagnetic J_2 = −6.9 K were extracted from the 9th order high temperature series expansion analysis. The magnetic susceptibility and the heat capacity measurements indicated that an occurrence of an unusual magnetic transition at T^* = 7.2 K where only the χ_{ab} showed the cusp and the heat capacity exhibited the tiny peak anomaly. The cusp in the χ_{ab} disappeared above around 5 T, and it exhibited temperature independent behavior below T^*. Remarkably, in spite of the fact that the compound is an insulator, the temperature-linear term 5.9 mJ/CumolK^2 at H = 0 T was observed in the heat capacity which was suppressed by the magnetic field around 10 T. This suggests that the unconventional magnetic excitation underlies on the ground state of $CaCu_3(OH)_6Cl_2{\cdot}0.6H_2O$ [3].

Figure 1 shows the magnetization curves for both H // *ab*-plane and H // *c*-axis at 1.4 K up to 71 T. The magnetization along the *c*-axis increases monotonously. In contrast, a slope of the curve for H // *ab*-plane becomes small above 5 T which may correspond to the disappearing of the cusp in χ_{ab} and the T-linear term in the magnetic field, and one can clearly see the upward convex feature above the 5 T anomaly. No meta-magnetic transitions and magnetization plateau at M_s/9 and M_s/3 for both directions were found. This may be attributed to the effect of the magnetic interactions J_2 and J_d which has not been considered in the theoretical calculations[1,2]. In order to clarify the magnetic properties of the S = 1/2 ideal Kagome lattice antiferromagnet, the magnetization measurement in the much higher field, microscopic measurements such as high-field ESR and theoretical investigation are required.

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Authors

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A Compact Permanent-Magnet System for Measuring Magnetic Circular Dichroism in Resonant Inelastic Soft X-Ray Scattering

J. Miyawaki, S. Suga, and Y. Harada

Resonant inelastic X-ray scattering (RIXS), especially soft X-ray RIXS (SX-RIXS), has made remarkable progress in energy resolution over the past few decades in conjunction with the improvement of the performance of synchrotron radiation sources and the advancements in the RIXS instrumentation. Accordingly, RIXS has come to occupy an important position in X-ray spectroscopy techniques for investigating the bulk electronic structures. The photon-in/photon-out process adds to RIXS the distinctive feature that the electronic structure can be measured even in an electronic and/or magnetic field. Regarding the use of the magnetic field for RIXS, magnetic circular dichroism (MCD) in RIXS (RIXS-MCD) has intensively been used to extract spin-resolved valence band excitations. In addition to all the features inherited from RIXS itself, RIXS-MCD of *dd* excitations that can easily be separated by the use of the latest high-energy-resolution RIXS apparatus can provide magnetic information for each localized *d* orbital. With these advantages, RIXS-MCD is becoming a very promising technique, and is expected to be successfully applied to new functional materials in which spins play important roles, such as multiferroics and those to be used for spintronic devices. In order to demonstrate the significance of RIXS-MCD with high energy resolution and encourage its wider use, it is highly desired that RIXS-MCD experiments can be performed as a common tool at any RIXS end-station in worldwide synchrotron radiation facilities. Therefore, we developed a compact and portable magnet system for RIXS-MCD composed of Nd-Fe-B permanent magnets which can generate a magnetic field of ~0.25 T [1].

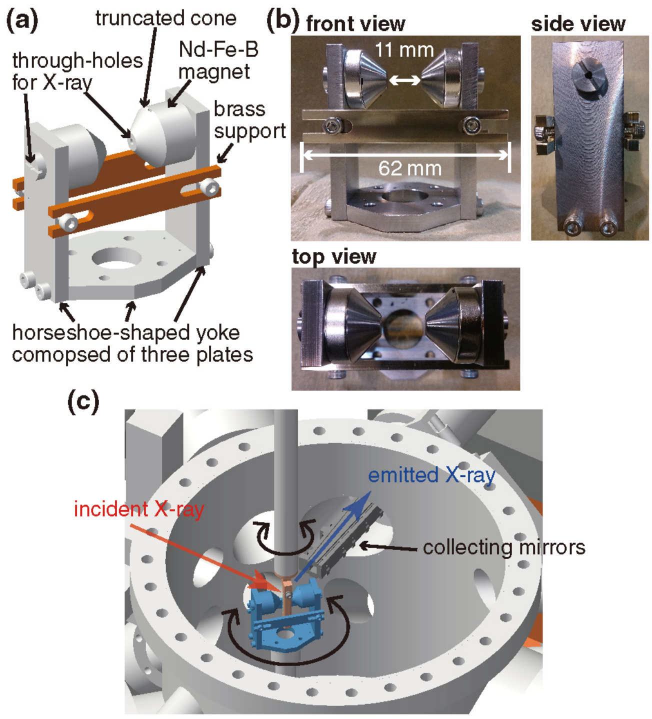

Fig. 1. Schematic representation and photographs of the magnet system and experimental setup. (a) Schematic representation and (b) photographs of the magnetic circuit. The magnets are fixed by a screw with a through-hole for the X-ray beam. (c) Experimental configuration of RIXS-MCD at the HORNET end-station in SPring-8 BL07LSU when the angle of the magnetic field is set at 45° to the incident X-ray.

Figures 1(a) and 1(b) display a schematic drawing and photographs of the originally-designed magnetic circuit. The magnetic circuit consists of Nd-Fe-B magnets, a horseshoe-shaped yoke, truncated cone poles, and two supports. The Nd-Fe-B magnets are the source of the magnetic field. The horseshoe-shaped yoke and truncated cone poles are made of Fe, and functions to focus the magnetic fields. The two supports are made of brass, and function to resist the attractive force between the magnets. The overall size of the magnetic circuit is within φ65 mm so that it can be installed through and mounted on the most commonly used 4-1/2 inch-diameter ConFlat® flange. This compact design of the magnetic circuit allows it to be installed without any modification to the existing vacuum chambers and optical systems for RIXS. Figure 1(c) is a schematic representation of the experimental configuration in a vacuum chamber using this magnet system at the HORNET end-station in SPring-8 BL07LSU.

We have demonstrated the capability of the present magnet system for RIXS-MCD. Figure 2 shows X-ray magnetic circular dichroism (XMCD) and RIXS-MCD of

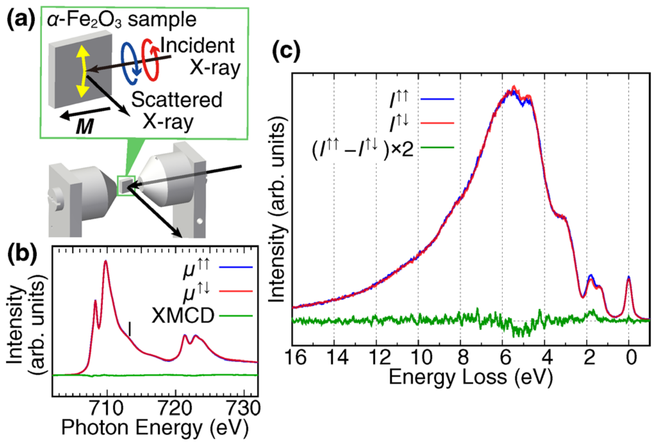

Fig. 2. Fe *L*-edge XMCD and RIXS-MCD spectra of an α-Fe_2O_3(111) single crystal. (a) Sketch of the experimental configuration with the orientation of the spin. The magnetic field is parallel to the incident X-ray and the incident angle is 10° from the sample surface. Yellow arrows on the α-Fe_2O_3(111) sample represent the direction of the antiferromagnetically coupled and canted spin moments on the (111) plane. (b) Fe $L_{2,3}$-edge XAS spectra measured by circularly polarized X-rays with the XMCD spectrum. (c) RIXS-MCD spectra measured at $h\nu$ = 713.25 eV indicated by a vertical line in (b).

weak ferromagnetism in α-Fe_2O_3. We measured XMCD and RIXS-MCD in the grazing incidence geometry as shown in Fig. 2(a). No discernible signal was detected in its XMCD spectrum [Fig. 2(b)]. This is because the net magnetic moment owing to the weak ferromagnetism is too small to be detected. Figure 2(c) exhibits the RIXS-MCD spectra excited at the charge-transfer satellite as indicated by the solid line in Fig. 2(b). RIXS-MCD was clearly observed at 1.8 and 4.85 eV loss energies, which are assigned to a *dd* excitation and a charge-transfer transition, respectively. Thus, RIXS-MCD was clearly observed by high-energy-resolution RIXS, though XMCD was not observed. These results confirmed that the observed RIXS-MCD was induced by the RIXS process, via the different relaxation probabilities of polarized valence electrons to polarized core holes created by the circularly polarized X-rays. These results suggest that more useful bulk information about the ground-state spin state can be obtained by using RIXS-MCD.

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Progress of Facilities

Supercomputer Center

The Supercomputer Center (SCC) is a part of the Materials Design and Characterization Laboratory (MDCL) of ISSP. Its mission is to serve the whole community of computational condensed-matter physics of Japan providing it with high performance computing environment. In particular, the SCC selectively promotes and supports large-scale computations. For this purpose, the SCC invites proposals for supercomputer-aided research projects and hosts the Steering Committee, as mentioned below, that evaluates the proposals.

The ISSP supercomputer system consists of two subsystems: System B, which is intended for more nodes with relatively loose connections. In July, 2015, the SCC replaced the two supercomputer subsystems (SGI Altix ICE 8400EX and NEC SX-9) with one new system (System B, SGI ICE XA/UV hybrid system). The system B consists of 1584 CPU nodes, 288 ACC nodes, and 19 FAT nodes. The CPU node has 2CPUs (Intel Xeon). The ACC node has 2CPUs (Intel Xeon) and 2GPUs (NVIDIA Tesla K40). The FAT node has 4CPUs (Intel Xeon) and large memory (1TB). The system B has totally 2.6 PFlops theoretical peak performance.

System C - FUJITSU PRIMEHPC FX10 was installed in April, 2013. It is highly compatible with K computer, the largest supercomputer in Japan. System C consists of 384 nodes, and each node has 1 SPARC64TM IXfx CPU (16 cores) and 32 GB of memory. The system C has totally 90.8 TFlops.

The hardware administration is not the only function of the SCC. Since 2015, the SCC has started “Project for advancement of software usability in materials science”. In this project, for enhancing the usability of the ISSP supercomputer system, we perform some software-advancement activities such as implementing a new function to an existing code, releasing a private code on Web, and writing manuals. Two target programs were selected in fiscal year 2016 and developed software were released as Komega (Kω) and mVMC. The SCC has also started a service for porting users’ materials science software to General Purpose GPUs (GPGPU) since 2015. Three programs were selected for the GPGPU porting in fiscal year 2016.

All staff members of university faculties or public research institutes in Japan are invited to propose research projects (called User Program). The proposals are evaluated by the Steering Committee of SCC. Pre-reviewing is done by the Supercomputer Project Advisory Committee. In fiscal year 2016, a total of 244 projects were approved. The total points applied and approved are listed on Table. 1 below. Additionally, we supported post-K and other computational materials science projects through Supercomputing Consortium for Computational Materials Science (SCCMS).

The research projects are roughly classified into the following three (the number of projects approved):

First-Principles Calculation of Materials Properties (117)
Strongly Correlated Quantum Systems (30)
Cooperative Phenomena in Complex, Macroscopic Systems (97)

All the three involve both methodology of computation and its applications. The results of the projects are reported in 'Activity Report 2016' of the SCC. Every year 3-4 projects are selected for “invited papers” and published at the beginning of the Activity Report. In the Activity Report 2016, the following three invited papers are included:

Class	Max Points		Application	Number of Projects	Total Points			
					Applied		Approved	
	System B	System C			System B	System C	System B	System C
A	100	100	any time	9	0.9k	0.9k	0.9k	0.9k
B	1k	500	twice a year	50	41.7k	8.2k	29.1k	7.2k
C	10k	2.5k	twice a year	166	1387.8k	164.7k	679.0k	126.7k
D	10k	2.5k	any time	7	59.0k	5.0k	33.3k	3.0k
E	30k	2.5k	twice a year	12	350.0k	30.0k	219.5k	26.5k
S			twice a year	0	0	0	0	0
SCCMS				32	218.9k	103.5k	218.9k	103.5k
Total				276	2058.3k	312.3k	1180.7k	267.8k

Table 1. Research projects approved in 2016
The maximum points allotted to the project of each class are the sum of the points for the two systems; Computation of one node for 24 hours corresponds to one points for the CPU nodes of System B and System C. The FAT and ACC nodes require four and two points for a 1-node 24-hours use, respectively.

"Development of First-Principles Simulation of Material Structure and Electronic Properties", Shinji TSUNEYUKI

"Massively parallel Monte Carlo simulation of a possible topological phase transition in two-dimensional frustrated spin systems", Tsuyoshi OKUBO"

"Irreversible Markov-Chain Monte Carlo methods", Koji HUKUSHIMA"

Neutron Science Laboratory

The Neutron Science Laboratory (NSL) has been playing a central role in neutron scattering activities in Japan since 1961 by performing its own research programs as well as providing a strong General User Program for the university-owned various neutron scattering spectrometers installed at the JRR-3 (20MW) operated by Japan Atomic Energy Agency (JAEA) in Tokai. In 2003, the Neutron Scattering Laboratory was reorganized into the Neutron Science Laboratory to further promote the neutron science with use of the instruments in JRR-3. Under the General User Program supported by NSL, 14 university-group-owned spectrometers in the JRR-3 reactor are available for a wide scope of researches on material science, and proposals close to 300 are submitted each year, and the number of visiting users under this program reaches over 6000 person-day/year. In 2009, NSL and Neutron Science Laboratory (KENS), High Energy Accelerator Research Organization (KEK) built a chopper spectrometer, High Resolution Chopper Spectrometer, HRC, at the beam line BL12 of MLF/J-PARC (Materials and Life Science Experimental Facility, J-PARC). HRC covers a wide energy and Q-range (10μeV < $\hbar\omega$ < 2eV and 0.02Å^{-1} < Q < 50Å^{-1}), and therefore becomes complementary to the existing inelastic spectrometers at JRR-3. HRC started to accept general users through the J-PARC proposal system in FY2011.

Triple axis spectrometers, HRC, and a high resolution powder diffractometer are utilized for a conventional solid state physics and a variety of research fields on hard-condensed matter, while in the field of soft-condensed matter science, researches are mostly carried out by using the small angle neutron scattering (SANS-U) and/or neutron spin echo (iNSE) instruments. The upgraded time-of-flight (TOF) inelastic scattering spectrometer, AGNES, is also available through the ISSP-NSL user program.

Scientific outputs from HRC in FY2016 covers wide range in magnetism and strongly correlated electrons. One of the research highlights is the observation of the crystal field excitation in breathing pyrochlore antiferromagnet $Ba_3Yb_2Zn_5O_{11}$ [1]. Combination of position sensitive detectors in wide scattering angle and strong neutron flux in wide energy range enables the effective measurement of neutron structure factor $S(Q, \hbar\omega)$ as shown in Fig. 1. Well-defined excitations are observed at 38.2, 55.0 and 68.3 meV. They are the crystal field excitations of Yb^{3+} ions having four Kramers doublets. The detailed analysis identified the parameters of the crystal field Hamiltonian having C_{3v} symmetry and determined the eigenstate of the ground state. The anisotropy of the effective spin 1/2 of the ground state was estimated. The information was indispensable for the further study of the breathing pyrochlore in the low-energy dynamics [2].

Technical progress of HRC spectrometer was the development of high pressure environment. Cylinder-type cell made of CuBe alloy was designed by Prof. Uwatoko. The volume for the sample space is 5 mm in diameter and 20 mm in length. The maximum pressure is 1.4 GPa. The measurement was performed on 0.4g of $CsFeCl_3$ sample. 1 K cryostat was used to achieve 0.7 K, and the power of the J-PARC operation was 150 kW. Well-defined spin wave was successfully measured in the pressure-induced magnetic phase in $CsFeCl_3$.

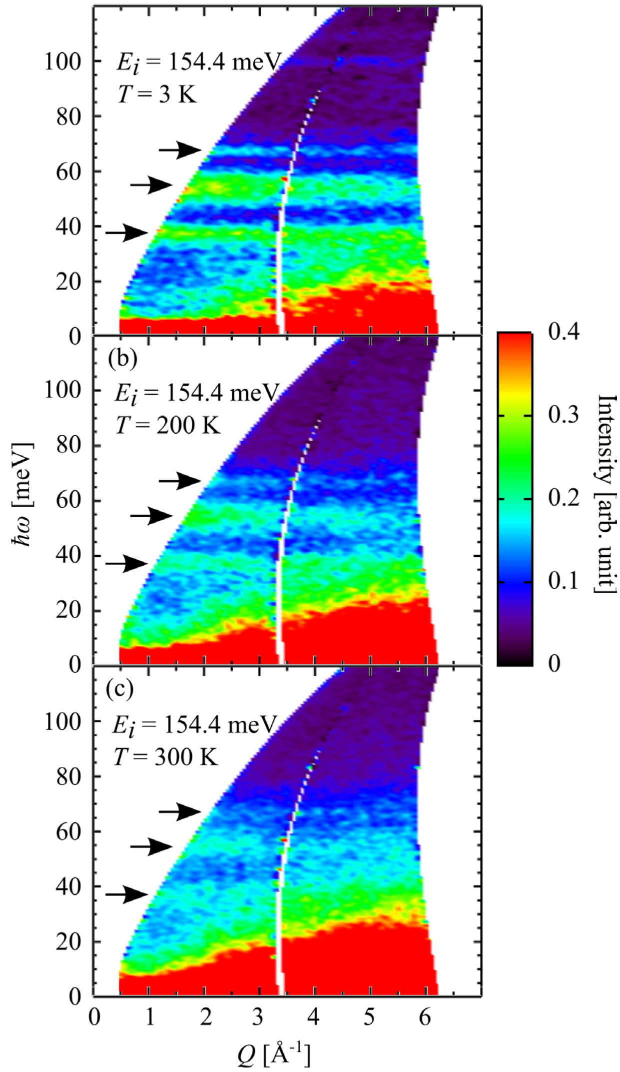

Fig. 1. Inelastic neutron spectra measured by HRC spectrometer at (a) 3 K, (b) 200 K, and (c) 300 K. The arrows indicate the crystal field excitations of Yb^{3+} ion. Dominant excitations in the low energy range are from phonon.

The NSL also operates the U.S.-Japan Cooperative Program on neutron scattering, providing further research opportunities to material scientists who utilize the neutron scattering technique for their research interests. In 2010, relocation of the U.S.-Japan triple-axis spectrometer, CTAX, was completed, and it is now open to users.
http://neutrons.ornl.gov/instruments/HFIR/CG4C/

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International MegaGauss Science Laboratory

The objective of this laboratory (Fig. 1) is to study the physical properties of solid-state materials (such as semiconductors, magnetic materials, metals, insulators, superconducting materials) under ultra-high magnetic field conditions. Such a high magnetic field is also used for controlling the new material phase and functions. Our pulse magnets, at moment, can generate up to 87 Tesla (T) by non-destructive manner, and from 100 T up to 760 T (the world strongest as an in-door record) by destructive methods. The laboratory is opened for scientists both from Japan and from overseas, especially from Asian countries, and many fruitful results are expected to come out not only from collaborative research but also from our in-house activities. One of our ultimate goals is to provide the scientific users as our joint research with magnets capable of a 100 T, millisecond long pulses in a non-destructive mode, and to offer versatile physical precision measurements. The available measuring techniques now involve magneto-optical measurements, cyclotron resonance, spin resonance, magnetization, and transport measurements. Recently, specific heat and calorimetric measurements are also possible to carry out with sufficiently high accuracy.

Our interests cover the study on quantum phase transitions (QPT) induced by high magnetic fields. Field-induced QPT has been explored in various materials such as quantum spin systems, strongly correlated electron systems and other magnetic materials. Non-destructive strong pulse magnets are expected to provide us with reliable and precise solid state physics measurements. The number of collaborative groups for the research is almost 75 in the FT of 2016.

A 210 MJ flywheel generator (Fig. 2), which is the world largest DC power supply (recorded in the Guinness Book of World Records) has been installed in the DC flywheel generator station at our laboratory, and used as an energy source of super-long pulse magnets. The magnet technologies are intensively devoted to the quasi-steady long pulse magnet (an order of 1-10 sec) energized by the giant DC power supply. The giant DC power source will also be used for the giant outer-magnet coil to realize a 100 T nondestructive magnet by inserting a conventional pulse magnet coil in its center bore.

Fig. 1. Signboard at the entrance of the IMGSL.

	Alias	Type	B_{max}	Pulse width Bore	Power source	Applications	Others
Building C Room 101-113	Electro- Magnetic Flux Compression	destructive	1000 T (under development)	μs 10 mm	5 MJ, 50 kV 2 MJ, 50 kV	Magneto-Optical Magnetization	5 K – Room temperature
	Horizontal Single-Turn Coil	destructive	300 T 200 T	μs 5 mm 10 mm	0.2 MJ, 50 kV	Magneto-Optical measurements Magnetization	5 K – 400 K
	Vertical Single-Turn Coil	destructive	300 T 200 T	μs 5 mm 10 mm	0.2 MJ, 40 kV	Magneto-Optical Magnetization	2 K – Room temperature
Building C Room 114-120	Mid-Pulse Magnet	Non-destructive	60 T 70 T	40 ms 18 mm 40 ms 10 mm	0.9 MJ, 10 kV	Magneto-Optical measurements Magnetization Magneto-Transport Hall resistance Polarization Magneto-Striction Magneto-Imaging Torque Magneto- Calorimetry Heat Capacity	Independent Experiment in 5 site Lowest temperature 0.1 K
Building C Room 121	PPMS	Steady State	14 T			Resistance Heat Capacity	Down to 0.3 K
	MPMS	Steady State	7 T			Magnetization	
Building K	Short-Pulse Magnet	Non-destructive	87 T (2-stage pulse) 85 T	5 ms 10 mm 5 ms 18 mm	0.5 MJ, 20 kV	Magnetization Magneto-Transport	2 K – Room temperature
	Long-Pulse Magnet	Non-destructive	43.5 T	1 s 30 mm	210 MJ, 2.7 kV	Resistance Magneto-Calorimetry	2 K – Room temperature

Table 1. Available Pulse Magnets, Specifications

Fig. 2. The building for the flywheel generator (left hand side) and a long pulse magnet station (right hand side). The flywheel giant DC generator is 350 ton in weight and 5 m high (bottom). The generator, capable of a 51 MW output power with the 210 MJ energy storage, is planned to energize the long pulse magnet generating 100 T without destruction.

Magnetic fields exceeding 100 T can only be obtained with destruction of a magnet coil, where ultra-high magnetic fields are obtained in a microsecond time scale. The project, financed by the ministry of education, culture, sports, science and technology aiming to generate 1000 T with the electromagnetic flux compression (EMFC) system (Fig. 3), has been proceeded. Our experimental techniques using the destructive magnetic fields have intensively been developed. The system which is unique to ISSP in the world scale is comprised of a power source of 5 MJ main condenser bank and 2 MJ condenser bank. Two magnet stations are constructed and both are energized from each power source. Both systems are fed with another 2 MJ condenser bank used for a seed-field coil, of which magnetic flux is to be compressed. The 2 MJ EMFC system is currently under the process for optimizing several mechanical and electrical parameters such as dimensions of coils and liners. And so far, generation of 450 T was successfully done using 1.6 MJ energy. The 5 MJ EMFC system is under conditioning the main gap switches by finely tuning control parameters. As

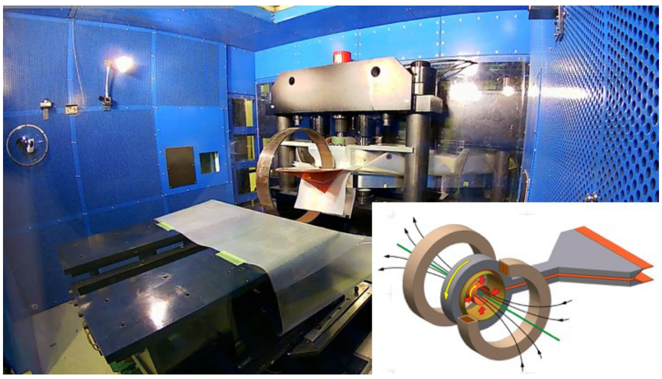


Fig. 3. (Build. C) A view of the electro-magnetic flux compression 1000 T-class megagauss generator set in side of an anti-explosive house. 1000 T project started since 2010, and finally condenser banks of 9 MJ (5 MJ + 2 MJ +2 MJ) as a main system with the 2 MJ sub bank system for the seed field have been installed, and settled in the year of 2014.

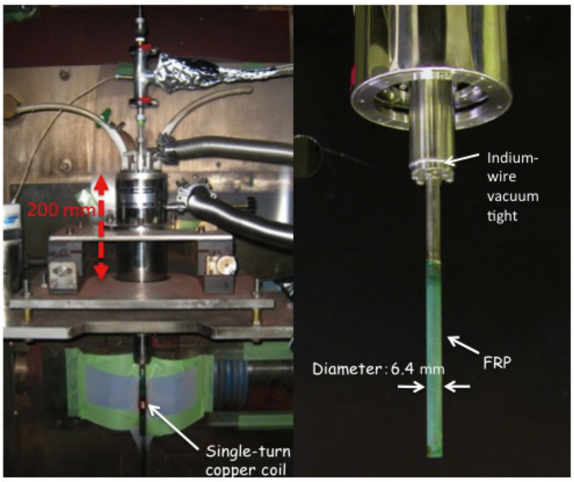


Fig. 4. Schematic picture of the H-type single-turn coil equipped with 50 kV, 200 kJ fast operating pulse power system, capable of generating 300 T within 3 mm bore coil.

an easy access to the megagauss science and technology, we have the single-turn coil (STC) system capable of generating the fields of up to 300 T by a fast-capacitor of 200 kJ. We have two STC systems, one is a horizontal type (H-type, Fig. 4) and the other is a vertical type (V-type). Various kinds of laser spectroscopy experiments such as the cyclotron resonance and the Faraday rotation are possible using the H-type STC.

Center of Computational Materials Science

The goal of the materials science is to understand and predict properties of complicated physical systems with a vast number of degrees of freedom. Since such problems cannot be solved with bare hands, it is quite natural to use computers in materials science. In fact, computer-aided science has been providing answers to many problems ranging from the most fundamental ones to the ones with direct industrial applications. In the recent trends of the hardware developments, however, the growth of computer power is mainly due to the growth in the number of the units. This fact thrusts a very challenging problem before us --- how can we parallelize computing tasks? In order to solve this problem in an organized way, we coordinate the use of the computational resources available to our community, and support community members through various activities such as administrating the website "MateriApps" for information on application software in computational science.

Fig. 1. Members of CCMS.

These activities are supported by funds for various governmental projects in which CCMS is involved. In particular, we are acting as the headquarters of Priority Area 7 of MEXT FLAGSHIP2020 Project (so-called "post-K computer project"). In addition to this, CCMS is involved in Priority Area 5 and Pioneering Area (CBSM2) of FLAGSHIP2020 project, Element Strategy Initiative, and Professional Development Consortium for Computational Materials Scientists (PCoMS).

The following is the selected list of meetings organized by CCMS in SY2016:

- 06/27-07/15 International Workshop and Symposia on Tensor-Networks and Quantum Many-Body Problems (TNQMP2016) (ISSP)
- 07/21-07/22 Post-K Priority Area 7 Symposium (Koshiba Hall, Hongo, Tokyo)
- 07/26 CCMS Hands-On: HΦ
- 08/30 TIA Kakehashi Poster Meeting (U. Tokyo satellite campus at Kashiwa)
- 09/01 Symposium on National Experimental Facilities and Supercomputers (Akihabara)
- 09/02 Symposium on industrial application of K-computer (Akihabara)
- 09/08 CCMS Hands-On: xTAPP (RIST, Kobe)
- 09/09 Post-K Pioneering Area (Challenge of Basic Science) Kickoff Meeting (Sendai)
- 10/04 RIST Materials Workshop (Akihabara)
- 10/05 Post-K Pioneering Area (CBSM2) Group D Meeting (Kashiwa)
- 10/11 TIA Symposium
- 10/21 RIST Symposuim (Tokyo)
- 11/14 Post-K Priority Area 7: Forum for industry-academia-government collaboration (Tokyo)
- 11/28 Post-K Priority Area 7: Group G Informal Meeting (Chofu, Tokyo)
- 11/29-11/30 International Symposium on Research and Education of Computational Science (RECS) (Hongo, Tokyo)
- 12/06-12/07 Post-K Priority Area 7: Symposium (ISSP)
- 01/10 Workshop on National Experimental Facilities and K-computer (Kobe)
- 02/15 PCoMS Skill-up Workshop (Tokyo)
- 02/17-02/18 Post-K Priority Area 7: Group D Symposium (Kanazawa)
- 02/16-02/17 Workshop on Dynamical Mean-Field Theory (Hongo, Tokyo)
- 02/20-02/21 CDMSI International Workshop on Scale bridging for the atomistic design of high performance materials (Tokyo)
- 02/23-02/24 AICS International Symposium (Kobe)
- 03/11 Visualization Symposium (Tokyo)
- 03/13-03/15 Workshop on Quantum Dynamics and Response (Hongo, Tokyo)

Laser and Synchrotron Research Center (LASOR Center)

Laser and Synchrotron Research (LASOR) Center started from October, 2012. LASOR Center aims to promote material sciences using advanced photon technologies at ISSP by combining the “Synchrotron Radiation Laboratory” and “Advanced Spectroscopy Group”. These two groups have long histories since 1980’s and have kept strong leaderships in each photon science fields for a long time in the world. In the past several decades, the synchrotron-based and laser-based photon sciences have made remarkable progresses independently. However, recent progresses in both fields make it feasible to merge the synchrotron-based and laser based technologies to develop a new direction of photon and materials sciences. In the LASOR Center, extreme laser technologies such as ultrashort-pulse generation, ultraprecise control of optical pulses in the frequency domain, and high power laser sources for the generation of coherent VUV and SX light are intensively under development. The cutting edge soft X-ray beamline is also developed at the synchrotron facility SPring-8.

LASOR center aims three major spectroscopic methods [ultrafast, ultra-high resolution, and operand spectroscopy] by three groups [extreme laser science group, soft-X-ray spectroscopy and materials science group, and coherent photon science group], as illustrated in Fig. 2. Under this framework, various advanced spectroscopy, such as ultra-high resolution photoemission, time-resolved, spin-resolved

Fig. 1. Open ceremony of LASOR center on October 2012.

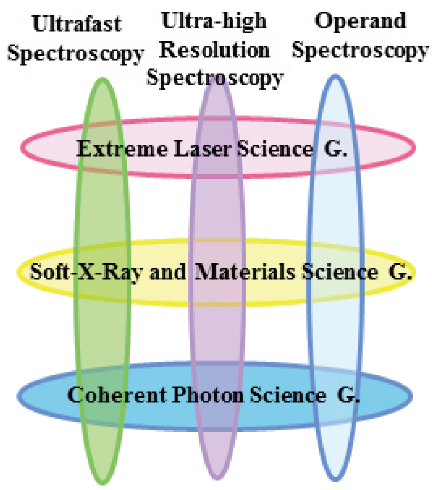


Fig. 2. Developments of advanced spectroscopy at LASOR center by three groups

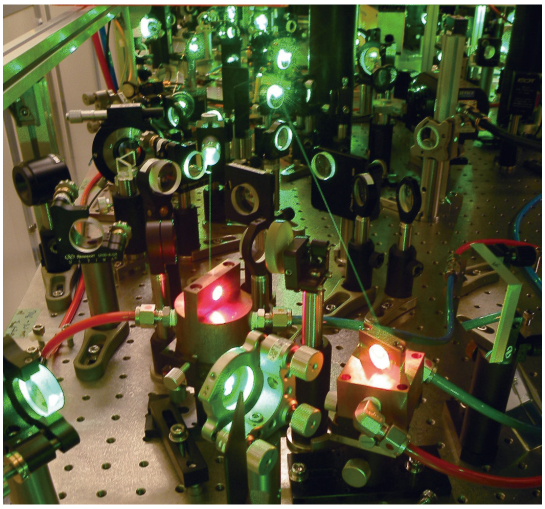


Fig. 3. Close look of a high-peak-power ultrashort-pulse laser

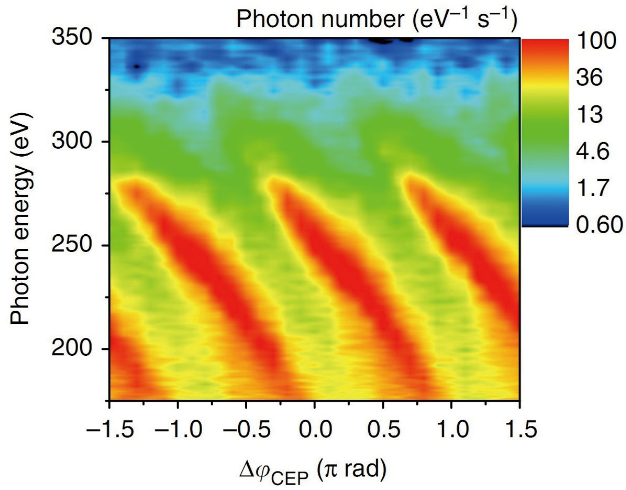


Fig. 5. Phase-dependence of high harmonic spectra in soft X rays.

spectroscopy, diffraction, light scattering, imaging, microscopy and fluorescence spectroscopy are in progress by employing new coherent light sources based on laser and synchrotron technologies that cover a wide spectral range from X-ray to terahertz. In LASOR Center, a variety of materials sciences for semiconductors, strongly-correlated materials, molecular materials, surface and interfaces, and bio-materials are studied using advanced light sources and advanced spectroscopy. Another important aim of LASOR Center is the synergy of photon and materials sciences.

Most of the research activities on the extreme laser development and their applications to materials science are performed in the ISSP buildings D and E at Kashiwa Campus where large clean rooms and the vibration-isolated floor are installed. On the other hand, the experiments utilizing the advanced synchrotron source are performed at a beamline BL07LSU in SPring-8 (Hyogo).

• Extreme Laser Science Group

The advancement of ultrashort-pulse laser technologies in the past decade has transformed the laser development at ISSP into three major directions, (i) towards ultrashort in the time domain, (ii) ultra high resolution in the spectral domain, and (iii) the extension of the spectral range, with extreme controllability of the laser sources. For ultrafast spectroscopy, we have developed carrier-envelope phase stable intense infrared light source that can produce sub-two cycle optical pulses for high harmonic and attosecond pulse generation. So far we observed coherent soft-X-ray radiation extending to a photon energy of ~330 eV. The simulation predicts the soft-X-ray field consists of single isolated attosecond pulses. For ultra-high resolution spectroscopy, fiber-laser-based light sources are intensively developed for producing EUV pulses for high resolution and time-resolved photoemission spectroscopy as well as extending the frequency comb to ultraviolet or infrared for various applications. The spectral range of intense optical pulses are being extended from visible to IR, MIR and THz ranges. Various types of high-repetition-rate ultrastable light sources are developed for laser-based ultrahigh resolution photoemission spectroscopy, high-average-power EUV generation in an enhancement cavity, and frequency comb spectroscopy for atomic physics, astronomical application, and frequency standards.

• Soft-X-ray and Materials Science Group

Recently, VUV and SX lasers have progressed very rapidly. They become very powerful for the materials science using the cutting-edge VUV and SX spectroscopy. Especially, angle resolved photoemission spectroscopy (ARPES) is very powerful to know the solid state properties. Laser has excellent properties, such as coherence, monochromaticity, polarization, ultra-short pulse, high intensity, and so on. By using monochromatic laser light, the resolution of ARPES becomes about 70-μeV. The materials science with sub-meV resolution-ARPES is improved drastically by

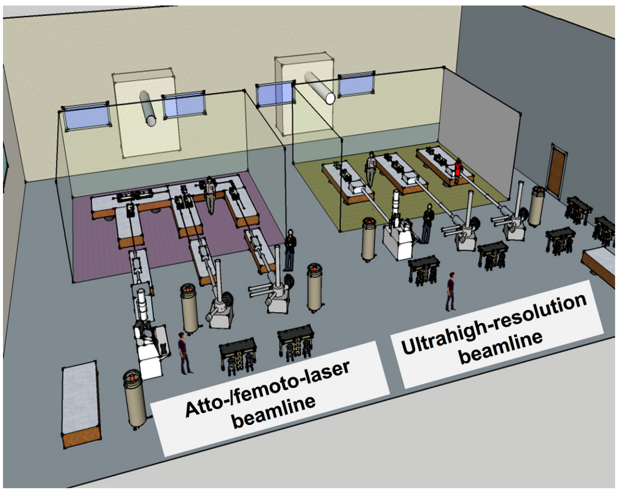


Fig. 4. Newly designed building E was constructed for new extreme VUV- and SX-lasers and new spectroscopy.

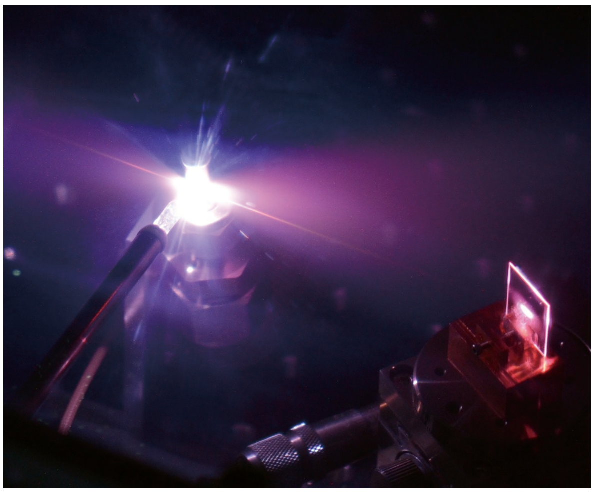


Fig. 6. 10-MHz high harmonic generation in an enhancement cavity.

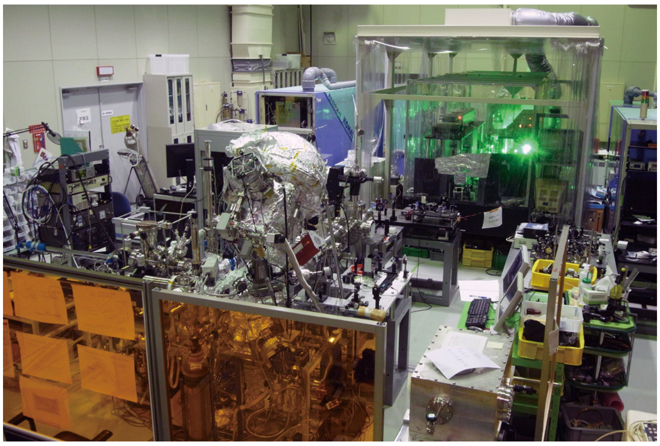


Fig. 7. Pump-probed photoemission system using 60-eV laser

using high resolution laser. For example, superconducting gap anisotropy of the superconductors and Fermiology of the strongly correlated materials are studied very well. On the other hand, using pulsed laser light, the time-resolved photoemission in fs region becomes powerful to know the relaxation process of photo-excited states of the materials. Furthermore, by using CW laser with circular polarization in VUV region, the photoelectron microscopy (PEEM) is developed. The spatial resolution of nm resolution is very powerful for the study of nanomagnetic materials.

• Coherent Photon Science Group

The coherent-photon science group has main interests in exploring a variety of coherent phenomena and non-equilibrium properties of excited states in condensed matters, in collaborations with research groups in charge of photoemission, operand-spectroscopy and extreme laser science. This group covers a wide range of materials, from semiconductors, ferromagnets, complexes and superconductors to biomaterials. Various ultrafast optics technologies such as femtosecond luminescence and pump-and-probe transmission/reflection spectroscopy are applied to studies on wavepacket dynamics, photo-induced phase transitions and carrier dynamics. Coherent control and observation of spin dynamics in magnetic materials and metamaterial structures by using high power terahertz radiation source is extensively studied. Advanced photonics devices are intensively studied, such as quantum nano-structure lasers with novel low-dimensional gain physics, low-power light-standard LEDs, very efficient multi-junction tandem solar cells for satellite use, and wonderful bio-/chemi-luminescent systems for wide bio-technology applications.

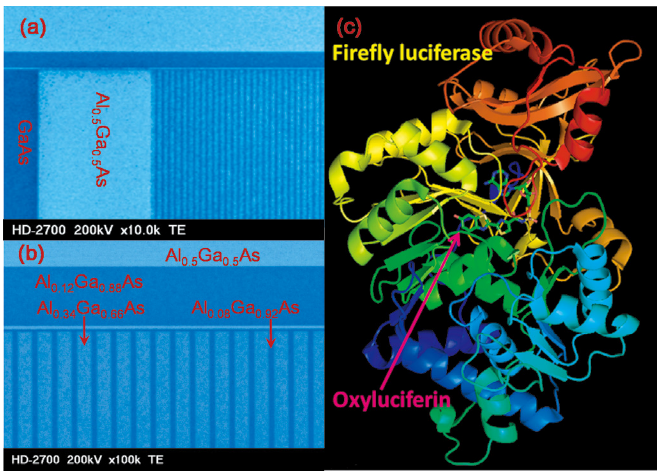


Fig. 8. Photonics devices under study: (left panel) semiconductor quantum wires and (right panel) firefly-bioluminescence system consisting of light emitter (oxyluciferin) and enzyme (luciferase)

Synchrotron Radiation Laboratory

The Synchrotron Radiation Laboratory (SRL) was established in 1975 as a research division dedicated to solid state physics using synchrotron radiation (SR). Currently, SRL is composed of two research sites, the Harima branch and the E-building of the Institute for Solid State Physics.

• Brilliant soft X-ray beamline at Harima branch

In 2006, the SRL staffs have joined the Materials Research Division of the Synchrotron Radiation Research Organization (SRRO) of the University of Tokyo and they have played an essential role in constructing a new high brilliant soft X-ray beamline, BL07LSU, in SPring-8. The light source is the polarization-controlled 25-m long soft X-ray undulator with electro-magnetic phase shifters that allow fast switching of the circularly (left, right) and linearly (vertical, horizontal) polarized photons.

The monochromator is equipped with a varied line-spacing plain grating, which covers the photon energy range from 250 eV to 2 keV. At the downstream of the beamline, a lot of experimental stations have been developed for frontier spectroscopy researches: five endstations, i.e. time-resolved soft X-ray spectroscopy (TR-SX) equipped with a two-dimensional angle-resolved time-of-flight (ARTOF) analyzer (Fig. 1), three-dimensional (3D) nano-ESCA station equipped with the Scienta R-3000 analyzer (Fig. 2), high resolution soft X-ray emission

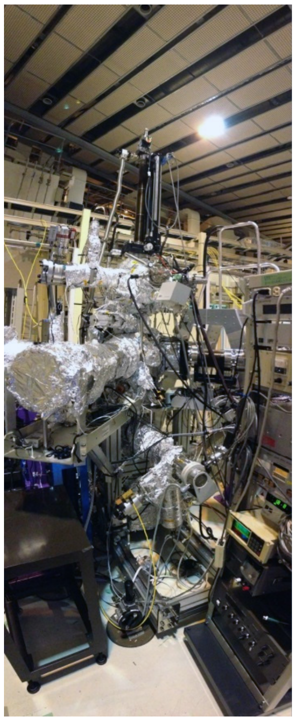


Fig. 1. TR-SX station

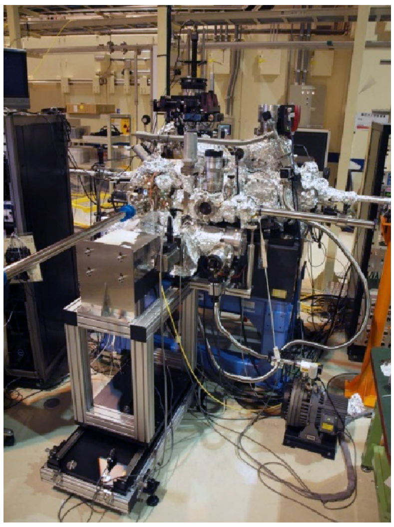


Fig. 2. 3D-nano ESCA station

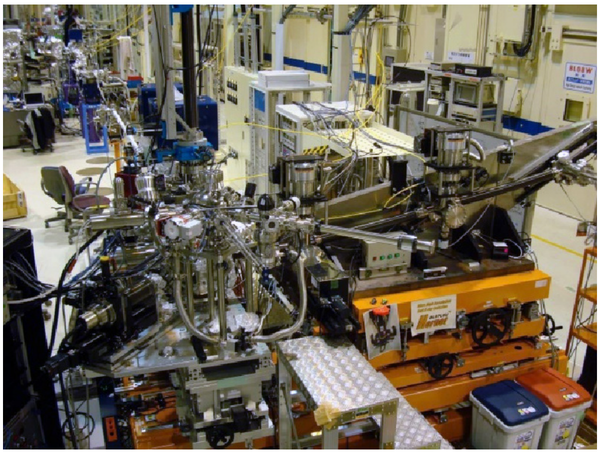


Fig. 3. Soft X-ray emission station

spectroscopy (XES) stations (Fig. 3) are regularly maintained by the SRL staffs and open for public use, and at free-port station many novel spectroscopic tools have been developed and installed such as soft X-ray resonant magneto-optical Kerr effect (MOKE) (Fig.4) and soft X-ray diffraction (Fig. 5), ambient pressure photoemission, two dimensional photo-electron diffraction and so on. The beamline construction was completed in 2009 and SRL established the Harima branch laboratory in SPring-8. At SPring-8 BL07LSU, each end-station has achieved high performance: the TR-SX station have established the laser-pump and SR-probe method with the time-resolution of 50 ps which corresponds to the SR pulse-width; the 3D nano-ESCA station reaches the spatial resolution of 70 nm; the XES station provides spectra with the energy resolution around 70 meV at 400 eV and will enable real ambient pressure experiments in the near future. Soft X-ray resonant MOKE station has been developed to make novel magneto-optical experiment using fast-switching of the polarization-controlled 25-m long soft X-ray undulator. The soft X-ray diffraction station has been fully constructed and the time-resolved measurement is available by using lasers at the TR-SX station. Each end-station has now been opened fully to outside users. In 2015, 176 researchers made their experiments during the SPring-8 operation time of 4805 hours.

• High-resolution Laser SARPES at E-building

Spin- and angle-resolved photoelectron spectroscopy (SARPES) is a powerful technique to investigate the spin-dependent electronic states in solids. In FY 2014, Laser and

Fig. 4. Soft X-ray MOKE station

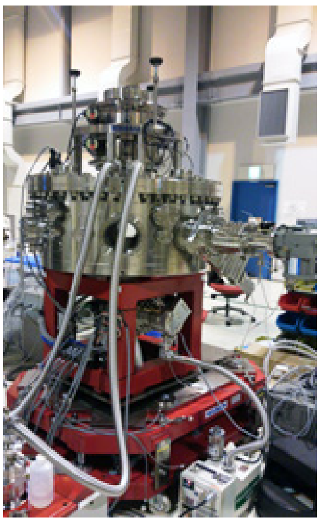


Fig. 5. Soft X-ray diffraction station

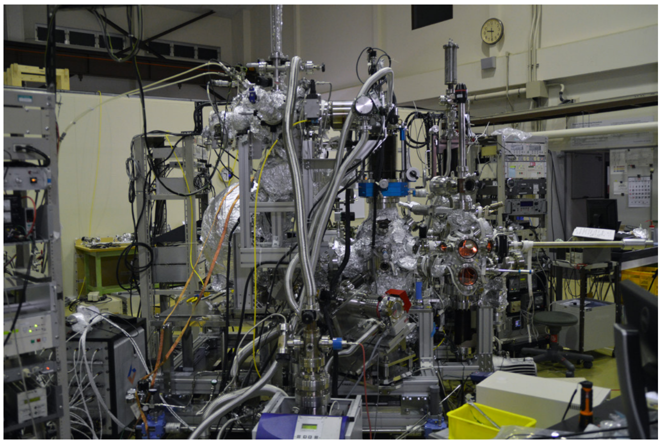


Fig. 6. Laser-SARPES system at E-building

Synchrotron Research Center (LASOR) SRL constructed a new SARPES apparatus (Fig. 6), which was designed to provide high-energy and -angular resolutions and high efficiency of spin detection using a laser light instead of the synchrotron radiation in Institute for Solid State Physics. The achieved energy resolution of 1.7 meV in SARPES spectra is the highest in the world at present. From FY 2015, the new SARPES system has been opened to outside users.

The Laser-SARPES system consists of an analysis chamber, a carousel chamber connected to a load-lock chamber, and a molecular beam epitaxy chamber, which are kept ultra-high vacuum (UHV) environment and are connected each other via UHV gate valves. The electrons are excited with 6.994-eV photons, yielded by 6th harmonic of a Nd:YVO_4 quasi-continuous wave laser with repetition rate of 120 MHz. The hemispherical electron analyzer is a custom-made ScientaOmicron DA30-L, modified for installing the spin detectors. The spectrometer is equipped with two high-efficient spin detectors associating very low energy electron diffraction are orthogonally placed each other, which allows us to analyze the three-dimensional spin polarization of electrons. At the exit of the hemispherical analyzer, a multi-channel plate and a CCD camera are also installed, which enables us to perform simultaneously the angle-resolved photoelectron spectroscopy with two-dimensional (energy-momentum) detection. So far, spin-dependent band structures of more than 10 materials have been studied by 4 outside groups.

Conferences and Workshops

International Conferences and Workshops

International Workshop "Theory of Correlated Topological Materials" and Symposium "Topological Phases and Functionality of Correlated Electron Systems"

Workshop: February 6 - March 3, 2017
Symposium: February 20 - 22, 2017

L. Balents, P. Gegenwart, S. Nakatsuji, M. Oshikawa, O. Tchernyand, and S. Trebst

In recent years, topology plays a key role in classifying, discovering, and even designing materials with desirable functionalities. The wide recognition of this trend manifested most notably in Nobel Prize in Physics 2016 awarded to the original works on "theoretical discoveries of topological phase transitions and topological phases of matter". Topology is a branch of mathematics, which studies classification of objects by regarding those connected by continuous deformations as equivalent. The application of topology to classification of quantum phases originated in the study of quantum Hall effects, but is recently expanded to much wider class of materials. The recent explosive growth of the field stemmed from the discovery of topological insulator, for which the classification of non-interacting electron systems developed first. Many of the theoretical predictions have been confirmed experimentally, and devices utilizing the topological properties are proposed. Recently, the focus of the fundamental research is shifting to the interplay of topological aspects and strong correlation in electron systems. Strongly correlated electron systems have been studied vigorously over several decades, but remain as a challenging problem theoretically and experimentally. However, new breakthroughs based on topological concepts are being made, and more are expected to come.

At this exciting time, this International Workshop and Symposium was organized to develop the frontier of condensed matter physics at the interface between topology and strong correlation, co-sponsored by ISSP, JSPS Program for Advancing Strategic International Networks to Accelerate the Circulation of Talented Researchers for "Leading Research Network Topological Phenomena in Novel Quantum Matter" (TopoNet), and Center for Magnetic Materials, Elements Strategy Initiative. The entire four-week program consisted of the three-day Symposium and the Workshop during the rest of the period. The Workshop part was primarily for discussion of theoretical studies. In order to facilitate collaborations, during the Workshop period, talks were limited to at most 2 hours each day, so that ample time was reserved for discussions. At the Symposium, many recent developments in experimental and theoretical studies were reported, and followed by vigorous discussions during coffee and lunch breaks, and after hours. The cumulative total of the daily attendance in the Workshop was 410 (over 17 days), while that in the Symposium was 347 (over 3 days).

The topics discussed at the Workshop/Symposium included various quantum spin liquids such as Kitaev spin liquid, Weyl semimetals and their electromagnetic responses, topological surface states, anomalous Hall effect in non-collinear antiferromagnets and its application to spintronics, and novel class of quantum criticalities. While these topics are diverse, intriguing connections among different subjects have also emerged. The lively discussions at the Workshop/Symposium suggested future directions, and have led to new collaborations.

International Workshop on Tensor Networks and Quantum Many-Body Problems (TNQMP2016)

Workshop: June 27 - July 15, 2016
Symposium: June 27, July 4, July 11, 2016

K. Harada, S. Hashimoto, N. Kawashima, T. Misawa, S. Morita, Y. Motoyama,
T. Okubo, M. Oshikawa, S. Todo, J. Yamazaki, T. Yanai, and K. Yoshimi

The meeting was held as one of the annual workshop series that started in 2006. Since the event was cancelled in 2011 because of the earthquake, this was the 10th. The main theme of this year's workshop was the tensor network state. The concept of the tensor network itself is not very new. The simplest example may be the Ising model, which itself can be regarded as a tensor network --- an Ising spin corresponds to an index to be contracted, and the local Boltzmann weight defines the tensor elements. Any statistical physical model on some lattice is actually a tensor network. The concept of the tensor network became popular recently mainly due to the interpretation from the information science viewpoint and several impressive demonstrations of its effectiveness in describing quantum states. Numerical methods based on the tensor network concept are now producing high-precision results for the models otherwise intractable, such as frustrated magnets and fermion systems. On every Monday, we had a symposium in which, in 30min talks, participants present their most recent results, whereas on Tuesday through Friday, we have two lectures a day, one in the morning and another in the afternoon, each being 1h 30min. In lectures basic concepts are explained in details. Every lecture was recorded and posted on YouTube. (You can find it by the keyword TNQMP2016.) For example, Román Orús (Mainz) gave lectures on the 1-dimensional and the 2-dimensional tensor network state for beginners, Glen Evenbly (UC Irvine) explained renormalization group method based on the tensor network representation, Tadashi Takayanagi (Kyoto) discussed the relationship between the MERA representation and AdS/CFT correspondence, Frank Pollmann (MPIPKS) and Norbert Schuch (MPQ) dealt with the problem of the topological properties in terms of tensor networks, Tomotoshi Nishino (Kobe) talked about applications to classical systems, and Philippe Corboz (Amsterdam) and Tao Xiang (CAS, Beijing) presented their results of the state-of-the-art tensor network calculations. Particularly impressive was the talk by Frank Verstraete (Vienna) who gave a blackboard lecture on the matrix product states and the matrix product operators, in which he showed how the Yang-Baxter equation can appear in the language of the tensor networks. Reflecting the high expectation among young researchers, the lecture room was crowded everyday. The integrated total number of audience including the symposia was 558.

The 17th International Conference on High Pressure in Semiconductor Physics (HPSP-17) & Workshop on High-Pressure Study on Superconducting (WHS)

August 7 - 11, 2016

K. Takarabe and Y. Uwatoko

The 17th International Conference on High Pressure in Semiconductor Physics (HPSP17) and the Workshop on High-pressure on Superconductors (WHS) was held at the Sanjo Conference Hall (Hongo, Univ. Tokyo, Japan) in the schedule of August 7th - 11th 2016. The aim of this first joint conference was to allow young and experienced researchers from different fields to meet together during a single-session conference to present and discuss their latest results in the field of application of high pressure and other forms of stress to the study of both semiconductors and superconductors. The idea of joint conference was to give an opportunity to the participants to have a bird-eye crossing two fields, bridging over towering two fields, and thus a new stimulus in both fields. A total of 110 people participated in the conference. This number means the acceptance of the new idea of organizing the high-pressure conference. We are deeply indebted to the International Advisory Committee for recommending the invited speakers for this new conference. We would like to thank for all participants from 14 countries: Canada, China, Estonian, France, Germany, Israel, Korea, Mexico, Poland, Russia, Spain, the United Kingdom, the United States, and Japan, having had brought their latest high-pressure studies. We sincerely thank to the Institute for Solid State Physics of the University of Tokyo for jointly hosting the WHS and JSPS KAKENHI the Grant-in-Aid for Specially Promoted Research, Megar Chemistry for jointly hosting the megabar chemistry session in the conference. We thank to all companies donated to the conference for running the conference smoothly. We finally thank to all steering and editorial member for running the conference successfully.

We look forward seeing you all in the next conference.

A list of companies donating to HPSP & WHS.

- Sanwa Trading Co., Ltd
- HMD Corporation
- Hamasho Corporation
- Nanki Engineering Works Co., Ltd.
- EL ElectroLAB Company
- Micro Industries Co., Ltd.
- Rockgate Corporation
- Ohsawa systems
- Tungaloy Corporation
- Quantum Design Japan, Inc.
- Kouatsu System Co., Ltd.
- Clover Foundation For the Future Scientist

Computational Materials Science —Now and the Future—

April 4 - 5, 2016

N. Kawashima, H. Noguchi, O. Sugino, H. Watanabe, S. Kasamatsu, Y. Noguchi, S. Morita, Y. Yoshimoto, S. Motome, T. Oda, H. Kawamura, Y. Okamoto, and Y. Kawakami

This workshop was organized for the computational condensed matter research community, especially for the users of the ISSP supercomputers, to exchange the most recent information on the computational condensed matter research and on the high-performance computation of related research areas. This was held as a series of annual workshop of ISSP supercomputer that has so far been held at around the year-end or the fiscal year-end, but was held this time at the start of the fiscal year for the first time. Because of the shifting of the time, participants were slightly increased in number. The selected topics include the target of the post-K supercomputer project, the progress made in the elements strategy projects, the emergent data-driven material research, and “the Project for advancement of software usability in materials science” that started by ISSP in 2015. In addition to seventeen invited talks and twenty-two poster presentations, panel discussion (by four panelists) was held to deepen understanding on that architectures that may be adopted for the next generation ISSP supercomputer. Many of the presentations contained new results obtained by performing larger scale calculations enabled by the new system B, which was introduced in July 2015.

First Workshop of the Solid State Chemistry Forum: Present and Future of Solid Materials

June 14 - 15, 2016

S. Shimakawa, H. Miyasaka, H. Kageyama, H. Kitagawa, R. Kanno, M. Takano, and Z. Hiroi

The workshop was planned as an opportunity for researchers working in various fields of solid state chemistry and materials science to get together and discuss the recent progress of solid state chemistry. It was the first meeting of the solid state chemistry forum founded in 2015. 62 presentations including 6 reviews, 11 invited and 45 poster talks were given. Approximately 100 people joined the meeting everyday. Intensively discussed were novel methods for inorganic and organic compounds, the chemical properties of catalyses, ionic conductors and materials for ion batteries, and the physical properties of quantum magnets, dielectrics and superconductors. The workshop gave a wonderful opportunity for attendees to understand the present status and to imagine the future prospect of materials research. Moreover, it was helpful in building a community for solid state chemists.

High Magnetic Field Co-laboratory, International Collaboration and Future of the High Magnetic Field Science

June 23 - 24, 2016

H. Nojiri, T. Sasaki, S. Awaji, T. Shimizu, Y. Imanaka, H. Ota,
M. Hagiwara, K. Kindo, S. Takeyama, M. Tokunaga, and Y. Matsuda

In 2015, the Global High Magnetic Forum was founded by the world leading high field facilities and the new phase of the international high magnetic field research community has begun at 10 years after the foundation of High Magnetic Field Forum of Japan. In such occasion, the workshop aimed at the mutual exchange and discussion on the trends of science in high magnetic fields and the organization for the facility network in domestic and regional levels. Nine sessions were hold with theme of science in the interdisciplinary area, science and material design/synthesis, science studied in steady fields, development of physics in spin systems under high magnetic fields, current status and future prospects of science in mega-gauss fields, generation of steady and quasi-steady fields and their application, current status and future prospects of non-destructive pulse magnets and their application, and international collaborations. Each session consists of a few leading talks by young representatives, contributed talks and comment from experienced leaders. Students and post-doc researchers presented their recent results in the poster session. Three leaders from China and Korea were invited to report the present status of research and facility in each country. In the final session, the attendants agreed to found the Asian high magnetic field forum and accelerate the regional research collaboration.

New Frontier of Pi-Electron Based Molecular Materials Science

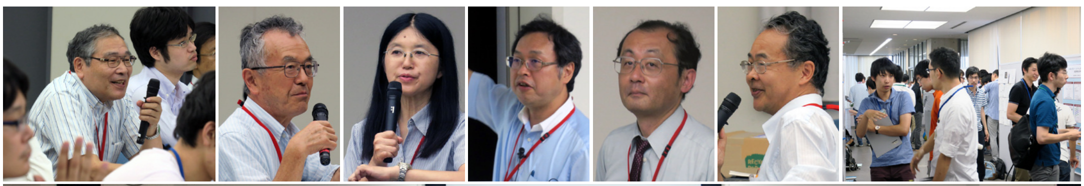
August 8 - 10, 2016

H. Sawa, K. Mori, M. Ogata, R. Kato, K. Kanoda, T. Sasaki,
I. Terasaki, T. Naito, H. Yamamoto, H. Mori, T. Osada, and M. Yamashita

We held a workshop by researchers dealing with experiments and theories including science of molecular π electron systems and related fields. In this workshop, we held discussions for molecular material development and condensed matter physics beyond the conventional framework. Furthermore, the role of ISSP as a hub of advanced research of material science was reconfirmed.

Molecular π-electron systems, in particular the quantum mechanical properties of crystalline materials composed of π-conjugated molecules, are studied for the development and deepening of basic physics, which is the creation of the basic principle of next-generation molecular electronics. In molecular crystals, exotic electronic states are realized by competition and cooperation of different order parameters of the energy scale and characteristic space-time scale, and insulators, semiconductors, metals, dielectrics, superconductors, etc. appear. We have the possibility to manipulate macroscopic functions due to exotic quantum properties of molecular crystals. Therefore, in this workshop, program organization was divided for each theme, and combining molecular system and inorganic system, we devised to clarify the physical aspects of various phenomena.

The number of people participating in this workshop exceeded 300 people in total, more than 120 attendees daily, which means that it became the largest in this year's ISSP workshop. Researchers in other fields interested in the molecular material science field gathered, so the academic expansion and objective consciousness became clear. Many young researchers who participated in the poster session conducted more active discussions than before.



ISSP Workshop: Frontier of Neutron Scattering Research in the Field of Magnetism and Strongly Correlated Electrons

October 6 - 7, 2016

T. Masuda, H. Yoshizawa, M. Fujita, and M. Takeda

Neutron scattering technique is a powerful probe for microscopic structure and dynamics of materials. ISSP and Japan Atomic Energy Agency (JAEA) have updated the neutron instruments and reconsidered the safety issues in the research reactor JRR3, which has been suspending its operation since the great east-Japan earthquake in March 2011, so that we will be able to resume the user program smoothly as soon as the JRR3 restarts. Recently the adaptability to new regulatory standard of the reactor's safety is being satisfied, and the director of JRR3 indicated that the reactor would restart its operation in the end of Japan fiscal year 2017. We, thus, held the ISSP workshop for the discussion of scientific research by using neutron spectrometers in JRR3. The main purpose is to fulfill the maximum scientific output after the restart. Specialists of triple axis spectrometer (TAS), outstanding users, and scientists in the facilities related to JRR3 participated in the workshop; the numbers of the participants were 64 for the first day and 49 for the second day. The importance of the TAS was reconfirmed. Furthermore settlement of working group for the future plan of JRR3 was proposed.

Trends and Prospects in the Condensed Matter Physics Studied by Scanning Tunneling Microscopy

October 30 - November 1, 2017

Y. Hasegawa, T. Hanaguri, T. Komeda, H. Shigekawa, F. Komori, and Y. Kim

Recent tremendous advances in scanning tunneling microscopy (STM) enable us to investigate physical properties of various materials in nanometer and atomic scale spatial resolutions that cannot be accessible by other methods. Nowadays, STM can be operated in dilution refrigerator temperature under high magnetic fields. In addition to structural and electronic properties, spin, phonon, and vibrational modes of individual atoms/molecules can be probed and their spatial mappings are visualized. Time-resolved measurements are performed in combination with laser pulses, and photon mappings showing site-dependent emission intensity within a single molecule are obtained. Throughout this workshop, we discussed various physical phenomena revealed by cutting-edge STM systems and shared their technological advances.

One of the recent hot topics we extensively discussed is surface superconductivity. It was first reported with STM by showing the superconducting gap and vortices in a single metallic layer formed on a substrate, and later confirmed by transport measurements through the monoatomic surface layer. It was found that atomic steps on the surface behave as a Josephson junction. Because of the broken space inversion symmetry, a mixture of s- and p-wave electron pairing is expected, and the detection of the unconventional pairing in tunneling spectra was discussed.

Topological insulator, Weyl semimetal, graphene etc. are also attractive subjects among STM researches because of their peculiar surface electronic states. The suppressed backscattering of the protected surface states on topological insulators was nicely demonstrated through the disappearance of the electron standing waves. On a Weyl semimetal the Fermi arc was visualized in quasiparticle interference pattern. It was also demonstrated that the Dirac cone of graphene can be well controlled through the modification in the step morphology of a SiC substrate

Time-resolved measurement was also a recent utmost achievement in STM as it realizes a microscope with both ultimate spatial and temporal resolutions. Site-dependent relaxation times of optical responses and spin precessions have been demonstrated in a pump-probe method with laser-combined STM. It was demonstrated that monocycle THz pulses work as a picosecond pulse in the bias voltage and will be used for time-resolved imaging near future.

Local Functionality of 3D Active-site on Atomic-Layer Materials

December 20 - 21, 2016
H. Daimon, R. Saito, T. Kinoshita, and T. Osada

Recent materials science is related to a development of new functional materials for realizing the energy-saving sustainable society. It is very important to understand the local 3D atomic arrangement as well as the bulk periodic arrangement to realize these functional materials. The discovery of graphene stimulated many researches on atomic layer material because of its novel electronic and optical properties. These zero- to two-dimensional local atomic structures have not been able to be studied because they have no translational symmetry which is necessary for x-ray diffraction analysis. The development of new analysis tools and theoretical studies based on experimental evidence are necessary to realize novel functional materials. Scanning probe microscope can study local atomic structure and properties, but it cannot reveal 3D atomic arrangement. Several atomic resolution holographies, which can visualize 3D atomic arrangement images around specific atoms in materials, have been developed and reached application levels in Japan recently. Two projects of Grant-in-Aid for Scientific Research on Innovative Areas by MEXT, “3D Active-site Science” and “Science of Atomic Layers”, are now running and many researchers are involved. About 90 people of not only the members of these groups but also related researchers in ISSP attended this symposium, and discussed about the development of functional materials, device application, improvement of measurement method, cooperation with theory, and so on. The attendee could find some seeds of collaboration among them and could hold a possibility of new science in common.

ISSP Workshop: Origins of material functions elucidated by SPring-8 BL07LSU

March 8, 2017
H. Wadati, S. Shin, F. Komori, I. Matsuda, and Y. Harada

Synchrotron radiation laboratory has a Harima branch to maintain and develop a high-brilliance soft X-ray beamline BL07LSU at SPring-8. There we are performing time-resolved, spatial-resolved and energy-resolved soft X-ray spectroscopy to study electronic states and dynamics of new materials. In this workshop, recent research activities at our beamline were reported and we discussed our new experimental techniques which will reveal the origins of material functions. The speakers talked about their recent results from each end station (time-resolved spectroscopy, 3D nano-ESCA, emission spectroscopy, and so on). There were two invited talks; one is about soft X-ray nanofocusing with ultraprecise mirrors, and the other is about nano-metric spin textures observed by coherent soft X-ray scattering. There were a lot of discussions for each talk, and we successfully started to obtain a clear vision about how we can elucidate the origins of material functions such as magnetism, chemical reaction, and biological systems. We also encouraged the young generation in this research field by awarding the best poster prizes to two graduate students.

Subjects of Joint Research

平成 28 年度　共同利用課題一覧（前期）　/ Joint Research List (2016 First Term)

嘱託研究員 / Commission Researcher

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：森　初果							
1	常圧で金属状態を示す純有機単一成分導体の開発	御崎　洋二	愛媛大学	大学院理工学研究科	Development of purely organic single-component molecular metals under ambient pressure	Youji Misaki	Ehime University
2	純有機単一成分超伝導体の開発	白旗　崇	愛媛大学	大学院理工学研究科	Development of purely organic single-component molecular superconductors	Kenta Kimura	Ehime University
担当所員：山下　穣							
3	回転超低温装置を用いた超流動ヘリウム 3 の研究	小原　顕	大阪市立大学	大学院理学研究科	Study of superfluid helium-three under rotation and ultra-low temperatures environments	Ken Obara	Osaka City University
担当所員：長谷川　幸雄							
4	^{3}He-^{4}He 希釈冷凍機と 14T 超伝導マグネットを組み合わせた複合極限環境下における STM の開発	河江　達也	九州大学	大学院工学研究院	Development of STM at very low-temperatures and strong magnetic fields	Tastuya Kawae	Kyushu University
5	トポロジカル絶縁体表面の磁気的干渉パターンの実空間イメージング	岡田　佳憲	東北大学	原子分子材料科学高等研究機構	Visualization of magnetic interference pattern on topological insulator surface	Yoshinori Okada	Tohoku University
担当所員：吉信　淳							
6	銅および合金表面における二酸化炭素の水素化反応に関する理論的研究	森川　良忠	大阪大学	大学院工学研究科	Theoretical study on hydrogenation of carbon dioxide over Cu and alloy metal surfaces	Yoshitada Morikawa	Osaka University
7	カルコゲン層状化合物 MoS_2 表面への分子吸着の高分解能電子エネルギー損失分光を用いた振動分光研究	米田　忠弘	東北大学	多元物質科学研究所	High resolution vibration spectroscopy of molecules adsorbed on MoS_2 surface	Tadahiro Komeda	Tohoku University

No.	課題名	氏名	所属		Title	Name	Organization
8	SiC 基板に成長させたエピタキシャルグラフェンの化学修飾と表面科学的評価	モハメド　ザキール　ホサイン	群馬大学	元素科学国際教育研究センター	Chemical modification and its characterization of epitaxial graphene grow on the SiC substrate	Md. Zakir Hossain	Gunma University
担当所員：川島　直輝							
9	テンソルネットワーク法の開発・改良	原田　健自	京都大学	大学院情報学研究科	Development of Tensor Network Method	Kenji Harada	Kyoto University
担当所員：上床　美也							
10	多重極限関連圧力装置の調整	高橋　博樹	日本大学	文理学部	Adjustment of Cubic Anvil apparatus	Hiroki Takahashi	Nihon University
11	希土類化合物の単結晶試料評価とその圧力効果	藤原　哲也	山口大学	大学院理工学研究科	Effect of Pressure on the Ce Compounds	Tetsuya Fujiwara	Yamaguchi University
12	希土類 122 化合物における圧力効果	繁岡　透	山口大学	大学院理学研究科	Pressure effect of rare earth 122 compounds	Toru Shigeoka	Yamaguchi University
13	磁性体の圧力効果	巨海　玄道	久留米工業大学	工学部	Effect of pressure on the Magnetic Materials	Gendo Oomi	Kurume Institute of Technology
14	圧力下 NMR 測定法に関する開発	藤原　直樹	京都大学	大学院人間・環境学研究科	Development of NMR measurement method under high pressure	Naoki Fujiwara	Kyoto University
15	低温用マルチアンビル装置の開発	辺土　正人	琉球大学	理学部	Development of multi-anvil apparatus for low temperature	Masato Hedo	University of the Ryukyus
16	中性子回析に用いる圧力装置の開発	片野　進	埼玉大学	大学院理工学研究科	Developments of High Pressure Cell for Neutron Diffraction	Susumu Katano	Saitama University
17	擬一次元有機物質の圧力下物性研究	糸井　充穂	日本大学	医学部	Study on pressure induced superconductivity of quasi organic conductor	Miho Itoi	Nihon University
18	高圧下の比熱測定装置の開発	梅原　出	横浜国立大学	工学部	Development of apparatus for specific heat measurements under high pressure	Izuru Umehara	Yokohama National University
19	磁化測定装置の開発	名嘉　節	物質・材料研究機構	機能性材料研究拠点	Development of the magnetometer	Takashi Naka	National Institute for Materials Science
20	AgPdCu 合金圧力セルを用いた磁場中比熱測定	河江　達也	九州大学	大学院工学研究院	Effect of pressure on the 3d transition compound	Tastuya Kawae	Kyushu University
21	3d 遷移化合物に関する圧力効果	鹿又　武	東北学院大学	工学総合研究所	Investigation of magnetic properties for 3d transition intermetallic compounds under pressure	Takeshi Kanomata	Tohoku Gakuin University
22	有機伝導体の圧力効果	村田　惠三	大阪経済法科大学	21 世紀社会総合研究センター	Effect of pressure on the organic conductor	Keizo Murata	Osaka University of Economics and Law

No.	課題名	氏名	所属		Title	Name	Organization
23	ダイヤモンドアンビルセルを用いた高圧低温下X線回折システムの開発	岡田　卓	東京大学	大学院理学系研究科	Development of X-ray diffraction system at high pressure and low temperature using diamond anvil cells	Taku Okada	The University of Tokyo
担当所員：野口　博司							
24	汎用他変数変分モンテカルロ法の整備・公開	大越　孝洋	東京大学	大学院工学系研究科	Development of Many-Variable Variational Monte Carlo Method	Takahiro Ohgoe	The University of Tokyo
25	シフト型クリロフ理論を中核とした物性計算むけ大行列数理ソルバー	山地　洋平	東京大学	大学院工学系研究科	Development of large matrix solver for condensed matter physics	Youhei Yamaji	The University of Tokyo
26	〃	星　健夫	鳥取大学	大学院工学研究科	〃	Takeo Hoshi	Tottori University
27	〃	曽我部　知広	名古屋大学	大学院工学研究科	〃	Tomohiro Sogabe	Nagoya University
28	〃	山元　進	東京工科大学	コンピュータサイエンス学部	〃	Susumu Yamamoto	Tokyo Institute of Technology
担当所員：柴山　充弘							
29	中性子散乱装置の共同利用・開発による強相関電子系物質の構造物性の研究	岩佐　和晃	茨城大学	フロンティア応用原子科学研究センター	Structural studies of strongly correlated electron systems by usage of neutron scattering and instrumental developments	Kazuaki Iwasa	Ibaraki University
30	湾曲大型２次元中性子検出器と低温振動写真撮影装置の開発	木村　宏之	東北大学	多元物質科学研究所	Development of Large-area curved two dimensional neutron detector and Low temperature oscillating photographic device	Hiroyuki Kimura	Tohoku University
31	中性子散乱装置のアップグレードと共同利用研究の推進	藤田　全基	東北大学	金属材料研究所	Upgrading of the neutron scattering device and promotion of the research and public use	Masaki Fujita	Tohoku University
32	C1-3　ULS 極小角散乱装置 IRT	杉山　正明	京都大学	原子炉実験所	Development of Micro-Focusing Small-Angle Neutron Scattering Spectrometer	Masaaki Sugiyama	Kyoto University
33	集光テスト用小型 SANS の開発及び冷中性子反射率計 / 干渉計のアップグレード	日野　正裕	京都大学	原子炉実験所	Improvement of MIEZE spectrometer and cold neutron reflectometer and interferometer	Masahiro Hino	Kyoto University
34	三軸分光器を用いた極端条件下における物質科学研究の実施	阿曽　尚文	琉球大学	理学部	Material science studies under extreme conditions by using triple-axis spectrometers	Naofumi Aso	University of the Ryukyus
35	三軸分光器の高度化およびそれを用いたスピンダイナミクス研究	佐藤　卓	東北大学	多元物質科学研究所	Improvement of triple-axis spectrometer and its application to the spin dynamics research	Taku Sato	Tohoku University
36	高度化した三軸分光器を用いた強相関電子系物質の研究	南部　雄亮	東北大学	金属材料研究所	Study of strongly correlated electron systems using advanced triple-axis spectrometers	Yusuke Nambu	Tohoku University
37	C1-2　SANS-U　及び C2-3-1　iNSE　装置 IRT	井上　倫太郎	京都大学	原子炉実験所	Development of Small-Angle Neutron Scattering and Spin and Spin Echo Spectrometer	Rintaro Inoue	Kyoto University

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：金道　浩一							
38	85 テスラマグネットを用いた超音波測定の開発	吉澤　正人	岩手大学	工学部	Development for Ultrasonic Measurements by use of 85 T-Magnet	Masahito Yoshizawa	Iwate University
39	〃	中西　良樹	岩手大学	工学部	〃	Yoshiki Nakanishi	Iwate University
担当所員：辛　埴							
40	高温超伝導体の高分解能光電子分光	藤森　淳	東京大学	大学院理学系研究科	Ultra-high resolution photoemission spectroscopy on high Tc superconductor	Atsushi Fujimori	The University of Tokyo
41	60-eV レーザーを用いた時間分解光電子分光の開発	石坂　香子	東京大学	大学院工学系研究科	The development of time-resolved photoemission using 60eV laser	Kyoko Ishizaka	The University of Tokyo
42	鉄系超伝導体のレーザー光電子分光	下志万　貴博	東京大学	大学院工学系研究科	Laser-ARPES on Fe superconductor	Takahiro Shimojima	The University of Tokyo
43	Bi 系超伝導体の角度分解光電子分光	竹内　恒博	豊田工業大学	工学部	Angle-resolved photoemission study on high Tc cuprate	Tsunehiro Takeuchi	Toyota Technological Institute
44	高分解能光電子分光による強相関物質の研究	横谷　尚睦	岡山大学	大学院自然科学研究科	Ultra-high resolution study on strongly correlated materials	Takayoshi Yokoya	Okayama University
45	酸化バナジウムの高分解能光電子分光	江口　律子	岡山大学	大学院自然科学研究科	Photoemission study on vanadium oxides	Ritsuko Eguchi	Okayama University
46	有機化合物の光電子分光	金井　要	東京理科大学	理工学部	Photoemission study on organic compounds	Kaname Kanai	Tokyo University of Science
47	重い電子系ウラン化合物の高分解能光電子分光	藤森　伸一	日本原子力研究開発機構	量子ビーム応用研究センター	Ultra high resolution photoemission study on heavy fermion Uranium compounds	Shinichi Fujimori	Japan Atomic Energy Agency
48	レーザー光電子分光による酸化物薄膜の研究	津田　俊輔	物質・材料研究機構	機能性材料研究拠点	Laser-Photoemission Study on Oxide Films	Shunsuke Tsuda	National Institute for Materials Science
49	４f 電子系物質の高分解能光電子分光	松波　雅治	豊田工業大学	工学部	Photoemission study on 4f materials	Masaharu Matsunami	Toyota Technological Institute
50	超高空間分解能光電子顕微鏡による磁区構造観察	中川　剛志	九州大学	大学院総合理工学府	Observation of magnetic domain structures by ultra-high resolution photoemission electron microscopy	Takeshi Nakagawa	Kyushu University
51	Mn 化合物の時間分解光電子分光	大川　万里生	東京理科大学	理学部	Time resolved Photoemission on Mn compounds	Mario Okawa	Tokyo University of Science
52	収差補正型光電子顕微鏡の建設と利用研究	小嗣　真人	東京理科大学	基礎工学部	Construction and utilization research of aberration correction photoelectron emission microscopy	Masato Kotsugi	Tokyo University of Science

No.	課題名	氏名	所属		Title	Name	Organization
53	時間分解・マイクロビームラインの開発と研究	室　隆桂之	高輝度光科学研究センター	利用研究促進部門	Development of micr- and time-resolved beamline	Takayuki Muro	Japan Synchrotron Radiation Institute
54	光電子分光法を用いた各種分子性結晶の電子状態の研究及び装置の低温化	木須　孝幸	大阪大学	大学院基礎工学研究科	Research on electron state of molecular crystals using photoemission spectroscopy	Takayuki Kisu	Osaka University
55	トポロジカル絶縁体の電子状態の解明	木村　昭夫	広島大学	大学院理学研究科	Electronic-structure study of topological insulators	Akio Kimura	Hiroshima University
担当所員：松田　巖							
56	軟Ｘ線アンジュレータビームラインの分光光学系の開発研究	雨宮　健太	高エネルギー加速器研究機構	物質構造科学研究所	Research and development of soft X-ray undulator beamline	Kenta Amemiya	High Energy Accelerator Research Institute
57	光電子スピン検出器の開発・研究	奥田　太一	広島大学	放射光科学研究センター	Research and development of a new photoelectron spin detector	Taichi Okuda	Hiroshima University
58	光電子顕微鏡による磁性ナノ構造物質の磁化過程	木下　豊彦	高輝度光科学研究センター	利用研究促進部門	Magnetization in process of magnetic nano structure by PEEM	Toyohiko Kinoshita	Japan Synchrotron Radiation Institute
59	高輝度軟Ｘ線を利用した強相関物質の電子状態研究	組頭　広志	高エネルギー加速器研究機構	物質構造科学研究所	Study of electronic states in strongly correlated materials with high brilliant soft-Xray.	Hiroshi Kumigashira	High Energy Accelerator Research Institute
60	高輝度放射光軟Ｘ線を用いた時間分解光電子分光による表面ダイナミクス研究	近藤　寛	慶應義塾大学	工学部	Study of surface dynamics by time-resolved photomission spectroscopy with high-brilliant soft X-rey synchrotron radiation	Hiroshi Kondoh	Keio University
61	二次元表示型スピン分解光電子エネルギー分析器の開発	大門　寛	奈良先端科学技術大学院大学	物質創成科学研究科	Development of 2D display type spin resolved photoelectron energy analyzer.	Hiroshi Daimon	Nara Institute of Science and Technology
62	軟Ｘ線放射光用チョッパー開発	大沢　仁志	高輝度光科学研究センター	ナノテクノロジー利用推進グループ	Developments of a chopper for soft X-ray synchrotron radiation	Hitoshi Osawa	Japan Synchrotron Radiation Institute
63	分子吸着系における時間分解光電子分光の研究	間瀬　一彦	高エネルギー加速器研究機構	物質構造科学研究所	Study of time-resolved photoemission spectroscopy for molecular adsorption system	Kazuhiko Mase	High Energy Accelerator Research Institute
64	共鳴磁気光学カー効果の散乱理論研究	田口　宗孝	奈良先端科学技術大学院大学	物質創成科学研究科	Study of scattering theory for the resonant magneto-optical Kerr effect	Munetaka Taguchi	Nara Institute of Science and Technology
担当所員：原田　慈久							
65	軟Ｘ線吸収／発光分光法によるリチウムイオン電池電極材料の電子物性研究	朝倉　大輔	産業技術総合研究所	省エネルギー研究部門	Study on the electronic property of electrode materials for Li-ion batteries by soft X-ray absorption/emission spectroscopy	Daisuke Asakura	National Institute of Advanced Industrial Science and Technology
66	極小角Ｘ線散乱と軟Ｘ線吸収・発光分光によるソフトマテリアルの物性研究	雨宮　慶幸	東京大学	大学院新領域創成科学研究科	Study on the physical properties of soft materials by a combination of ultra-small-angle X-ray scattering and soft X-ray absorption/emission spectroscopy	Yoshiyuki Amemiya	The University of Tokyo
67	省エネ・創エネ・蓄電デバイスのオペランド分光	尾嶋　正治	東京大学	放射光連携研究機構	Operando nano-spectroscopy for energy efficient, power generation and energy storage devices	Masaharu Oshima	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
68	軟 X 線発光・共鳴非弾性散乱分光の磁気円・線二色性測定システムの構築	菅　滋正	大阪大学	産業科学研究所	Construction of a noble system for circular and linear dichroism in soft X-ray emission and RIXS spectroscopy	Suga Shigemasa	Osaka University
69	二次元原子薄膜トランジスタの電子状態のナノ分析 (T)	吹留　博一	東北大学	電気通信研究所	Nanoscale analysis of electronic states of graphene device	Hirokazu Fukidome	Tohoku University
70	高分解能光電子分光による酸化バナジウムの研究	藤原　秀紀	大阪大学	大学院基礎工学研究科	Study on vanadium oxides by high resolution Photoemission	Hidenori Fujiwara	Osaka University
71	軟 X 線吸収 / 発光分光法によるリチウム電池電極材料の電子物性研究	細野　英司	産業技術総合研究所	エネルギー技術研究部門	Study on the electronic property of electrode materials for Li-ion batteries by soft X-ray absorption/emission spectroscopy	Eiji Hosono	National Institute of Advanced Industrial Science and Technology
担当所員：和達　大樹							
72	共鳴硬・軟 X 線散乱による構造物性と磁性研究	村上　洋一	高エネルギー加速器研究機構	物質構造科学研究所	Studying structures and magnetism of materials by resonant hard and soft x-ray scattering	Youichi Murakami	High Energy Accelerator Research Institute
73	三次元 nanoESCA による実デバイスのオペランド電子状態解析	永村　直佳	物質・材料研究機構	先端材料解析研究拠点	Operando analysis of the electronic structure of actual devices by 3DnanoESCA	Naoka Nagamura	National Institute for Materials Science
74	共鳴軟Ｘ線散乱を用いた外場下での電子秩序状態の解明	山崎　裕一	東京大学	大学院工学系研究科	Observation of electric ordered state under external field by resonant soft x-ray scattering	Yuichi Yamasaki	The University of Tokyo

一般研究員 / General Researcher

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：榊原　俊郎							
1	重い電子系超伝導体の対称性の決定	町田　一成	立命館大学	理工学部	Determination of gap symmetry in heavy fermion superconductors	Kazunari Machida	Ritsumeikan University
2	強相関電子系化合物の秩序相に対する結晶対称性および電子軌道の効果	横山　淳	茨城大学	理学部	Effects of crystal symmetry and electron orbitals in ordered states of strongly correlated electron systems	Makoto Yokoyama	Ibaraki University
3	〃	益子　寛明	茨城大学	大学院理工学研究科	〃	Hiroaki Mashiko	Ibaraki University
4	RIr_2Zn_{20}(R ＝ 希土類元素) の極低温磁化測定	加瀬　直樹	新潟大学	自然科学研究科	Magnetization measurements of RIr_2Zn_{20} (R = Rare earth) at low temperature	Kase Naoki	Niigata University
5	〃	棚橋　正貴	新潟大学	自然科学研究科	〃	Tanahashi Masataka	Niigata University
6	層状ルテニウム酸化物超伝導体 Sr_2RuO_4 における一軸性圧力下比熱測定	矢口　宏	東京理科大学	理工学部	Specific heat measurements of the layered ruthenate superconductor Sr_2RuO_4 under uniaxial pressure	Hiroshi Yaguchi	Tokyo University of Science

No.	課題名	氏名	所属		Title	Name	Organization
7	〃	山崎　照夫	東京理科大学	理工学部	〃	Teruo Yamazaki	Tokyo University of Science
8	重い電子系 $Ce_2Pt_6Ga_{15}$ の極低温比熱測定	松本　裕司	名古屋工業大学	大学院工学研究科	Specific heat measurement of heavy fermion $Ce_2Pt_6Ga_{15}$	Yuji Matsumoto	Nagoya Institute of Technology
9	〃	植田　拓也	名古屋工業大学	大学院工学研究科	〃	Takuya Ueda	Nagoya Institute of Technology
10	三方晶 $DyNi_3Ga_9$ の極低温磁化比熱測定	松本　裕司	名古屋工業大学	大学院工学研究科	Magnetic and specific heat measurements of trigonal $DyNi_3Ga_9$	Yuji Matsumoto	Nagoya Institute of Technology
11	〃	二宮　博樹	名古屋工業大学	大学院工学研究科	〃	Hiroki Ninomiya	Nagoya Institute of Technology
12	(Th, U)Ru_2Si_2 混晶系の電子状態	芳賀　芳範	日本原子力研究開発機構	先端基礎研究センター	Electronic states in (Th, U)Ru_2Si_2 alloy system	Yoshinori Haga	Japan Atomic Energy Agency
13	〃	松本　裕司	名古屋工業大学	大学院工学研究科	〃	Yuji Matsumoto	Nagoya Institute of Technology
14	強相関電子系準結晶・近似結晶の極低温磁化測定	出口　和彦	名古屋大学	大学院理学研究科	Low temperature magnetization measurement of strongly correlated electron quasicrystals and approximants	Kazuya Deguchi	Nagoya University
15	〃	松川　周矢	名古屋大学	大学院理学研究科	〃	Shuya Matsukawa	Nagoya University
16	〃	國方　翔太	名古屋大学	大学院理学研究科	〃	Shouta Kunikata	Nagoya University
17	有機無機ハイブリッドスピン系の低温物性	山口　博則	大阪府立大学	大学院理学系研究科	Low temperature physical properties of metal-radical hybrid-spin systems	Hironori Yamaguchi	Osaka Prefecture University
18	〃	岡田　将孝	大阪府立大学	大学院理学系研究科	〃	Masataka Okada	Osaka Prefecture University
19	UBe_{13} 及びその Th 置換系における極低温精密物性測定	清水　悠晴	東北大学	金属材料研究所	Study of heavy-fermion superconductivity and non-Fermi-liquid behaviors in UBe_{13} and Th-doped systems	Yusei Shimizu	Tohoku University
担当所員：長田　俊人							
20	ナノセンシングデバイスに関する研究	松木　孝憲	東京大学	大学院新領域創成科学研究科	Research on nano sensing devices	Takanori Matsuki	The University of Tokyo
担当所員：山下　穣							
21	超流動 ^{3}He-A1 相中のスピン流れと電場の交差相関の探索	白濱　圭也	慶應義塾大学	理工学部	Study of cross-correlation between spin flow and electric field in superfluid ^{3}He-A1	Keiya Shirahama	Keio Universitt

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22	〃	山口　明	兵庫県立大学	大学院物質理学研究科	〃	Akira Yamaguchi	University of Hyogo
23	〃	村川　智	東京大学	低温センター	〃	Satoshi Murakawa	The University of Tokyo
24	〃	互井　通裕	慶應義塾大学	大学院理工学研究科	〃	Michihiro Tagai	Keio Universitt
25	制限空間内で回転する超流動ヘリウム３－Ａ相の量子渦の研究	石川　修六	大阪市立大学	大学院理学研究科	Study on quantum vortices of Superfluid ^{3}He-A phase in confined geometry	Osamu Ishikawa	Osaka Prefecture University
担当所員：勝本　信吾							
26	グラフェン、及び各種二次元単原子層の新奇スピン物性の研究	春山　純志	青山学院大学	大学院理工学研究科	Study of novel spin-based phenomena in graphene and other 2D mono-atomic layers	Jyunji Haruyama	Aoyama Gakuin University
27	〃	片桐　勇人	青山学院大学	大学院理工学研究科	〃	Yoto Katagiri	Aoyama Gakuin University
28	〃	山田　峻矢	青山学院大学	大学院理工学研究科	〃	Shunya Yamada	Aoyama Gakuin University
29	〃	大畠　智佳	青山学院大学	大学院理工学研究科	〃	Chika Ohata	Aoyama Gakuin University
30	〃	深井　佳乃	青山学院大学	大学院理工学研究科	〃	Yoshino Fukai	Aoyama Gakuin University
31	ナノセンシングデバイスに関する研究	割澤　伸一	東京大学	大学院新領域創成科学研究科	Research on nano sensing devices	Shinichi Warisawa	The University of Tokyo
32	〃	松木　孝憲	東京大学	大学院新領域創成科学研究科	〃	Takanori Matsuki	The University of Tokyo
33	〃	方　琦	東京大学	大学院新領域創成科学研究科	〃	Fang Qi	The University of Tokyo
34	〃	中村 高道	東京大学	大学院新領域創成科学研究科	〃	Takamichi Nakamura	The University of Tokyo
担当所員：小森　文夫							
35	近藤半導体 YbB_{12}(001) 表面原子構造と局所電子状態	大坪　嘉之	大阪大学	大学院生命機能研究科	Surface atomic structure and local electronic states of Kondo semiconductor YbB_{12}(001)	Yoshiyuki Ohtsubo	Osaka University
36	〃	萩原　健太	大阪大学	大学院理学研究科	〃	Kenta Hagiwara	Osaka University

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37	Al-Pd-Ru 準結晶・近似結晶における空孔濃度の研究	金沢　育三	東京学芸大学	自然科学系	Positron-annihilation studies of Al-Pd-Mn quasicrystal and its approximant crystals	Ikuzo Kanazawa	Tokyo Gakugei University
38	〃	中島　諒	東京学芸大学	大学院教育学研究科	〃	Makoto Nakajima	Tokyo Gakugei University
39	Ni(111) 試料の表面酸化と酸化物表面近傍の酸素欠損型欠陥に関する研究	松本　益明	東京学芸大学	教育学部	Study of oxidation of Ni(111) surface and vacancies near the oxide surface	Masuaki Matsumoto	Tokyo Gakugei University
40	〃	小野寺　健洋	東京学芸大学	大学院教育学研究科	〃	Takehiro Onodera	Tokyo Gakugei University
41	Ag 超薄膜 /Si(111) 基板界面への水素吸蔵	中辻　寛	東京工業大学	大学院総合理工学研究科	Hydrogen absorption at the interface of Ag thin film and Si(111) substrate	Kan Nakatsuji	Tokyo Gakugei University
42	レアメタルフリー磁性材料 L10-FeCo の磁気特性の解析	小嗣　真人	東京理科大学	基礎工学部	Analysis of magnetic properties of rare-metal-free super magnet "L10-FeCo"	Masato Kotsugi	Tokyo University of Science
43	“トポロジカル近藤絶縁体 "SmB_6 の走査トンネル顕微分光	菅　滋正	大阪大学	産業科学研究所	Scanning tunneling microscopy/spectroscopy of the so-called topological　Kondo insulator SmB_6	Shigemasa Suga	Osaka University
44	金属／半導体表面上へのナノ構造を持つ超薄膜の形成とその磁気ダイナミックスの磁気光学的測定	河村　紀一	日本放送協会放送技術研究所	新機能デバイス研究部	Study on magnetic dynamics of ultra-thin films and nano-structures on metal / semiconductor surfaces	Norikazu Kawamura	NHK　Science and Technology Research Laboratories
担当所員：長谷川　幸雄							
45	二ホウ化物薄膜上エピタキシャルシリセン及びゲルマネンの低温走査トンネル顕微鏡観察	高村　由起子	北陸先端科学技術大学院大学	マテリアルサイエンス研究科	Low temp. STM investigation of epitaxial silicene and germanene on diboride	Yukiko Takamura	Japan Advanced Institute of Science and Technology
46	〃	アントワーヌ　フロランス	北陸先端科学技術大学院大学	マテリアルサイエンス研究科	〃	Antoine Fleurence	Japan Advanced Institute of Science and Technology
47	〃	米澤　隆宏	北陸先端科学技術大学院大学	マテリアルサイエンス研究科	〃	Takahiro Yonezawa	Japan Advanced Institute of Science and Technology
48	特異なラシュバ効果によるスピンホール効果の観測	坂本　一之	千葉大学	大学院融合科学研究科	Observation of the spin Hall effect originating from a peculiar Rashba effect	Kazuyuki Sakamoto	Chiba University
49	〃	阿部　巧	千葉大学	大学院融合科学研究科	〃	Takumi Abe	Chiba University
50	重い電子系超伝導の実空間観察のための超低温・強磁場の小型 STM の開発	河江　達也	九州大学	大学院工学研究院	Development of a miniature STM for low-temperature and high-eld measurements　of heavy fermion superconductors	Tatsuya Kawae	Kyusyu University
51	〃	高田　弘樹	九州大学	大学院工学府	〃	Hiroki Takata	Kyusyu University
52	〃	志賀　雅亘	九州大学	大学院工学府	〃	Masanobu Shiga	Kyusyu University

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53	STM/STS による 1 原子層表面超構造 (Tl,Pb)/Si(111) における超伝導ギャップの観測	高山　あかり	東京大学	大学院理学系研究科	Observation of superconducting gap for one-atomic-layer surface-superstructure (Tl,Pb)/Si(111) studied by STM and STS	Akari Takayama	The University of Tokyo
担当所員：リップマー　ミック							
54	真空蒸着法で製膜されたペロブスカイト太陽電池の構造・機能性の評価	川嶋　一裕	東京大学	大学院新領域創成科学研究科	A study of structural and functional properties of perovskite solar cells fabricated by vacuum evaporation method	Kazuhiro Kawashima	The University of Tokyo
55	新規ウルツァイト型四面体強誘電体材料の創成 (II)	安井 伸太郎	東京工業大学	応用セラミックス研究所	The creation of novel wurtzite-type tetrahedral ferroelectric materials (II)	Shintaro Yasui	Tokyo Institute of Technology
56	遷移金属酸化物 $LaAlO_3/SrTiO_3$ ヘテロ界面金属層における Ir ドープの影響	李 美希	奈良先端科学技術大学院大学	物質創成科学研究科	Effects of the doped Ir in the $LaAlO_3/SrTiO_3$ metallic interface	Mihee Lee	Nara Institute of Science and Technology
担当所員：吉信　淳							
57	遷移金属酸窒化物・酸硫化物のドーピングと水の光分解触媒への応用の研究	山田　太郎	東京大学	大学院工学系研究科	Doping of transition-metal oxynitrides and oxysulfides and application for water-splitting photocatalysts	Taro Yamada	The University of Tokyo
58	〃	後藤　陽介	東京大学	大学院工学系研究科	〃	Yousuke Goto	The University of Tokyo
59	〃	坂井　延寿	東京大学	大学院工学系研究科	〃	Enjyu Sakai	The University of Tokyo
60	〃	西山　洋	東京大学	化学システム工学	〃	Hiroshi Nishiyama	The University of Tokyo
61	〃	守屋　映祐	東京大学	大学院工学系研究科	〃	Yosuke Moriya	The University of Tokyo
62	〃	鐘　苗	東京大学	大学院工学系研究科	〃	Zhong Miao	The University of Tokyo
63	〃	岩瀬　元希	明治大学	研究・知財戦略機構	〃	Motoki Iwase	Meiji University
64	Si(001) 表面上の準安定共吸着過程の透過 FTIR 測定	大野　真也	横浜国立大学	大学院工学研究院	FTIR measurements of metastable physisorption processes on Si(001)	Shinya Ohno	Yokohama National University
65	〃	小川　新	横浜国立大学	理工学部	〃	Arata Ogawa	Yokohama National University
66	水素終端 Si(110)-(1×1) 表面のエッチング過程 II：非線形プロセスの形成	須藤　彰三	東北大学	大学院理学研究科	Wet chemical etching process of the hydrogen terminated Si(110)-(1×1) surfaces II	Shozo Suto	Tohoku University
67	〃	川本　絵里奈	東北大学	大学院理学研究科	〃	Erina Kawamoto	Tohoku University

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担当所員：秋山　英文							
68	GaPN 混晶のアップコンバージョン発光に関する研究	矢口　裕之	埼玉大学	大学院理工学研究科	Upconversion luminescence in GaPN alloys	Hiroyuki Yaguchi	Saitama University
69	〃	飯村　啓泰	埼玉大学	大学院理工学研究科	〃	Keitai Iimura	Saitama University
70	〃	高宮　健吾	埼玉大学	総合技術支援センター	〃	Kengo Takamiya	Saitama University
71	ナノセンシングデバイスに関する研究	松木　孝憲	東京大学	大学院新領域創成科学研究科	Research on nano sensing devices	Takanori Matsuki	The University of Tokyo
担当所員：廣井　善二							
72	トンネル構造を有する金属間化合物の結晶構造および電子物性に関する研究	山田　高広	東北大学	多元物質科学研究所	Characterization of crystal structures and electric properties of intermetallic compounds with tunnel structures	Takahiro Yamada	Tohoku University
担当所員：川島　直輝							
73	蜂の巣格子一般化 Heisenberg-Kitaev 模型の磁気励起と熱励起	鈴木　隆史	兵庫県立大学	大学院工学研究科	Magnetic and thermal properties of the generalized Heisenberg-Kitaev model on a honeycomb lattice	Takafumi Suzuki	University of Hyogo
74	テンソルネットワーク法のアルゴリズム開発	原田　健自	京都大学	大学院情報学研究科	Development of tensor network algorithms	Kenji Harada	Kyoto University
担当所員：上床　美也							
75	有機分子性導体の高圧物性の研究	鳥塚　潔	武蔵野大学	教育学部	Studies on High Pressure Properties of Organic Molecular Conductors	Kiyoshi Torizuka	Musashino University
76	Co 基ホイスラー合金における圧力誘起マルテンサイト変態に関する研究	重田 出	鹿児島大学	大学院理工学研究科	Study on pressure-induced martensitic phase transformation in Co-based Heusler alloys	Shigeta Iduru	Kagoshima University
77	〃	大岡　隆太郎	鹿児島大学	理学部	〃	Ryutaro Ooka	Kagoshima University
78	鉄系超伝導体 FeSe 単結晶における圧力電子相図の決定	芝内　孝禎	東京大学	大学院新領域創成科学研究科	Determination of electronic phase diagram under high pressure in single crystals of iron-based superconductor FeSe	Takasada Shibauchi	The University of Tokyo
79	〃	水上　雄太	東京大学	大学院新領域創成科学研究科	〃	Yuta Mizukami	The University of Tokyo
80	〃	松浦　康平	東京大学	大学院新領域創成科学研究科	〃	Kouhei Matsuura	The University of Tokyo

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81	単結晶 $R_2T_3Ge_5$(R: 希土類，T: 遷移金属元素) の高圧下物性	中島　美帆	信州大学	理学部	Physical properties of $R_2T_3Ge_5$ (R: rare earth metal, T: transition metal element) single crystals under high pressure	Miho Nakashima	Shinshu University
82	〃	中村　優希	信州大学	理学部	〃	Yuki Nakamura	Shinshu University
83	鉄系超伝導体 K_xFe_2-yCh_2(Ch=S, Se) の圧力下電気抵抗測定	小林　寿夫	兵庫県立大学	大学院物質理学研究科	Electrical resistivity measurements under high pressure on K_xFe_2-yCh_2(Ch=S and Se)	Hisao Kobayashi	University of Hyogo
84	ホイスラー化合物強磁性体 Co_2FeGa の高圧化磁化測定	伊藤　昌和	鹿児島大学	学術研究院理工学域	Magnetization of Heusler compound Co_2FeGa under pressure	Masakazu Ito	Kagoshima University
85	〃	松隈　秀憲	鹿児島大学	大学院理工学研究科	〃	Hidenori Matsuguma	Kagoshima University
86	三角格子反強磁性体の低温磁性	柄木　良友	琉球大学	教育学部	Low temperature magnetism of triangular antiferromagnets.	Yoshitomo Karaki	University of the Ryukyus
87	RT_2Cd_{20} の圧力下電気抵抗	廣瀬　雄介	新潟大学	理学部	Resistivity of RT_2Cd_{20} under pressure	Yusuke Hirose	Niigata University
88	〃	角田　竜馬	新潟大学	大学院自然科学研究科	〃	Ryoma Tsunoda	Niigata University
89	梯子格子銅酸化物超伝導体の圧力下電気抵抗率測定	久田　旭彦	徳島大学	大学院ソシオ・アーツ・アンド・サイエンス研究部	Resistivity measurements under pressure in the two-leg ladder cuprate superconductor	Akihiko Hisada	Tokushima University
90	〃	藤原　直樹	京都大学	大学院人間・環境学研究科	〃	Naoki Fujiwara	Kyoto University
91	有機導体研究に向けた静水圧高圧技術の開発	村田　惠三	大阪経済法科大学	２１世紀社会総合研究センター	Development of High Pressure Technique orienting to the Research of Organic Conductors	Keizo Murata	Osaka　University of Economics and Law
92	回転希釈冷凍機を用いた量子液体・固体研究	白濱　圭也	慶應義塾大学	理工学部	Study of quantum fluids and solids using rotating dilution refrigerator	Keiya Shirahama	Keio Universitt
93	〃	村川　智	東京大学	低温センター	〃	Satoshi Murakawa	The University of Tokyo
94	〃	高橋　大輔	足利工業大学	共通教育センター	〃	Daisuke Takahashi	Ashikaga Institute of Technology
95	〃	立木　智也	慶應義塾大学	大学院理工学研究科	〃	Tomoya Tsuiki	Keio Universitt
96	YbH_2+x の磁性と伝導	中村　修	岡山理科大学	学外連携推進室	Magnetic and transport properties in YbH_2+x	Osamu Nakamura	Okayama University of Science
97	希土類化合物における価数揺らぎの圧力効果	中野　智仁	新潟大学	大学院自然科学研究科	Effect of pressure of valence fluctuation in rare earth compounds	Tomohito Nakano	Niigata University

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98	〃	上杉　和哉	新潟大学	大学院自然科学研究科	〃	Kazuya Uesugi	Niigata University
99	かご状化合物における新奇量子臨界現象の探索	中野　智仁	新潟大学	大学院自然科学研究科	Investigation of novel quantum critical phenomena in cage-compound	Tomohito Nakano	Niigata University
100	〃	福原　慶	新潟大学	大学院自然科学研究科	〃	Kei Fukuhara	Niigata University
101	$YbCo_2Zn_{20}$ の Co 元素位置の置換効果 III	阿曽　尚文	琉球大学	理学部	Substitution effect at Co element in $YbCo_2Zn_{20}$ III	Naofumi Aso	University of the Ryukyus
102	〃	小林　理気	琉球大学	理学部	〃	Riki Kobayashi	University of the Ryukyus
103	〃	高村　治希	琉球大学	大学院理工学研究科	〃	Haruki Takamura	University of the Ryukyus
104	$YbCo_2Zn_{20}$ の Zn 元素位置の置換効果 III	阿曽　尚文	琉球大学	理学部	Substitution effect at Zn element in $YbCo_2Zn_{20}$ III	Naofumi Aso	University of the Ryukyus
105	〃	小林　理気	琉球大学	理学部	〃	Riki Kobayashi	University of the Ryukyus
106	〃	高村　治希	琉球大学	大学院理工学研究科	〃	Haruki Takamura	University of the Ryukyus
107	多形化合物 RIr_2Si_2(R= 希土類）の磁気転移　6	繁岡　透	山口大学	大学院理工学研究科	Magnetic transitions of polymorphic compound RIr_2Si_2(R=rare earth) 6	Toru Shigeoka	Yamaguchi University
108	〃	藤原　哲也	山口大学	大学院理工学研究科	〃	Tetsuya Fujiwara	Yamaguchi University
109	〃	内間　清晴	沖縄キリスト教短期大学	総合教育系	〃	Kiyoharu Uchima	Okinawa Christian Junior College
110	擬三元系 (Ho,Y)Rh_2Si_2 単結晶の磁気特性 3	繁岡　透	山口大学	大学院理工学研究科	Magnetic characteristics of pseudoternary system (Ho,Y)Rh_2Si_2 single crystal 3	Toru Shigeoka	Yamaguchi University
111	〃	内間　清晴	沖縄キリスト教短期大学	総合教育系	〃	Kiyoharu Uchima	Okinawa Christian Junior College
112	〃	園部　太暉	山口大学	理学部	〃	Taiki Sonobe	Yamaguchi University
113	ホイスラー型強磁性形状記憶合金の格子定数の圧力依存性	安達　義也	山形大学	大学院理工学研究科	Pressure dependence of the lattice constants for the Heusler type ferromagnetic shape memory alloys	Yoshiya Adachi	Yamagata University
114	〃	小木　雄貴	山形大学	工学部	〃	Yuki Ogi	Yamagata University

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115	圧力下磁場中点接合分光実験の試み	本山　岳	島根大学	大学院総合理工学研究科	Development of a new method of Point-Contact-Spectroscopy under pressure	Gaku Momoyama	Shimane University
116	〃	瀬崎　眞澄	島根大学	大学院総合理工学研究科	〃	Masumi Sezaki	Shimane University
117	導電性ラングミュア・ブロジェット膜の高圧下の電気的性質に関する研究	三浦　康弘	桐蔭横浜大学	大学院工学研究科	Studies on Electrical Properties of Conductive Langmuir-Blodgett Films under High Pressure	Yasuhiro Miura	Toin University of Yokohama
118	新規三元化合物 $EuCuP_2$ の輸送特性 (2)	藤原　哲也	山口大学	大学院理工学研究科	Transport property of the novel ternary compound $EuCuP_2$ II	Tetsuya Fujiwara	Yamaguchi University
119	〃	園部　太暉	山口大学	理学部	〃	Taiki Sonobe	Yamaguchi University
120	$YbMn_2Ge_2$ の高圧力下磁化測定 (3)	藤原　哲也	山口大学	大学院理工学研究科	Magnetization measurements under high pressures in $YbMn_2Ge_2$ III	Tetsuya Fujiwara	Yamaguchi University
121	〃	平山　拓斗	山口大学	理学部	〃	Takuto Hirayama	Yamaguchi University
122	Pr-Zn-Ge 三元系新規化合物の合成および単結晶育成 (2)	藤原　哲也	山口大学	大学院理工学研究科	Synthesis and single crystal growth of Pr-Zn-Ge novel ternary intermetallics II	Tetsuya Fujiwara	Yamaguchi University
123	〃	平山　拓斗	山口大学	理学部	〃	Takuto Hirayama	Yamaguchi University
124	ウラン化合物反強磁性体 UIrGe の圧力効果	Pospisil Jiri	日本原子力研究開発機構	先端基礎研究センター	Effect of pressure on antiferromagnetism in uranium compound UIrGe	Jiri Pospisil	Japan Atomic Energy Agency
125	〃	芳賀　芳範	日本原子力研究開発機構	先端基礎研究センター	〃	Yoshinori Haga	Japan Atomic Energy Agency
126	強相関電子系準結晶・近似結晶における高圧下物性研究	出口　和彦	名古屋大学	大学院理学研究科	High-pressure study on strongly correlated electron quasicrystals and approximants	Kazuhiko Deguchi	Nagoya University
127	〃	松川　周矢	名古屋大学	大学院理学研究科	〃	Shuya Matsukawa	Nagoya University
128	Mn_2Sb 基メタ磁性体の磁気特性	小山　佳一	鹿児島大学	大学院理工学研究科	Magnetic properties of Mn_2Sb-based metamagnets	Keiichi Koyama	Kagoshima University
129	〃	アッドライン　ンゴジ　ムウッド	鹿児島大学	大学院理工学研究科	〃	Adline Ngozi Nwodo	Kagoshima University
130	3 次元直交ダイマー格子イリジウム酸化物における電子物性の圧力依存性の評価	青山　拓也	東北大学	大学院理学研究科	Evaluation of pressure dependences of electronic properties on three-dimensional orthogonal dimer iridium oxide	Takuya Aoyama	Tohoku University
131	圧力下で価数転移を示す Eu 化合物の探索	本多　史憲	東北大学	金属材料研究所	Investigation of valence transition of Eu compounds under high pressure	Fuminori Honda	Tohoku University

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132	〃	大貫　惇睦	琉球大学	理学部	〃	Yoshichika Onuki	University of the Ryukyus
133	強磁性体 CrAlGe に対する元素置換効果	三井　好古	鹿児島大学	大学院理工学研究科	Substitution effects for ferromagnetic compound CrAlGe	Yoshifuru Mitsui	Kagoshima University
134	〃	吉永　総志	鹿児島大学	大学院理工学研究科	〃	Soshi Yoshinaga	Kagoshima University
135	Mn_2Sb 基フェリ磁性体のメタ磁性転移とアレスト効果	三井　好古	鹿児島大学	大学院理工学研究科	Metamagnetic transition and arrested effect for Mn_2Sb-based ferrimagnet	Yoshifuru Mitsui	Kagoshima University
136	〃	若森　太音	鹿児島大学	大学院理工学研究科	〃	Wakamori Taoto	Kagoshima University
137	遷移金属化合物の高圧力下の輸送特性	仲間　隆男	琉球大学	理学部	Pressure effect on transport properties of transition metal compounds	Takao Nakama	University of the Ryukyus
138	〃	屋良　朝之	琉球大学	大学院理工学研究科	〃	Tomoyuki Yara	University of the Ryukyus
139	空間反転対称性のない遷移金属間化合物とその関連物質の高圧下輸送特性	辺土　正人	琉球大学	理学部	Transport properties of non-centrosymmetric transition metals compounds under high pressure	Masato Hedo	University of the Ryukyus
140	〃	垣花　将司	琉球大学	大学院理工学研究科	〃	Masashi Kakihana	University of the Ryukyus
141	〃	西村　健吾	琉球大学	大学院理工学研究科	〃	Kengo Nishimura	University of the Ryukyus
142	価数揺動物質の高圧力中輸送特性の研究	仲間　隆男	琉球大学	理学部	Transport properties of valence fluctuating compounds under pressure	Takao Nakama	University of the Ryukyus
143	〃	鈴木　史記	琉球大学	大学院理工学研究科	〃	Fuminori Suzuki	University of the Ryukyus
144	圧力誘起価数転移の探索と高圧下輸送特性	辺土　正人	琉球大学	理学部	Searching of pressure-induced valence transition and transport properties under high pressure	Masato Hedo	University of the Ryukyus
145	〃	安次富　洋介	琉球大学	大学院理工学研究科	〃	Yousuke Ashitomi	University of the Ryukyus
146	鉄系超伝導体 $K_xFe_{2-y}Ch_2$ (Ch=S, Se) の圧力下電気抵抗測定	池田　修悟	兵庫県立大学	大学院物質理学研究科	Development of secondary battery materials by nanostructure control	Shugo　Ikeda	University of Hyogo
147	〃	土屋　優	兵庫県立大学	大学院物質理学研究科	〃	Yuu　Tsuchiya	University of Hyogo

担当所員：吉澤　英樹

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148	$YbCo_2Zn_{20}$ 置換系試料の極低温比熱測定 II	小林　理気	琉球大学	理学部	Specific heat measurement at very low temperature on $YbCo_2Zn_{20}$ systems II	Riki Kobayashi	University of the Ryukyus
149	〃	阿曽　尚文	琉球大学	理学部	〃	Naofumi Aso	University of the Ryukyus
150	〃	高村　治希	琉球大学	大学院理工学研究科	〃	Haruki Takamura	University of the Ryukyus
151	鉄系超伝導物質 $FeTe_{1-x}S_x$ の純良大型単結晶における O_2 雰囲気中アニールの効果	山崎　照夫	東京理科大学	理工学部	Effect of O_2-annealing in the pure large single crystals of the Fe-based superconducting material $FeTe_{1-x}S_x$	Teruo Yamazaki	Tokyo University of Science
152	〃	矢口　宏	東京理科大学	理工学部	〃	Hiroshi Yaguchi	Tokyo University of Science
153	〃	飯泉　武顕	東京理科大学	理工学研究科	〃	Takeaki Iizuka	Tokyo University of Science
担当所員：益田　隆嗣							
154	磁性不純物による三角スピンチューブのスピンダイナミクスの変化	真中　浩貴	鹿児島大学	学術研究院理工学域	Magnetic impurity effect on spin dynamics of triangular spin tubes	Hirotaka Manaka	Kagoshima University
155	$Ce(Ru_{1-x}Rh_x)_2Al_{10}(x>0.5)$ 単結晶試料の高エネルギー X 線ラウエ装置による結晶方位同定	小林　理気	琉球大学	理学部	Alignment of $Ce(Ru_{1-x}Rh_x)_2Al_{10}(x>0.5)$ single crystals by high-energy X-ray Laue diffraction	Riki Kobayashi	University of the Ryukyus
担当所員：嶽山　正二郎							
156	超強磁場磁気光学による $Cu_3Mo_2O_9$ の磁化プラトーの研究	黒江　晴彦	上智大学	理工学部	Ultra-high magnetic field magneto-optical approach to the study of magnetization plateau in $Cu_3Mo_2O_9$ using vertical single-turn coil system	Haruhiko Kuroe	Sophia University
157	磁気光学測定を用いたハロゲン化金属ペロブスカイト型結晶の励起子特性の研究	松下　智紀	東京大学	大学院工学系研究科	Study on excitonic properties of organometallic lead halide perovskite using magneto-optical measurement	Tomonori Matsushita	The University of Tokyo
158	〃	中村　唯我	東京大学	大学院工学系研究科	〃	Yuiga Nakamura	The University of Tokyo
担当所員：金道　浩一							
159	10 MJ コンデンサーバンク用大型ワイドボアパルスマグネットの開発	萩原　政幸	大阪大学	大学院理学研究科	Development of a large wide-bore pulse magnet for a 10 MJ capacitor bank	Masayuki Hagiwara	Osaka University
160	〃	谷口　一也	大阪大学	大学院理学研究科	〃	Kazuya Taniguchi	Osaka University
161	元素置換したクロミズム化合物の強磁場下での構造と磁性	浅野　貴行	福井大学	大学院工学研究科	Structural and magnetic properties of element-substituted chromic compounds under high-magnetic fields	Takayuki Asano	University of Fukui

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162	〃	横山　太紀	福井大学	工学部	〃	Taiki Yokoyama	University of Fukui
163	幾何学的フラストレート磁性体の強磁場磁化測定	菊池　彦光	福井大学	大学院工学研究科	Magnetization measurements of the frustrated magnets	Hikomitsu Kikuchi	University of Fukui
164	〃	笠松　直幸	福井大学	大学院工学研究科	〃	Naoyuki Kasamatsu	University of Fukui
165	希土類金属間化合物の強磁場物性研究	海老原　孝雄	静岡大学	理学部	Physical properties in rare earth intermetallic compounds at high magnetic fields	Takao Ebihara	Shizuoka University
166	〃	ジュマエダ・ジャトミカ	静岡大学	大学院総合科学技術研究科	〃	Jumaeda Jatmika	Shizuoka University
167	近藤半導体 (Yb, R)B_{12} (R=Zr, Sc, Y) の 80T 級磁場下での強磁場物性	伊賀　文俊	茨城大学	理学部	High field physical property of Kondo insulator (Yb, R)B_{12} (R=Zr, Sc, Y) up to 80T class by using the pulse magnet	Fumitoshi Iga	Ibaraki University
168	〃	植松　直之	茨城大学	大学院理工学研究科	〃	Naoyuki Uematsu	Ibaraki University
169	高圧合成希土類 12 ホウ化物の磁化特性と比熱	伊賀　文俊	茨城大学	理学部	Magnetic and thermal properties of rare earth dodeca-borides produced by high pressure synthesis	Fumitoshi Iga	Ibaraki University
170	〃	菊地　翔弥	茨城大学	大学院理工学研究科	〃	Shoya Kikuchi	Ibaraki University
171	高圧合成希土類 12 ホウ化物及び valence skipping 超伝導参照物質 (Ca,Sr)FeO_3 の磁化特性と比熱	伊賀　文俊	茨城大学	理学部	Magnetic and thermal properties of rare earth dodeca-borides produced by high pressure synthesis and valence-skipping superconductor reference (Ca,Sr)FeO_3	Fumitoshi Iga	Ibaraki University
172	〃	横道　啓省	茨城大学	理学科	〃	Keisei Yokomichi	Ibaraki University
173	topological insulator SmB_6,YbB_{12} の磁化特性と比熱	伊賀　文俊	茨城大学	理学部	Magnetic and thermal properties of topological insulator SmB_6 and YbB_{12}	Fumitoshi Iga	Ibaraki University
174	〃	平野　航	茨城大学	理学部	〃	Wataru Hirano	Ibaraki University
175	スピン 1/2 反強磁性テトラマー物質 $CuInVO_5$ の強磁場磁化測定	長谷　正司	物質・材料研究機構	量子ビームユニット	High-field magnetization measurements on the spin-1/2 antiferromagnetic tetramer substance $CuInVO_5$	Masashi Hase	National Institute for Materials Science
176	重い電子系化合物が示す非従来型超伝導と磁性の相関	横山　淳	茨城大学	理学部	Interplay between unconventional superconductivity and magnetism in heavy-fermion compounds	Makoto Yokoyama	Ibaraki University
177	〃	大高 凌	茨城大学	大学院理工学研究科	〃	Ryo Otaka	Ibaraki University
178	Cr 系遍歴電子炭化物窒化物の強磁場磁化測定	和氣　剛	京都大学	大学院工学研究科	Magnetization measurement on itinerant electron Cr-based carbides and nitrides	Takeshi Waki	Kyoto University

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179	〃	高尾　健太	京都大学	大学院工学研究科	〃	Kenta Takao	Kyoto University
180	二次元または三次元のフラストレート格子を持つフッ化物の磁性	植田　浩明	京都大学	大学院理学研究科	Magnetism of fluorides with two-dimensional or three-dimensional frustrated lattices	Hiroaki Ueda	Kyoto University
181	〃	後藤　真人	京都大学	大学院理学研究科	〃	Masato Goto	Kyoto University
182	〃	稲盛　樹	京都大学	理学部	〃	Tatsuki Inamori	Kyoto University
183	スピネル $CuCr_2S_4$ の高磁場物性	伊藤　昌和	鹿児島大学	学術研究院理工学域	Magnetic properties of spinel $CuCr_2S_4$ in high magnetic field	Masakazu Ito	Kagoshima University
184	〃	平　敦志	鹿児島大学	大学院理工学研究科	〃	Atsushi Taira	Kagoshima University
185	$YbMn_6Ge_6$ およびその周辺物質の強磁場磁化過程	道岡　千城	京都大学	大学院理学研究科	High field magnetization of $YbMn_6Ge_6$ and its substituted compounds	Chishiro Michioka	Kyoto University
186	〃	原口　祐哉	京都大学	大学院理学研究科	〃	Yuya Haraguchi	Kyoto University
187	〃	勝間　勇人	京都大学	大学院大学院理学研究科	〃	Hayato Katsuma	Kyoto University
188	三角カゴメ複合格子をもつ新規フラストレート磁性体の強磁場磁化	佐藤　博彦	中央大学	理工学部	High-field magnetization of new frustrated magnet with kagome-triangular lattice	Hirohiko Sato	Chuo University
189	〃	石井　雄大	中央大学	理工学部	〃	Takehiro Ishii	Chuo University
190	新規三角格子フェリ磁性体の磁場誘起相の探索	佐藤　博彦	中央大学	理工学部	Search of field-induced magnetic phase of a new triangular-lattice ferrimagnet	Hirohiko Sato	Chuo University
191	〃	千代田　彩果	中央大学	大学院理工学研究科	〃	Ayaka Chiyoda	Chuo University
192	金属ナノクラスターネットワークの磁気抵抗測定	稲田　貢	関西大学	システム理工学部	Electronic transport properties of metal cluster networks under high-magnetic field	Mitsuru Inada	Kansai University
193	〃	中谷　勇哉	関西大学	大学院理工学研究科	〃	Yuya Nakatani	Kansai University
194	金属ナノ結晶の磁化特性	稲田　貢	関西大学	システム理工学部	Magnetic properties of metal nanocrystals	Mitsuru Inada	Kansai University
195	〃	三宅　伴季	関西大学	大学院理工学研究科	〃	Tomonori Miyake	Kansai University

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196	過剰オーバードープ Bi-2212 のパルス強磁場中面間輸送特性の研究	渡辺　孝夫	弘前大学	大学院理工学研究科	Interlayer magnetotransport measurements under pulsed magnetic fields for heavily overdoped Bi-2212	Takao Watanabe	Hirosaki University
197	〃	臼井　友洋	弘前大学	大学院理工学研究科	〃	Tomohiro Usui	Hirosaki University
198	〃	寺本　祐基	弘前大学	大学院理工学研究科	〃	Yuki Teramoto	Hirosaki University
199	有機 / 無機スピン源を持つ新規量子スピン系の低温・強磁場物性	小野　俊雄	大阪府立大学	大学院理学系研究科	Physical properties in the low temperature and high magnetic field region of the new quantum spin systems that has organic/inorganic spin sources	Toshio Ono	Osaka Prefecture University
200	〃	三宅　陽太	大阪府立大学	大学院理学系研究科	〃	Yota Miyake	Osaka Prefecture University
201	〃	奥田　恭平	大阪府立大学	大学院理学系研究科	〃	Kyohei Okuda	Osaka Prefecture University
202	〃	遠藤　耀司	大阪府立大学	大学院理学系研究科	〃	Youji Endo	Osaka Prefecture University
担当所員：徳永　将史							
203	$A_{1-x}Sr_xFeO_3$ (A = Nd, Sm) の反強磁性と熱電特性に関する研究	中津川　博	横浜国立大学	大学院工学研究院	Antiferromagnetism and thermoelectric properties in $A_{1-x}Sr_xFeO_3$(A = Nd, Sm)	Hiroshi Nakatsugawa	Yokohama National University
204	強磁場を利用した FeMn 基形状記憶合金の物性調査	キョ　キョウ	東北大学	大学院工学研究科	Investigation on physical properties of FeMn-based shape memory alloys	Xiao Xu	Tohoku University
205	高マンガンシリサイドの強磁場下輸送現象	原　嘉昭	茨城工業高等専門学校	自然科学科	The transport phenomenon under high magnetic field of higher manganese silicides (HMSs)	Yoshiaki Hara	National Institute of Technology, Ibaraki College
206	PrT_2Cd_{20} の強磁場磁化測定	廣瀬　雄介	新潟大学	理学部	High-field magnetization of PrT_2Cd_{20}	Yusuke Hiroshi	Niigata University
207	〃	河野　琢馬	新潟大学	理学部	〃	Takuma Kawano	Niigata University
208	マルチフェロイクス物質の磁場誘起現象の研究	寺田　典樹	物質・材料研究機構	中性子散乱グループ	Study of magnetic field phenomena in multiferroics	Noriki Terada	National Institute for Materials Science
209	非破壊パルス磁場を用いた磁場誘起秩序相におけるグラファイトの輸送測定	矢口　宏	東京理科大学	理工学部	Transport measurements of graphite in the field-induced ordered phase using non-destructive pulsed magnetic fields	Hiroshi Yaguchi	Tokyo University of Science
210	遍歴電子強磁性中での局在磁気モーメントの磁化過程	太田　寛人	東京農工大学	大学院工学研究院	Magnetic behavior of localized magnetic moments in itinerant ferromagnet	Hiroto Ohta	Tokyo University of Agriculture and Technology
211	〃	鈴木　敦	東京農工大学	大学院工学府	〃	Atsushi Suzuki	Tokyo University of Agriculture and Technology

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212	フラストレーションを有する磁性体の強磁場下での振る舞い	香取　浩子	東京農工大学	大学院工学研究院	Magnetic properties of frustrated magnets in high magnetic fields	Hiroko Katori	Tokyo University of Agriculture and Technology
213	〃	磯崎　勝哉	東京農工大学	大学院工学府	〃	Katsuya Isozaki	Tokyo University of Agriculture and Technology
214	六方晶 $Eu_2Pt_6Ga_{15}$ の強磁場磁化過程	松本　裕司	名古屋工業大学	大学院工学研究科	Magnetic properties of hexagonal $Eu_2Pt_6Ga_{15}$ under high magnetic field	Yuji Matsumoto	Nagoya Institute of Technology
215	〃	植田　拓也	名古屋工業大学	大学院工学研究科	〃	Takuya Ueda	Nagoya Institute of Technology
216	3 次元直交ダイマー格子イリジウム酸化物における強磁場中磁気特性の評価	青山　拓也	東北大学	大学院理学研究科	Evaluation of magnetic properties on three-dimensional orthogonal dimer iridium oxide under high magnetic field	Takuya Aoyama	Tohoku University
217	カイラル量子磁性体 $A(TiO)Cu_4(PO_4)_4$ (A = Ba, Sr) の強磁場磁化測定	木村　健太	大阪大学	大学院基礎工学研究科	High-field magnetization measurements of the chiral quantum magnet $A(TiO)Cu_4(PO_4)_4$(A = Ba, Sr)	Kenta Kimura	Osaka University
218	強相関ウラン化合物 U(Ir,Rh)Ge の強磁場磁化測定	Pospisil Jiri	日本原子力研究開発機構	先端基礎研究センター	High-field magnetization in strongly correlated uranium compounds U(Ir,Rh)Ge	Jiri Pospisil	Japan Atomic Energy Agency
219	〃	芳賀　芳範	日本原子力研究開発機構	先端基礎研究センター	〃	Yoshinori Haga	Japan Atomic Energy Agency
220	強磁場による強相関電子系準結晶・近似結晶の研究	出口　和彦	名古屋大学	大学院理学研究科	High magnetic field study of strongly correlated electron quasicrystals and approximants	Kazuhiko Deguchi	Nagoya University
221	〃	松川　周矢	名古屋大学	大学院理学研究科	〃	Shuya Matsukawa	Nagoya University
222	$U_2Ir_3Si_5$ の強磁場下における磁気相図の研究	本多　史憲	東北大学	金属材料研究所	Study of magnetic phase diagram on $U_2Ir_3Si_5$ under high magnetic field	Fuminori Honda	Tohoku University
223	〃	李　徳新	東北大学	金属材料研究所	〃	Dexin Li	Tohoku University
224	単体元素半導体 Te の強磁場中の磁気抵抗測定とその角度依存性	小林　夏野	岡山大学	エネルギー環境新素材拠点	Magnetoresistance and angular dependence in Pulsed Magnetic Field on Semiconducting Tellurium	Kobayashi Kaya	Okayama University
225	非破壊パルス・マグネットを用いた $(Cu,Zn)_3Mo_2O_9$ の磁化測定	黒江　晴彦	上智大学	理工学部	Magnetization in $(Cu,Zn)_3Mo_2O_9$ under pulsed magnetic field	Haruhiko Kuroe	Sophia University
226	$CeIr(In_{1-x}Cd_x)_5$ のメタ磁性の研究	摂待　力生	新潟大学	理学部	Metamagnetism in $CeIr(In_{1-x}Cd_x)_5$	Rikio Settai	Niigata University
227	〃	角田　竜馬	新潟大学	大学院自然科学研究科	〃	Ryoma Tsunoda	Niigata University
228	重い電子系化合物 UPd_2Cd_{20} のメタ磁性	廣瀬　雄介	新潟大学	理学部	Metamagnetism of the heavy-fermion compound UPd_2Cd_{20}	Yusuke Hirose	Niigata University

No.	課題名	氏名	所属		Title	Name	Organization
229	〃	鈴木　佳孝	新潟大学	大学院自然科学研究科	〃	Yoshitaka Suzuki	Niigata University
230	ディラック半金属 Cd_3As_2 薄膜における量子ホール状態の解明	打田　正輝	東京大学	大学院工学系研究科	Investigation of quantum Hall states in Dirac semimetal Cd_3As_2 films	Masaki Uchida	The University of Tokyo
231	極性キラルらせん磁性体における電気磁気効果	徳永　祐介	東京大学	大学院新領域創成科学研究科	Magneto-chiral dichroism in a chiral ferrimagnet	Yusuke Tokunaga	The University of Tokyo
232	〃	荒木　勇介	東京大学	大学院新領域創成科学研究科	〃	Yusuke Araki	The University of Tokyo
担当所員：松田　康弘							
233	希土類金属間化合物の超磁場物性研究	海老原　孝雄	静岡大学	理学部	Physical Properties at super high magnetic fields in rare earth intermetallic compounds	Takao Ebihara	Shizuoka University
234	〃	ジュマエダ・ジャトミカ	静岡大学	大学院総合科学技術研究科	〃	Jumaeda Jatmika	Shizuoka University
235	近藤半導体 $(Yb,R)B_{12}$、価数揺動物質 $(Y,Tm)B_6$、およびペロブスカイト酸化物のワンターンコイル 120T パルス磁場下での強磁場磁化過程	伊賀　文俊	茨城大学	理学部	High field magnetization of Kondo insulator $(Yb,R)B_{12}$, valence fluctuation material $(Y,Tm)B_6$ and perovskite oxides by using one-turn coil in a 120 T pulse magnet	Fumitoshi Iga	Ibaraki University
236	〃	羽賀　浩人	茨城大学	大学院理工学研究科	〃	Haga Hiroto	Ibaraki University
237	キラルフェリ磁性体における磁気キラル二色性	有馬　孝尚	東京大学	大学院新領域創成科学研究科	Magneto-chiral dichroism in a chiral ferrimagnet	Takahisa Arima	The University of Tokyo
238	〃	阿部　伸行	東京大学	大学院新領域創成科学研究科	〃	Nobuyuki Abe	The University of Tokyo
239	〃	豊田　新悟	東京大学	大学院新領域創成科学研究科	〃	Shingo Toyoda	The University of Tokyo
240	〃	前島　夏奈	東京大学	大学院新領域創成科学研究科	〃	Kana Maeshima	The University of Tokyo
241	横型シングルターンコイルを用いた $Cu_3Mo_2O_9$ の飽和磁場の探索 II	黒江　晴彦	上智大学	理工学部	Investigation of saturation magnetization in $Cu_3Mo_2O_9$ using horizontal single-turn coil System	Haruhiko Kuroe	Sophia University
242	酸素−窒素混合固体における磁場誘起相転移	小林　達生	岡山大学	大学院自然科学研究科	Field-induced phase transition in O_2-N_2 mixed solid	Tatsuo Kobayashi	Okayama University
担当所員：辛　埴							
243	鉄系超伝導体の時間分解角度分解光電子分光	下志万　貴博	東京大学	大学院工学系研究科	Time and angle-resolved photoemission study on the iron-based superconductors	Takahiro Shimojima	The University of Tokyo

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244	〃	三石　夏樹	東京大学	大学院工学系研究科	〃	Natsuki Mitsuishi	The University of Tokyo
245	レーザー角度分解光電子分光による遷移金属ダイカルコゲナイドの研究	中村　飛鳥	東京大学	大学院工学系研究科	Laser photoemission study on the transition metal dichalcogenides	Asuka Nakamura	The University of Tokyo
246	層状ダイカルコゲナイド MX_2 におけるスピン分裂の観測	石坂　香子	東京大学	大学院工学系研究科	Observation of spin splitting in transition-metal dichalcogenides MX_2	Kyoko Ishizaka	The University of Tokyo
247	〃	吉田　訓	東京大学	大学院工学系研究科	〃	Satoshi Yoshida	The University of Tokyo
248	トポロジカル絶縁体表面のディラック電子におけるキャリア濃度に依存した非平衡ダイナミクスの解明	木村　昭夫	広島大学	大学院理学研究科	Carrier concentration dependent nonequilibrium dynamics of Dirac fermions in TIs	Akio Kimura	Hiroshima University
249	〃	吉川　智己	広島大学	理学部	〃	Tomoki Yoshikawa	Hiroshima University
250	バンドギャップを制御した黒リンの非平衡キャリアダイナミクス	ムニサ　ヌルママティ	広島大学	大学院理学研究科	Nonequilibrium Carrier Dynamics in Black Phosphorus with Tuned Band Gap	Munisa Nurmamat	Hiroshima University
251	〃	頼　燎平	広島大学	大学院理学研究科	〃	Ryohei Yori	Hiroshima University
252	希薄磁性トポロジカル半導体の非平衡キャリアダイナミクス	陳　家華	広島大学	大学院理学研究科	Nonequilibrium Carrier Dynamics in Dilute Magnetic Topological Semiconductors	Chen Jiahua	Hiroshima University
253	単一３次元ディラックコーンを有するディラック半金属の非平衡ダイナミクスの解明	角田一樹	広島大学	大学院理学研究科	Nonequilibrium electron dynamics of Dirac semimetals with a single 3D Dirac cone	Kazuki Sumida	Hiroshima University
254	III-V 族半導体基板上に作製したビスマス１次元構造のスピン偏極電子状態２	大坪　嘉之	大阪大学	大学院生命機能研究科	Electronic structure and its spin polarization of one-dimensional bismuth surface layers grown on III-V semiconductor substrates II	Yoshiyuki Ohtsubo	Osaka University
255	〃	岸　潤一郎	大阪大学	大学院生命機能研究科	〃	Junichiro Kishi	Osaka University
256	バルク敏感高分解能スピン分解光電子分光を用いたハーフメタル強磁性体の本質的電子状態の観測	藤原　弘和	岡山大学	大学院自然科学研究科	Observation of intrinsic electronic states of half-metallic ferromagnets studied by bulk-sensitive high-resolution spin-resolved photoemission spectroscopy	Hirokazu Fujiwara	Okayama University
担当所員：小林　洋平							
257	モードロックレーザーの開発	井手口　拓郎	東京大学	大学院理学系研究科	Development of mode-locked laser	Takuro Ideguchi	The University of Tokyo
258	超高速発光分光用ファイバーレーザーの試作	末元　徹	豊田理化学研究所		Development of a fiber laser for ultrafast luminescence spectroscopy	Tohru Suemoto	Toyota Rikagaku Kenkyuujyo
担当所員：板谷　治郎							

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259	テラヘルツ分光装置を用いた酸化物磁性材料の研究	大越　慎一	東京大学	大学院理学系研究科	Study of magnetic oxide using terahertz spectroscopy	Shinichi Ohkoshi	The University of Tokyo
260	〃	生井　飛鳥	東京大学	大学院理学系研究科	〃	Asuka Namai	The University of Tokyo
261	〃	吉清　まりえ	東京大学	大学院理学系研究科	〃	Marie Yoshikiyo	The University of Tokyo
262	ペロブスカイト鉛ハライドにおける時間分解コヒーレントフォノン分光	牧野　哲征	福井大学	学術研究院工学系部門	Time-resolved coherent phonon spectroscopy in perovskite lead halides	Takayuki Makino	University of Fukui
263	〃	伊藤　竜一	福井大学	学術研究院工学系部門	〃	Ryuichi Ito	University of Fukui
大阪大学 先端強磁場科学研究センター / Center for Advanced High Magnetic Field Science, Osaka University							
264	パルス強磁場を用いた強相関電子系物質の強磁場物性の研究	竹内　徹也	大阪大学	低温センター	Physical properties of strongly correlated electron systems under pulsed high magnetic field.	Tetsuya Takeuchi	Osaka University
265	〃	大貫　惇睦	琉球大学	理学部	〃	Yoshichika Onuki	University of the Ryukyus
266	新規低次元磁性体の合成とその量子磁性の解明	本多　善太郎	埼玉大学	大学院理工学研究科	Synthesis, structure, and magnetism of novel low-dimensional transition metal coordination polymers	Zentaro Honda	Saitama University
267	単軸性キラル磁性体の磁気特性測定　−磁気トルクと磁気共鳴測定−	戸川　欣彦	大阪府立大学	大学院工学研究科	Magnetic property of monoaxial chiral magnetic materials examined by means of magnetic torque and resonance measurements	Yoshihiko Togawa	Osaka Prefecture University
268	パルス強磁場用極低温実験装置の開発	野口　悟	大阪府立大学	２１世紀科学研究機構	Development of the cryostat for pulsed high magnetic field	Satoru Noguchi	Osaka Prefecture University
269	〃	飯田　賢斗	大阪府立大学	大学院工学研究科	〃	Kento Iida	Osaka Prefecture University
270	〃	石打　翔馬	大阪府立大学	工学域	〃	Shoma Ishiuchi	Osaka Prefecture University
271	三角スピンチューブの多周波電子スピン共鳴	真中　浩貴	鹿児島大学	学術研究院理工学域工学系	Multi-frequency electron spin resonance measurements on triangular spin tubes	Hirotaka Manaka	Kagoshima University
272	クロムフタロシアニン系分子伝導体における巨大磁気抵抗	花咲　徳亮	大阪大学	大学院理学研究科	Giant magnetoresistance in molecular conductor with (phthalocyaninato)chromium	Noriaki Hanasaki	Osaka University
273	RT_2Cd_{20} の強磁場磁化	廣瀬　雄介	新潟大学	理学部	High-field magnetization of RT_2Cd_{20}	Yusuke Hirose	Niigata University
274	〃	河野　琢馬	新潟大学	理学部	〃	Takuma Kawano	Niigata University

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275	高強度光源を用いた圧力下強磁場 ESR 装置の開発	櫻井　敬博	神戸大学	研究基盤センター	Development of high field and high pressure ESR system using high intensity light source	Takahiro Sakurai	Kobe University
276	擬テトラヘドラル４配位構造を持つ２価コバルト単核単分子磁石のゼロ磁場分裂定数の決定	福田　貴光	大阪大学	大学院理学研究科	Determination of zero-field splitting parameters of a novel mononuclear divalent cobalt single molecule magnet having the pseudo-tetrahedral coordination geometry	Takamitsu Fukuda	Osaka University
277	パルス強磁場を用いた高周波 ESR 測定による低次元磁性体の研究	大久保　晋	神戸大学	分子フォトサイエンス研究センター	High-frequency ESR measurements of low-dimensional magnet using pulsed magnetic field	Susumu Okubo	Kobe University
278	鉄系超伝導体の強磁場物性に関する研究	柏木　隆成	筑波大学	大学院数理物質科学研究科	Study of physical properties of Fe-based superconductors under high magnetic fields	Takanari Kashiwagi	University of Tsukuba
279	〃	寺尾　耕太郎	筑波大学	大学院数理物質科学研究科	〃	Kotaro Terao	University of Tsukuba
280	$Ba(TiO)Cu_4(PO_4)_4$ の強磁場 ESR	木村　健太	大阪大学	大学院基礎工学研究科	High-field ESR study of $Ba(TiO)Cu_4(PO_4)_4$	Kenta Kimura	Osaka University
281	S_3/2 カゴメ格子反強磁性体 $Li_2Cr_3SbO_8$ の強磁場磁化測定	吉田　紘行	北海道大学	大学院理学研究院	Magnetization measurement of S=3/2 kagome lattice antiferromagnet $Li_2Cr_3SbO_8$ under high-magnetic field	Hiroyuki Yoshida	Hokkaido University
282	S= 1/2 擬一次元化合物 $CaCu_2(OH)_3Cl_3$ のスピン一重項基底状態における強磁場磁化測定	吉田　紘行	北海道大学	大学院理学研究院	High-field magnetization measurement on the spin singlet ground state of S=1/2 pseudo one-dimensional compound $CaCu_2(OH)_3Cl_3$	Hiroyuki Yoshida	Hokkaido University
283	$RCrTiO_5$ (R= 希土類元素) の特異な磁気特性と誘電特性	安井　幸夫	明治大学	理工学部	Magnetic and dielectric properties of $RCrTiO_5$(R=Rare earth elements)	Yukio Yasui	Meiji University
284	ハニカム格子系 $Li_3Ni_2SbO_6$ の高磁場下の磁気構造	安井　幸夫	明治大学	理工学部	Magnetic structure of honeycomb spin system $Li_3Ni_2SbO_6$ in high magnetic field	Yukio Yasui	Meiji University
285	Kitaev 型量子スピン液体の強磁場磁化過程測定	北川　健太郎	東京大学	大学院理学系研究科	High-field magnetization measurement for Kitaev-type quantum spin liquid	Kentaro Kitagawa	The University of Tokyo
286	S = 1/2 カゴメ格子反強磁性体 $CaCu_3(OH)_6Cl_2$・$0.6H_2O$ の強磁場磁化測定	吉田　紘行	北海道大学	大学院理学研究院	High-field magnetization measurement on S = 1/2 kagome lattice antiferromagnet $CaCu_3(OH)_6Cl_2$・$0.6H_2O$	Hiroyuki Yoshida	Hokkaido University
287	擬一次元鎖を含む三角格子反強磁性体 β'-$LiCoPO_4$ の強磁場磁化測定	吉田　紘行	北海道大学	大学院理学研究院	High-field magnetization measurement of pseudo one-dimensional chain triangular antiferromagnet β'-$LiCoPO_4$	Hiroyuki Yoshida	Hokkaido University
288	高出力テラヘルツ光源 (ジャイロトロン) を光源とする ESR 分光 の研究	出原　敏孝	福井大学	遠赤外領域開発研究センター	Study on ESR spectroscopy using high power THz radiation sources - Gyrotrons	Toshitaka Idehara	University of Fukui
289	〃	小川　勇	福井大学	遠赤外領域開発研究センター	〃	Isamu Ogawa	University of Fukui
290	多重極限環境下の電子スピン共鳴計測に用いる高出力ミリ波・サブミリ波伝送系の開発研究	光藤　誠太郎	福井大学	遠赤外領域開発研究センター	Development of high-power millimeter and submillimeter wave transmission system for electron spin resonance measurement under multiple extreme environment	Seitaro Mitsudo	University of Fukui
291	多重極限電子スピン共鳴計測に用いる高出力ミリ波・サブミリ波伝送系の開発研究	藤井　裕	福井大学	遠赤外領域開発研究センター	Development of high-power millimeter and submillimeter wave transmission system for electron spin resonance measurement under multiple extreme environment	Yutaka Fujii	University of Fukui

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292	正方格子フラストレート系の強磁場磁性	山口　博則	大阪府立大学	大学院理学系研究科	High-field magnetic property of frustrated square lattices	Hironori Yamaguchi	Osaka Prefecture University
293	低次元フラストレートスピン系における強磁場中の反強磁性共鳴	小野　俊雄	大阪府立大学	大学院理学系研究科	Electron spin resonance in the high magnetic field on the low dimensional frustrated spin systems	Toshio Ono	Osaka Prefecture University
294	〃	遠藤　耀司	大阪府立大学	大学院理学系研究科	〃	Youji Endo	Osaka Prefecture University
295	量子スピンギャップ系の強磁場中電気分極測定	木村　尚次郎	東北大学	金属材料研究所	Dielectric polarization measurements of the quantum spin gap systems in high magnetic fields	Shojiro Kimura	Tohoku University
296	$CaBaCo_4O_7$ 及び $CaBaFe_4O_7$ 単結晶試料の強磁場下での磁化・電気分極・ESR 測定	桑原　英樹	上智大学	理工学部	Magnetization, electric polarization, and ESR measurements for $CaBaCo_4O_7$ and $CaBaFe_4O_7$ single crystals in pulsed high magnetic fields.	Hideki Kuwahara	Sophia University
297	〃	小田　涼佑	上智大学	大学院理工学研究科	〃	Ryosuke Oda	Sophia University
298	単結晶 $A_x(NH_3)_yFeSe$ 超伝導体 (A = アルカリ金属、アルカリ土類金属）の強磁場下における超伝導物性	神戸　高志	岡山大学	大学院自然科学研究科	Superconducting properties of single-crystal $A_x(NH_3)_yFeSe$ under high magnetic field	Takashi Kambe	Okayama University
299	電荷分離型イオン性固体の磁性転換機構の解明	山田　美穂子	大阪大学	大学院理学研究科	Elucidation of the magnetic conversion mechanism of charge-separated-type ionic solids	Mihoko Yamada	Osaka University

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1	遷移金属酸化物、酸窒化物、酸水素化物における構造物性研究	山浦　淳一	東京工業大学	元素戦略研究センター	Study of structural physics on transition metal oxides, oxynitrides and oxyhydrides	Junichi Yamaura	Tokyo Institute of Technology
2	〃	真木　祥千子	東京工業大学	元素戦略研究センター	〃	Sachiko Maki	Tokyo institute of technology
3	遷移金属酸窒化物・酸硫化物のドーピングと水の光分解触媒への応用の研究	山田　太郎	東京大学	大学院工学系研究科	Doping of transition-metal oxynitrides and oxysuldes and application for water-splitting photo-catalysts	Taro Yamada	The University of Tokyo
4	〃	後藤　陽介	東京大学	大学院工学系研究科	〃	Yosuke Goto	The University of Tokyo
5	〃	坂井　延寿	東京大学	大学院工学系研究科	〃	Enjyu Sakai	The University of Tokyo
6	〃	守屋　映祐	東京大学	大学院工学系研究科	〃	Yosuke Moriya	The University of Tokyo
7	〃	西山　洋	東京大学	大学院工学系研究科	〃	Hiroshi Nishiyama	The University of Tokyo

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8	〃	岩瀬　元希	明治大学	研究・知財戦略機構	〃	Motoki　Iwase	Meiji University
9	〃	鐘　苗	東京大学	大学院工学系研究科	〃	Zhong Miao	The University of Tokyo
10	パイロクロア型希土類酸化物の単結晶育成と磁気フラストレーションの研究	松平　和之	九州工業大学	大学院工学研究院	Single crystal growth and study of frustrated magnetism in pyrochlore rare-earth oxides	Kazuyuki Matsuhira	Kyushu Institute of Technology
11	電子が複合自由度を持つ遷移金属系物質の純良単結晶育成と物性評価	片山　尚幸	名古屋大学	大学院工学研究科	Growth of single crystals of transition metal compounds with charge, orbital and spin degrees of freedom	Naoyuki Katayama	Nagoya University
12	〃	菅原　健人	名古屋大学	大学院工学研究科	〃	Kento Sugawara	Nagoya University

物質合成・評価設備 G クラス / Materials Synthesis and Characterization G Class Researcher

No.	課題名	氏名	所属		Title	Name	Organization
1	高温高圧水中の固体酸・塩基触媒反応の速度論的解析	大島　義人	東京大学	大学院新領域創成科学研究科	Kinetic analysis of solid acid and base catalyzed reactions in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
2	〃	秋月　信	東京大学	大学院新領域創成科学研究科	〃	Makoto Akizuki	The University of Tokyo
3	高温高圧水中における固体触媒の酸性質の解明	大島　義人	東京大学	大学院新領域創成科学研究科	Elucidation of solid catalysts' acidity in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
4	〃	井上　拓紀	東京大学	大学院新領域創成科学研究科	〃	Hiroki Inoue	The University of Tokyo
5	固体酸触媒を利用した超臨界水中の有機合成反応に関する研究	大島　義人	東京大学	大学院新領域創成科学研究科	Research on Organic Synthetic Reactions using Solid Acid Catalyst in Supercritical Water	Yoshito Oshima	The University of Tokyo
6	〃	単　しん	東京大学	大学院新領域創成科学研究科	〃	Shan Xin	The University of Tokyo
7	鉄カルコゲナイド超伝導体の純良単結晶における X 線回折	芝内　孝禎	東京大学	大学院新領域創成科学研究科	X-ray diffraction in high-quality single crystals of iron-chalcogenide superconductors	Takasada Shibauchi	The University of Tokyo
8	〃	水上　雄太	東京大学	大学院新領域創成科学研究科	〃	Yuta Mizukami	The University of Tokyo
9	〃	松浦　康平	東京大学	大学院新領域創成科学研究科	〃	Kouhei Matsuura	The University of Tokyo
10	〃	細井　優	東京大学	大学院新領域創成科学研究科	〃	Hosoi Suguru	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
11	〃	石田　浩祐	東京大学	工学部	〃	Kousuke Ishida	The University of Tokyo
12	泥岩が示す不完全な半透膜性に関する研究	徳永　朋祥	東京大学	大学院新領域創成科学研究科	Research of incomplete semipermeable properties of mudstones	Tomochika Tokunaga	The University of Tokyo
13	〃	廣田　翔伍	東京大学	工学部	〃	Shogo Hirota	The University of Tokyo
14	ケミカルループ法における高活性酸素キャリア複合粒子の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of oxygen carrier composite particles with high activity in a chemical looping method	Junichiro Otomo	The University of Tokyo
15	〃	味谷　和之	東京大学	大学院新領域創成科学研究科	〃	Kazuyuki Miya	The University of Tokyo
16	ケミカルループ法における酸素キャリア材料の構造評価と劣化要因の解明	大友　順一郎	東京大学	大学院新領域創成科学研究科	A structure and degradation factor of oxygen carrier material in chemical loop method.	Junichiro Otomo	The University of Tokyo
17	〃	斉藤　佑耶	東京大学	大学院新領域創成科学研究科	〃	Yuya Saito	The University of Tokyo
18	ペロブスカイト型酸化物を用いたケミカルルーピングシステムの開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Long Term Stabilities and Reduction Kinetics of Metal Oxides Supported on Perovskite Oxides as Oxygen Carriers in Chemical Looping Systems	Junichiro Otomo	The University of Tokyo
19	〃	オーチェン ジェームズ オーチェン	東京大学	大学院新領域創成科学研究科	〃	Ochieng James Ochieng	The University of Tokyo
20	超臨界水を利用した有機無機混合廃棄物の処理と金属化合物のリサイクル	大島　義人	東京大学	大学院新領域創成科学研究科	Decomposing mixtures of organic and inorganic waste and recycling of metal compounds using supercritical water	Yoshito Oshima	The University of Tokyo
21	〃	升川　駿	東京大学	大学院新領域創成科学研究科	〃	Shun Masukawa	The University of Tokyo
22	イオン - 電子混合伝導体を用いた異相界面接合体の作製及び 界面輸送現象の解析	大友　順一郎	東京大学	大学院新領域創成科学研究科	Material synthesis of heterojunction layers using mixed ion conductors and analysis of transport phenomenon of its interface	Junichiro Otomo	The University of Tokyo
23	〃	松岡　修平	東京大学	大学院新領域創成科学研究科	〃	Shuhei Mastuoka	The University of Tokyo
24	高温高圧水を反応場とした層状固体触媒反応	大島　義人	東京大学	大学院新領域創成科学研究科	Study of layered solid catalyzed reaction in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
25	〃	佐々木　栞	東京大学	大学院新領域創成科学研究科	〃	Shiori Sasaki	The University of Tokyo
26	固体酸化物型燃料電池のイオン拡散現象の検討	大友　順一郎	東京大学	大学院新領域創成科学研究科	Study of cation diffusion of Solid Oxide Fuel Cell	Junichiro Otomo	The University of Tokyo
27	〃	岡村　晋太郎	東京大学	大学院新領域創成科学研究科	〃	Shintaro Okamura	The University of Tokyo

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28	金属酸化物還元反応を利用したプロトン伝導型空気電池の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of proton conducting air cell with redox reaction of metal oxide	Junichiro Otomo	The University of Tokyo
29	〃	月村　玲菜	東京大学	大学院新領域創成科学研究科	〃	Reina Tsukimura	The University of Tokyo
30	超臨界水熱法により合成した酸化物ナノ粒子の構造解析	大島　義人	東京大学	大学院新領域創成科学研究科	Structure analysis of metal oxide nanoparticles synthesized under supercritical water	Yoshito Oshima	The University of Tokyo
31	〃	横　哲	東京大学	大学院新領域創成科学研究科	〃	Akira Yoko	The University of Tokyo
32	ケミカルループ法における酸素キャリアの微細構造制御と反応機構の解明	大友　順一郎	東京大学	大学院新領域創成科学研究科	Micro structural design and reaction analysis of oxygen carriers used in chemical looping method	Junichiro Otomo	The University of Tokyo
33	〃	橋本　隼輔	東京大学	工学部	〃	Shunsuke Hashimoto	The University of Tokyo
34	プロトン伝導性固体電解質を用いた電解合成反応における電極触媒開発と速度論的解析	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of electro-catalysts and kinetic analysis for electrolysis using proton conducting fuel cells	Junichiro Otomo	The University of Tokyo
35	〃	高坂　文彦	東京大学	大学院新領域創成科学研究科	〃	Fumihiko Kosaka	The University of Tokyo
36	プロトン伝導性固体電解質を用いたアンモニア電解合成と速度論解析	大友　順一郎	東京大学	大学院新領域創成科学研究科	Electrochemical synthesis of ammonia using proton conducting solid electrolyte and its kinetic analysis	Junichiro Otomo	The University of Tokyo
37	〃	中村　剛久	東京大学	大学院新領域創成科学研究科	〃	Nakamura Takehisa	The University of Tokyo
38	ITFC におけるプロトン伝導体の材料設計および触媒開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Material design and development of catalyst for ITFC using proton conductor	Junichiro Otomo	The University of Tokyo
39	〃	小城　元	東京大学	大学院新領域創成科学研究科	〃	Gen Kojo	The University of Tokyo
40	メソポーラスマテリアル・グラフェンオキサイドに担持した金属触媒のキャラク タリゼーション	佐々木　岳彦	東京大学	大学院新領域創成科学研究科	Characterization for metal catalysts loaded on mesoporous materials and graphene oxides	Takehiko Sasaki	The University of Tokyo
41	〃	Etty Nurlia Kusumawati	東京大学	大学院理学系研究科	〃	Etty Nurlia Kusumawati	The University of Tokyo
42	マグネトプランバイト構造をもつ鉄酸化物の磁気異方性	植田　浩明	京都大学	大学院理学研究科	Magnetic anisotropy of iron oxides with magnetoplumbite structure	Hiroaki Ueda	Kyoto University
43	〃	森下　翔	京都大学	大学院理学研究科	〃	Haruka Morishita	Kyoto University
44	〃	谷奥 泰明	京都大学	大学院理学研究科	〃	Yasuaki Tanioku	Kyoto University

No.	課題名	氏名	所属		Title	Name	Organization
45	正 20 面体クラスター固体の電気伝導と磁性	木村　薫	東京大学	大学院新領域創成科学研究科	Electrical conductivity and Magnetic properties of Icosahedral Cluster Solids	Kaoru Kimura	The University of Tokyo
46	〃	廣戸　孝信	東京大学	大学院新領域創成科学研究科	〃	Takanobu Hiroto	The University of Tokyo
47	触媒反応の insitu ラマン散乱測定	佐々木　岳彦	東京大学	大学院新領域創成科学研究科	In situ measurement of Raman scattering for heterogeneous catalytic reactions	Takehiko Sasaki	The University of Tokyo
48	超高圧プレスを用いた新規プロトニクス酸化物のソフト化学的合成法の検討	山口　周	東京大学	大学院工学系研究科	Oxide-Protonics materials synthesis by combined use of soft chemical method and high pressure	Shu Yamaguchi	The University of Tokyo
49	〃	三好　正悟	東京大学	大学院工学系研究科	〃	Shogo Miyoshi	The University of Tokyo
50	〃	田中　和彦	東京大学	大学院工学系研究科	〃	Kazuhiko Tanaka	The University of Tokyo
51	〃	本多　慶一郎	東京大学	大学院工学系研究科	〃	Keiichiro Honda	The University of Tokyo
52	溶融亜鉛メッキ合金相の応力誘起変態	山口　周	東京大学	大学院工学系研究科	Stress-induced phase transformation of Fe-Zn alloy formed in hot-dip process	Shu Yamaguchi	The University of Tokyo
53	〃	三好　正悟	東京大学	大学院工学系研究科	〃	Shogo Miyoshi	The University of Tokyo
54	〃	田中　和彦	東京大学	大学院工学系研究科	〃	Kazuhiko Tanaka	The University of Tokyo
55	バナジウム酸水素化物における圧力効果	山本　隆文	京都大学	大学院工学研究科	Pressure Effect on Vanadium Oxyhydrides	Takafumi Yamamoto	Kyoto University
56	〃	陰山　洋	京都大学	大学院工学研究科	〃	Hiroshi Kageyama	Kyoto University
57	〃	竹入　史隆	京都大学	大学院工学研究科	〃	Takeiri Fumitaka	Kyoto University
58	〃	村上　泰斗	京都大学	工学部	〃	Taito Murakami	Kyoto University
59	サイト秩序型ポストスピネル酸化物 AM_2O_4 の高温高圧合成	白子 雄一	名古屋大学	大学院工学研究科	High-pressure high-temperature syntheses of site ordered post-spinel oxides AM_2O_4	Yuichi Shirako	Nagoya University
60	〃	申　善雅	名古屋大学	大学院工学研究科	〃	Shin Sunah	Nagoya University
61	超高圧直接窒化法を用いた前期遷移金属多窒化物の探査	丹羽　健	名古屋大学	大学院工学研究科	Exploration of early-transition metal pernitrides by direct nitriding reaction in high pressure	Ken Niwa	Nagoya University

No.	課題名	氏名	所属		Title	Name	Organization
62	〃	山本　拓朗	名古屋大学	大学院工学研究科	〃	Takurou Yamamoto	Nagoya University
63	$LnMn_2AlTi_2O_9$ の高圧高温合成とその特性評価	志村　元	名古屋大学	大学院工学研究科	Synthesis and Characterization of $LnMn_2AlTi_2O_9$	Gen Shimura	Nagoya University
64	3d 遷移金属を含む $CaFe_2O_4$ 型 NaM_2O_4 の高圧合成	廣瀬　瑛一	名古屋大学	大学院工学研究科	High pressure synthesis of $CaFe_2O_4$-type NaM_2O_4 containing 3d transition metal	Eiichi Hirose	Nagoya University
65	高圧合成法による新規熱電変換材料の開発	関根　ちひろ	室蘭工業大学	大学院工学研究科	Development of new thermoelectric materials using high-pressure synthesis method	Chihiro Sekine	Muroran Institute of Technology
66	〃	住岡 和也	室蘭工業大学	大学院工学研究科	〃	Sumioka Kazuya	Muroran Institute of Technology
67	高圧下での $MoSi_2$ 型構造の $FeAl_2$ 結晶の作製	木村　薫	東京大学	大学院新領域創成科学研究科	High pressure synthesis of $MoSi_2$ type iron aluminide, $FeAl_2$ crystal	Kaoru Kimura	The University of Tokyo
68	〃	飛田　一樹	東京大学	大学院新領域創成科学研究科	〃	Kazuki Tobita	The University of Tokyo
69	ナフタレンの圧力誘起重合反応	篠崎　彩子	名古屋大学	大学院環境学研究科	Pressure-induced oligomerization of naphthalene	Ayako Shiozaki	Nagoya University
70	新規ペロブスカイト型遷移金属窒化物の超高圧合成と結晶化学	長谷川　正	名古屋大学	大学院工学研究科	High pressure synthesis and crystal chemistry of perovskite-type transition metal nitrides	Masashi Hasegawa	Nagoya University
71	〃	山田　祥吾	名古屋大学	大学院工学研究科	〃	Shogo Yamada	Nagoya University
72	下部マントルの高温高圧条件におけるマントル鉱物と窒素との反応性の探索	鍵　裕之	東京大学	大学院理学系研究科	Reactivity of nitrogen with minerals at lower-mantle conditions	Hiroyuki Kagi	The University of Tokyo
73	〃	篠崎　彩子	名古屋大学	大学院環境学研究科	〃	Ayako Shiozaki	Nagoya University
74	〃	星野　由紀子	東京大学	大学院理学系研究科	〃	Yukiko Hoshino	The University of Tokyo
75	高圧下でのアミノ酸のペプチド化反応の観察	鍵　裕之	東京大学	大学院理学系研究科	Peptide formation of amino acids under high pressure	Hiroyuki Kagi	The University of Tokyo
76	〃	藤本　千賀子	東京大学	大学院理学系研究科	〃	Chikako Fujimoto	The University of Tokyo
77	新規磁石材料の微細構造解析	齋藤　哲治	千葉工業大学	工学部	Microstructural studies of new permanent magnet materials	Tetsuji Saito	Chiba Institute of Technology
78	天然鉱物の微細組織と結晶性の実態	永嶌　真理子	山口大学	大学院理工学研究科（理学）	Evaluation of micro-texture and crystallinity of natural minerals	Mariko Nagashima	Yamaguchi University

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79	透過型電子顕微鏡による機能性金属錯体の歪み測定	糸井　充穂	日本大学	医学部	Distortion measurement for multifunctional metal complex by Transmission Electron Microscope	Miho Itoi	Nihon University School of Medicine
80	自己組織化現象を用いたガスセンシングデバイスの作成に関する研究（仮）	割澤　伸一	東京大学	大学院新領域創成科学研究科	Study on fabrication of gas sensing device using self-organization phenomenon (tentative title)	Shinichi Warisawa	The University of Tokyo
81	〃	中村 高道	東京大学	大学院新領域創成科学研究科	〃	Takamichi Nakamura	The University of Tokyo
82	ハーフメタル型ホイスラー合金の磁性と輸送特性に関する研究	重田 出	鹿児島大学	大学院理工学研究科	Study on the magnetic and transport properties of half-metallic Heusler alloys	Iduru Shigeta	Kagoshima University
83	〃	大岡　隆太郎	鹿児島大学	理学部	〃	Ryutaro Ooka	Kagoshima University
84	ホイスラー型化合物の磁性と伝導の研究	廣井　政彦	鹿児島大学	大学院理工学研究科	Study on the magnetic and electrical properties of Heusler compounds	Masahiko Hiroi	Kagoshima University
85	新規遷移金属燐化物単結晶の磁性	長谷川　正	名古屋大学	大学院工学研究科	Magnetic properties of novel transition metal phosphides	Masashi Hasegawa	Nagoya University
86	〃	野崎　達海	名古屋大学	大学院工学研究科	〃	Nozaki Tatsumi	Nagoya University
87	低次元鉄系化合物の電子物性に関する研究	大串　研也	東北大学	大学院理学研究科	Study on electronic properties of Fe-based materials with low-dimensional structure	Kenya Ohgushi	Tohoku University
88	〃	青山　拓也	東北大学	大学院理学研究科	〃	Takuya Aoyama	Tohoku University
89	〃	橋詰　和樹	東北大学	理学部	〃	Kazuki Hashizume	Tohoku University
90	単体元素半導体 Te の磁場中磁気抵抗測定と角度依存性	小林　夏野	岡山大学	エネルギー環境新素材拠点	Angular dependent Magnetoresistance in Magnetic Field on Semiconducting Tellurium	Kaya Kobayashi	Okayama University
91	新規 5d 遷移金属化合物の探索	有馬　孝尚	東京大学	大学院新領域創成科学研究科	Exploration of new 5d transition metal compounds	Takahisa Arima	The University of Tokyo
92	〃	徳永　祐介	東京大学	大学院新領域創成科学研究科	〃	Yusuke Tokunaga	The University of Tokyo
93	〃	阿部　伸行	東京大学	大学院新領域創成科学研究科	〃	Nobuyuki Abe	The University of Tokyo
94	〃	植松　大介	東京大学	大学院新領域創成科学研究科	〃	Daisuke Uematsu	The University of Tokyo
95	〃	豊田　新悟	東京大学	大学院新領域創成科学研究科	〃	Shingo Toyoda	The University of Tokyo

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96	〃	鷲見　浩樹	東京大学	大学院新領域創成科学研究科	〃	Hiroki Sumi	The University of Tokyo
97	〃	前島　夏奈	東京大学	大学院新領域創成科学研究科	〃	Kana Maeshima	The University of Tokyo
98	〃	藤間　友理	東京大学	大学院新領域創成科学研究科	〃	Yuri Fujima	The University of Tokyo
99	Cu－Ni－X（X=Co,Fe）系単結晶性合金中の磁性微粒子析出過程と磁気特性の関係	竹田　真帆人	横浜国立大学	大学院工学研究院	Precipitation behavior and magnetic properties of fine magnetic particles in Cu - Ni base alloys single Crystal	Mahoto Takeda	Yokohama National University
100	〃	坂倉　響	横浜国立大学	大学院工学府	〃	Hibiki Sakakura	Yokohama National University
101	軽元素からなる 3d バンド伝導体の新物質開拓	岡本　佳比古	名古屋大学	大学院工学研究科	Novel metallic compounds with 3d electrons of light elements	Yoshihiko Okamoto	Nagoya University
102	新規 5d 遷移金属化合物の探索	徳村　謙祐	東京大学	大学院新領域創成科学研究科	Exploration of new 5d transition metal compounds	Kensuke　Tokumura	The University of Tokyo
103	〃	中川　直己	東京大学	大学院新領域創成科学研究科	〃	Naoki　Nakagawa	The University of Tokyo
104	〃	小池　仁希	東京大学	大学院新領域創成科学研究科	〃	Yoshiki　Koike	The University of Tokyo
105	〃	近江　毅志	東京大学	大学院新領域創成科学研究科	〃	Tsuyoshi Omi	The University of Tokyo
106	〃	荒木　勇介	東京大学	大学院新領域創成科学研究科	〃	Araki　Yusuke	The University of Tokyo

物質合成・評価設備 U クラス / Materials Synthesis and Characterization U Class Researcher

No.	課題名	氏名	所属		Title	Name	Organization
1	ナノ材料を用いた Li イオン電池材料開発	細野　英司	産業技術総合研究所	省エネルギー研究部門	Development of secondary battery materials by using nano-materials	Eiji　Hosono	National Institute of Advanced Industrial Science and Technology
2	ナノ構造制御による二次電池材料開発	牧之瀬　佑旗	産業技術総合研究所	省エネルギー研究部門	Development of secondary battery materials by nanostructure control	Yuki　Makinose	National Institute of Advanced Industrial Science and Technology
3	円錐黒鉛ウイスカーの物性・生成機構	齋藤　幸恵	東京大学	大学院農学生命科学研究科	Properties and Growth mechanism of cone-shaped graphitic whisker	Yukie　Saito	The University of Tokyo
4	高圧印加による Li ドープ α 菱面体晶ボロンの作製	木村　薫	東京大学	大学院新領域創成科学研究科	Synthesis of Li-dope alpha-rhombohedral boron by high-pressurization	Kaoru　Kimura	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
5	〃	張　禎桓	東京大学	大学院新領域創成科学研究科	〃	Jang Jeonghwan	The University of Tokyo
6	超臨界水中における L- システインおよびタウリンの分解挙動に関する検討	布浦　鉄兵	東京大学	環境安全研究センター	Degradation behavior of L-cysteine and taurine in supercritical water	Teppei Nunoura	The University of Tokyo
7	〃	鈴木　萌	東京大学	大学院新領域創成科学研究科	〃	Moe Suzuki	The University of Tokyo
8	イリジウム酸化物薄膜の構造評価	平岡　奈緒香	東京大学	大学院理学系研究科	Evaluation of structure of iridate thin films	Naoka Hiraoka	The University of Tokyo
9	〃	根岸　真通	東京大学	大学院理学系研究科	〃	Masamichi Negishi	The University of Tokyo
10	分子間相互作用による高性能有機半導体の集合構造と機能制御	三谷　真人	東京大学	大学院新領域創成科学研究科	Control of assembled structures and functions of high performance organic semiconductors through intermolecular interactions	Masato Mitani	The University of Tokyo
11	〃	櫛田　智克	東京大学	大学院新領域創成科学研究科	〃	Tomokatsu Kushida	The University of Tokyo
12	〃	三津井　親彦	東京大学	大学院新領域創成科学研究科	〃	Chikahiko Mitsui	The University of Tokyo
13	ケミカルループ法における高活性かつ長期安定性に長けた酸素キャリア材料の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of oxygen carrier materials with high activity and high durability for chemical looping systems.	Junichiro Otomo	The University of Tokyo
14	〃	岡　輝	東京大学	大学院新領域創成科学研究科	〃	Hikaru Oka	The University of Tokyo
15	ペロブスカイト酸化物 $PbVO_3$ の高圧下反強磁性絶縁体―強磁性金属への相転移挙動の観察	岡　研吾	中央大学	理工学部	Investigation of the phase transition from antiferromagnetic-insulator to ferromagnetic-metal phase in perovskite $PbVO_3$ under high-pressure	Kengo Oka	Chuo University

長期留学研究員 / Long Term Young Researcher

No.	課題名	氏名	所属		Title	Name	Organization
1	超流動ヘリウム 3-A 相の半整数量子渦の研究	木村　豊	大阪市立大学	大学院理学研究科	Study of the half quantized vortex in superfluid ^{3}He-A phase	Kimura Yutaka	Osaka City University
2	強相関遷移金属化合物の圧力下物性探索	嶋津　拓	千葉大学	理学部	High pressure study of strongly correlated transition-metal compounds	Taku Shimazu	Chiba University
3	多重極限物性測定装置の開発と量子臨界物性の研究	佐藤　和樹	大阪大学	大学院理学研究科	Development of experimental measuring equipments under multiplex extreme conditions and studies on quantum critical phenomena	Kazuki Sato	Osaka University

No.	課題名	氏名	所属		Title	Name	Organization

短期留学研究員 / Short term Young Researcher

1	第一原理におけるゼーベック係数の計算	高　成柱	大阪大学	大学院基礎工学研究科	Seebeck coefficient calculation from first-principle	Ko Sonjy	Osaka University

平成 28 年度 共同利用課題一覧（後期）/ Joint Research List (2016 Latter Term)

嘱託研究員 / Commission Researcher

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：森　初果							
1	水素結合型分子導体における H/D 同位体効果による相転移機構の理論的研究	立川　仁典	横浜市立大学	大学院生命ナノシステム科学研究科	Theoretical study of phase transition mechanism induced by H/D isotope effect in hydrogen-bonded molecular conductors	Masanori Tachikawa	Yokohama City Uninersity
2	〃	長嶋　雲兵	計算科学振興財団	共用促進研究部門	〃	Umpei Nagashima	Foundation for Computational Science
3	常圧で金属状態を示す純有機単一成分導体の開発	御崎　洋二	愛媛大学	大学院理工学研究科	Development of purely organic single-component molecular metals under ambient pressure	Kenta Kimura	Ehime University
4	純有機単一成分超伝導体の開発	白旗　崇	愛媛大学	大学院理工学研究科	Development of purely organic single-component molecular superconductors	Takashi Shirahata	Ehime University
担当所員：長谷川　幸雄							
5	スピン編曲走査トンネル顕微鏡に適した探針開発とその評価	岡　博文	東北大学	多元物質科学研究所	Development and characterization of probe tips for spin-polarized scanning tunneling microscopy	Hirofumi Oka	Tohoku University
6	〃	米田　忠弘	東北大学	多元物質科学研究所	〃	Tadahiro Komeda	Tohoku University
7	トポロジカル絶縁体表面の磁気的干渉パターンの実空間イメージング	岡田　佳憲	東北大学	原子分子材料科学高等研究機構	Visualization of magnetic interference pattern on topological insulator surface	Yoshinori Okada	Tohoku University
8	走査トンネル顕微鏡によるスピン検出に向けたマイクロ波導入機構の開発	安　東秀	北陸先端科学技術大学院大学	マテリアルサイエンス系	Development of a microwave system for spin detection with scanning tunneling microscopy	Tishu An	Nara Institute of Science and Technology
9	^{3}He-^{4}He 希釈冷凍機と 14T 超伝導マグネットを組み合わせた複合極限環境下における STM の開発	河江　達也	九州大学	大学院工学研究院	Development of STM at very low-temperatures and strong magnetic fields	Tastuya Kawae	Kyushu University
担当所員：吉信　淳							
10	金属表面に吸着した生体分子の高分解能電子エネルギー損失分光を用いた振動分光研究	米田　忠弘	東北大学	多元物質科学研究所	A vibrational study of bio-molecules on metals using high resolution electron energy loss spectroscopy	Tadahiro Komeda	Tohoku University
11	銅合金触媒の表面電子状態と二酸化炭素の活性化・水素化の研究	森川　良忠	大阪大学	大学院工学研究科	Study on activation and hydrogenation of carbon dioxide on Cu alloy catalysts	Yoshitada Morikawa	Osaka University
12	固体表面に吸着したキラル分子の光学物性及び振動状態評価	桑原　裕司	大阪大学	大学院工学研究科	Investigation of optical and vibrational properties of chiral molecules on sold surfaces	Yuji Kuwahara	Osaka University

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：中辻　知							
13	価数揺動重い電子系イッテルビウム化合物の結晶場基底状態	久我　健太郎	理化学研究所	放射光科学総合研究センター	Crystal-electric-field ground state in valence fluctuating and heavy fermion Yb-based compound	Kentarou Kuga	RIKEN
担当所員：上床　美也							
14	磁性体の圧力効果	巨海　玄道	久留米工業大学	工学部	Effect of pressure on the Magnetic Materials	Gendo Oomi	Kurume Institute of Technology
15	多重極限関連圧力装置の調整	高橋　博樹	日本大学	文理学部	Adjustment of Cubic Anvil apparatus	Hiroki Takahashi	Nihon University
16	擬一次元有機物質の圧力下物性研究	糸井　充穂	日本大学	医学部	Study on pressure induced superconductivity of quasi organic conductor	Miho Itoi	Nihon University
17	3d 遷移化合物に関する圧力効果	鹿又　武	東北学院大学	工学総合研究所	Effect of pressure on the 3d transition compounds	Takeshi Kanomata	Tohoku Gakuin University
18	希釈冷凍機温度で使用可能な 10GPa 級超高圧発生装置の開発	松林　和幸	電気通信大学	大学院情報理工学研究科	Development of 10Gpa class high pressure apparatus for low temperature	Kazuyuki Matsubayashi	The University of Electro-Communications
19	有機伝導体の圧力効果	村田　惠三	大阪経済法科大学	21 世紀社会総合研究センター	Effect of pressure on the organic conductor	Keizo　Murata	Osaka University of Economics and Law
20	圧力下 NMR 測定法に関する開発	藤原　直樹	京都大学	大学院人間・環境学研究科	Development of NMR measurement method under high pressure	Naoki Fujiwara	Kyoto University
21	高圧下の比熱測定装置の開発	梅原　出	横浜国立大学	工学部	Development of apparatus for specific heat measurements under high pressure	Izuru Umehara	Yokohama National University
22	希土類 122 化合物における圧力効果	繁岡　透	山口大学	大学院理学研究科	Pressure effect of rare earth 122 compounds	Toru Shigeoka	Yamaguchi University
23	中性子回析に用いる圧力装置の開発	片野　進	埼玉大学	大学院理工学研究科	Developments of High Pressure Cell for Neutron Diffraction	Susumu Katano	Saitama University
24	低温用マルチアンビル装置の開発	辺土　正人	琉球大学	理学部	Development of multi-anvil apparatus for low temperature	Masato Hedo	University of the Ryukyus
25	磁化測定装置の開発	名嘉　節	物質・材料研究機構	機能性材料研究拠点	Development of the magnetometer	Takashi Naka	National Institute for Materials Science
担当所員：野口　博司							
26	シフト型クリロフ理論を中核とした物性計算むけ大行列数理ソルバー	星　健夫	鳥取大学	大学院工学研究科	Development of large matrix solver for condensed matter physics	Takeo Hoshi	Tottori University

No.	課題名	氏名	所属		Title	Name	Organization
27	〃	曽我部　知広	名古屋大学	大学院工学研究科	〃	Tomohiro Sogabe	Nagoya University
28	〃	山地　洋平	東京大学	大学院工学系研究科	〃	Youhei Yamaji	The University of Tokyo
29	汎用多変数変分モンテカルロ法の整備・公開	大越　孝洋	東京大学	大学院工学系研究科	Development of Many-Variable Variational Monte Carlo Method	Takahiro Ohgoe	The University of Tokyo
担当：中性子科学研究施設							
30	4G における共同利用推進	佐藤　卓	東北大学	多元物質科学研究所	Research and Support of General-Use at 4G	Taku Sato	Tohoku University
31	〃	奥山　大輔	東北大学	多元物質科学研究所	〃	Daisuke Okuyama	Tohoku University
32	〃	那波　和宏	東北大学	多元物質科学研究所	〃	Kazuhiro Nawa	Tohoku University
33	T2-2 における共同利用推進	木村　宏之	東北大学	多元物質科学研究所	Research and Support of General-Use at T2-2	Hiroyuki Kimura	Tohoku University
34	〃	坂倉　輝俊	東北大学	多元物質科学研究所	〃	Terutoshi Sakakura	Tohoku University
35	T1-2、T1-3 における共同利用推進	藤田　全基	東北大学	金属材料研究所	Research and Support of General-Use at T1-2 and T1-3	Masaki Fujita	Tohoku University
36	〃	南部　雄亮	東北大学	金属材料研究所	〃	Yusuke Nambu	Tohoku University
37	〃	鈴木　謙介	東北大学	金属材料研究所	〃	Kensuke Suzuki	Tohoku University
38	〃	池田　陽一	東北大学	金属材料研究所	〃	Yoichi Ikeda	Tohoku University
39	C1-2 における共同利用推進	杉山　正明	京都大学	原子炉実験所	Research and Support of General-Use at C1-2	Masaaki Sugiyama	Kyoto University
40	C1-2、C2-3-1、C3-1-2 における共同利用推進	井上　倫太郎	京都大学	原子炉実験所	Research and Support of General-Use at C1-2, C2-3-1 and C3-1-2	Rintaro Inoue	Kyoto University
41	C3-1-2、C2-3-1 における共同利用推進	日野　正裕	京都大学	原子炉実験所	Research and Support of General-Use at C3-1-2 and C2-3-1	Masahiro Hino	Kyoto University
42	C1-3-mfSANS、C3-1-2 における共同利用推進	大場　洋次郎	京都大学	原子炉実験所	Research and Support of General-Use at C1-3-mfSANS and C3-1-2	Yojiro Oba	Kyoto University

No.	課題名	氏名	所属		Title	Name	Organization
43	C3-1-2 における共同利用推進	田崎　誠司	京都大学	大学院工学研究科	Research and Support of General-Use at C3-1-2	Seiji Tasaki	Kyoto University
44	C1-3-mfSANS における共同利用推進	古坂　道弘	北海道大学	大学院工学研究院	Research and Support of General-Use at C1-3-mfSANS	Michihiro Furusaka	Hokkaido University
45	〃	大沼　正人	北海道大学	大学院工学研究院	〃	Masato Ohnuma	Hokkaido University
46	〃	間宮　広明	物質・材料研究機構	先端材料解析研究拠点	〃	Hiroaki Mamiya	National Institute for Materials Science
47	〃	藤原　健	産業技術総合研究所	計量標準総合センター	〃	Takeshi Fujiwara	National Institute of Advanced Industrial Science and Technology
48	C3-1-2 における共同利用推進	北口　雅暁	名古屋大学	現象解析研究センター	Research and Support of General-Use at C3-1-2	Masaaki Kitaguchi	Nagoya University
49	6G における共同利用推進	富安　啓輔	東北大学	大学院理学研究科	Research and Support of General-Use at 6 G	Keisuke Yomiyasu	Tohoku University
50	〃	岩佐　和晃	茨城大学	フロンティア応用原子科学研究センター	〃	Kazuaki Iwasa	Ibaraki University
担当所員：辛　埴							
51	高温超伝導体の高分解能光電子分光	藤森　淳	東京大学	大学院理学系研究科	Ultra-high resolution photoemission spectroscopy on high Tc superconductor	Atsushi Fujimori	The University of Tokyo
52	60-eV レーザーを用いた時間分解光電子分光の開発	石坂　香子	東京大学	大学院工学系研究科	The development of time-resolved photoemission using 60eV laser	Kyoko Ishizaka	The University of Tokyo
53	鉄系超伝導体のレーザー光電子分光	下志万　貴博	東京大学	大学院工学系研究科	Laser-ARPES on Fe superconductor	Takahiro Shimojima	The University of Tokyo
54	高分解能光電子分光による強相関物質の研究	横谷　尚睦	岡山大学	大学院自然科学研究科	Ultra-high resolution study on strongly correlated materials	Takayoshi Yokoya	Okayama University
55	有機化合物の光電子分光	金井　要	東京理科大学	理工学部	Photoemission study on organic compounds	Kaname Kanai	Tokyo University of Science
56	重い電子系ウラン化合物の高分解能光電子分光	藤森　伸一	日本原子力研究開発機構	量子ビーム応用研究センター	Ultra high resolution photoemission study on heavy fermion Uranium compounds	Shinichi Fujimori	Japan Atomic Energy Agency
57	レーザー光電子分光による酸化物薄膜の研究	津田　俊輔	物質・材料研究機構	機能性材料研究拠点	Laser-Photoemission Study on Oxide Films	Shunsuke Tsuda	National Institute for Materials Science
58	Mn 化合物の時間分解光電子分光	大川　万里生	東京理科大学	理学部	Time resolved Photoemission on Mn compounds	Mario Okawa	Tokyo University of Science

No.	課題名	氏名	所属		Title	Name	Organization
59	収差補正型光電子顕微鏡の建設と利用研究	小嗣　真人	東京理科大学	基礎工学部	Construction and utilization research of aberration correction photoelectron emission microscopy	Masato Kotsugi	Tokyo University of Science
60	時間分解・マイクロビームラインの開発と研究	室　隆桂之	高輝度光科学研究センター	利用研究促進部門	Development of micr- and time-resolved beamline	Takayuki Muro	Japan Synchrotron Radiation Institute
61	光電子分光法を用いた各種分子性結晶の電子状態の研究及び装置の低温化	木須　孝幸	大阪大学	大学院基礎工学研究科	Research on electron state of molecular crystals using photoemission spectroscopy	Takayuki Kisu	Osaka University
62	トポロジカル絶縁体の電子状態の解明	木村　昭夫	広島大学	大学院理学研究科	Electronic-structure study of topological insulators	Akio Kimura	Hiroshima University
63	時間分解光電子分光を用いた強相関係物質の研究	溝川　貴司	早稲田大学	理工学術院	Time-resolved photoemmission study on strongly-correlated materials	Takashi Mizokawa	Waseda University
担当所員：松田　巌							
64	高輝度放射光軟Ｘ線を用いた時間分解光電子分光による表面ダイナミクス研究	近藤　寛	慶應義塾大学	工学部	Study of surface dynamics by time-resolved photomission spectroscopy with high-brilliant soft X-ray synchrotron radiation	Hiroshi Kondoh	Keio University
65	時間分解光電子顕微分光実験の技術開発	木下　豊彦	高輝度光科学研究センター	利用研究促進部門	Technical development of time-resolved photoemission microscopy measurement	Toyohiko Kinoshita	Japan Synchrotron Radiation Institute
66	高輝度軟Ｘ線を利用した強相関物質の電子状態研究	組頭　広志	高エネルギー加速器研究機構	物質構造科学研究所	Study of electronic states in strongly correlated materials with high brilliant soft-Xray	Hiroshi Kumigashira	High Energy Accelerator Research Institute
67	二次元表示型角度分解光電子エネルギー分析器の開発	大門　寛	奈良先端科学技術大学院大学	物質創成科学研究科	Development of 2D display type angle-resolved photoelectron energy analyzer.	Hiroshi Daimon	Nara Institute of Science and Technology
68	時間分解光電子分光実験の技術開発	虻川　匡司	東北大学	多元物質科学研究所	Technical development of time-resolved photoemission spectroscopy measurement	Tadashi Abukawa	Tohoku University
69	表面光電子分光実験の技術開発	坂本　一之	千葉大学	大学院融合科学研究科	Technical development of photoemission spectroscopy measurement for surfaces	Kazuyuki Sakamoto	Chiba University
70	スピン分解光電子分光の測定技術開発	木村　昭夫	広島大学	大学院理学研究科	Technical development of spin-resolved photoemission spectroscopy measurement	Akio Kimura	Hiroshima University
71	軟Ｘ線アンジュレータビームラインの分光光学系の開発研究	雨宮　健太	高エネルギー加速器研究機構	物質構造科学研究所	Research and development of soft X-ray undulator beamline	Kenta Amemiya	High Energy Accelerator Research Institute
72	共鳴磁気光学カー効果の散乱理論研究	田口　宗孝	奈良先端科学技術大学院大学	物質創成科学研究科	Study of scattering theory for the resonant magneto-optical Kerr effect	Taguchi Munetaka	Nara Institute of Science and Technology
73	時間分解磁気光学実験の技術開発	小嗣　真人	東京理科大学	基礎工学部	Technical development of time-resolved magneto-optical experiment	Masato Kotsugi	Tokyo University of Science
74	高輝度放射光光電子分光と軟Ｘ線回折の測定技術開発	藤森　淳	東京大学	大学院理学系研究科	Ultra-high resolution photoemission spectroscopy on high Tc superconductor	Atsushi Fujimori	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：原田　慈久							
75	軟Ｘ線吸収／発光分光法によるリチウムイオン電池電極材料の電子物性研究	朝倉　大輔	産業技術総合研究所	省エネルギー研究部門	Study on the electronic property of electrode materials for Li-ion batteries by soft X-ray absorption/emission spectroscopy	Daisuke Asakura	National Institute of Advanced Industrial Science and Technology
76	〃	細野　英司	産業技術総合研究所	省エネルギー研究部門	〃	Eiji Hosono	National Institute of Advanced Industrial Science and Technology
77	省エネ・創エネ・蓄電デバイスのオペランド分光	尾嶋　正治	東京大学	放射光連携研究機構	Operando nano-spectroscopy for energy efficient, power generation and energy storage devices	Masaharu Oshima	The University of Tokyo
78	軟Ｘ線発光・共鳴非弾性散乱分光の磁気円・線二色性測定システムの構築	菅　滋正	大阪大学	産業科学研究所	Construction of a noble system for circular and linear dichroism in soft X-ray emission and RIXS spectroscopy	Shigemasa Suga	Osaka University
79	二次元原子薄膜トランジスタの電子状態のナノ分析 (T)	吹留　博一	東北大学	電気通信研究所	Nanoscale analysis of electronic states of graphene device	Hirokazu Fukidome	Tohoku University
80	高分解能光電子分光による酸化バナジウムの研究	藤原　秀紀	大阪大学	大学院基礎工学研究科	Study on vanadium oxides by high resolution Photoemission	Hidenori Fujiwara	Osaka University
担当所員：和達　大樹							
81	時間分解吸収分光による $EuNi_2(Si_{1-x}Ge)_2$ の価数転移ダイナミクスの解明	三村　功次郎	大阪府立大学	大学院工学研究科	Dynamics of valence transition $EuNi_2(Si_{1-x}Ge)_2$ revealed by time-resolved XAS	Kojiro Mimura	Osaka Prefecture University
82	三次元 nanoESCA による実デバイスのオペランド電子状態解析	永村　直佳	物質・材料研究機構	先端材料解析研究拠点	Operando analysis of the electronic structure of actual devices by 3DnanoESCA	Naoka Ngamura	National Institute for Materials Science
83	共鳴軟Ｘ線散乱を用いた外場下での電子秩序状態の解明	山崎　裕一	東京大学	大学院工学系研究科	Observation of electric ordered state under external field by resonant soft x-ray scattering	Yuichi Yamasaki	The University of Tokyo

一般研究員 / General Researcher

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：榊原　俊郎							
1	強相関電子系化合物の秩序相に対する結晶対称性および電子軌道の効果	横山　淳	茨城大学	理学部	Effects of crystal symmetry and electronic state in ordered phase of strongly correlated electron systems	Makoto Yokoyama	Ibaraki University
2	〃	川崎　郁斗	兵庫県立大学	大学院物質理学研究科	〃	Ikuto Kawasaki	University of Hyogo
3	単結晶 $YbNi_2Si_3$ の極低温磁化・比熱測定	松本　裕司	名古屋工業大学	大学院工学研究科	Magnetization and specific heat measurements for single crystal $YbNi_2Si_3$ at low temperature	Yuji Matsumoto	Nagoya Institute of Technology

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4	〃	兵藤　一志	名古屋工業大学	大学院工学研究科	〃	Kazushi Hyodo	Nagoya Institute of Technology
5	$TmTr_2Zn_{20}$(Tr = Rh, Ir) の極低温磁化測定	加瀬　直樹	新潟大学	大学院自然科学研究科	Magnetization measurements of $TmTr_2Zn_{20}$ (Tr = Rh, Ir) at low temperatures	Naoki Kase	Niigata University
6	〃	棚橋　正貴	新潟大学	大学院自然科学研究科	〃	Masataka Tanahashi	Niigata University
7	キャリアドープされたパイロクロア型イリジウム酸化物の磁性	松平　和之	九州工業大学	大学院工学研究院	Magnetism of carrier doped pyrochlore iridates	Kazuyuki Matsuhira	Kyushu Institute of Technology
8	〃	柴原　怜央	九州工業大学	大学院工学府	〃	Reo Shibahara	Kyushu Institute of Technology
9	ルテニウム酸化物 Sr_2RuO_4 の超伝導における一軸性圧力効果の比熱測定を用いた研究	矢口　宏	東京理科大学	理工学部	Specific-heat study of uniaxial-pressure effects on superconductivity in the ruthenate Sr_2RuO_4	Hiroshi Yaguchi	Tokyo University of Science
10	〃	山崎　照夫	東京理科大学	理工学部	〃	Teruo Yamazaki	Tokyo University of Science
11	重い電子系超伝導体の対称性決定の理論	町田　一成	立命館大学	理工学部	Theoretical studies on determination of pairing symmetry in heavy Fermion superconductors	Kazushige Machida	Ritsumeikan University
12	$Tb_{2-x}Ti_{2+x}O_{7+y}$ ($x<xc$) で実現するスピン液体の極低温比熱測定	高津　浩	京都大学	大学院工学研究科	Specific heat experiments on the spin liquid $Tb_{2-x}Ti_{2+x}O_{7+y}$	Hiroshi Takatsu	Kyoto University
13	磁気フラストレートした一次元量子スピン系 $Rb_{2-x}Cs_xCu_2Mo_3O_{12}$ の磁気的挙動	安井　幸夫	明治大学	理工学部	Magnetic Behavior of Magnetically Frustrated One-dimensional Quantum Spin System $Rb_{2-x}Cs_xCu_2Mo_3O_{12}$	Yukio Yasui	Meiji University
14	$U_{1-x}Th_xBe_{13}$ における極低温角度分解磁場中比熱測定	清水　悠晴	東北大学	金属材料研究所	Low-temperature heat capacity measurements for $U_{1-x}Th_xBe_{13}$ under angle-resolved magnetic fields	Yusei Shimizu	Tohoku University
15	新規電荷移動錯体の低温磁気測定	山口　博則	大阪府立大学	大学院理学系研究科	Low temperature magnetic properties of new charge-transfer complexs	Hironori Yamaguchi	Osaka Prefecture University
16	〃	岡部　俊輝	大阪府立大学	大学院理学系研究科	〃	Toshiki Okabe	Osaka Prefecture University
担当所員：森　初果							
17	純有機単一成分導体における H/D 同位体効果の理論的研究	兼松　佑典	広島市立大学	大学院情報科学研究科	Theoretical study of H/D isotope effect in purely organic single-component conductor	Yusuke Kanematsu	Hiroshima University
18	〃	立川　仁典	横浜市立大学	大学院生命ナノシステム科学研究科	〃	Masanori Tachikawa	Yokohama City University
19	〃	山本　魁知	横浜市立大学	大学院生命ナノシステム科学研究科	〃	Kaichi Yamamoto	Yokohama City University

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：長田　俊人							
20	混晶 $Bi_{1-x}Sb_x$ のキャリア数制御のための輸送特性測定	矢口　宏	東京理科大学	理工学部	Transport measurements for tuning the carrier concentrations of $Bi_{1-x}Sb_x$ alloys	Hiroshi Yaguchi	Tokyo University of Science
21	〃	仁野平　諒	東京理科大学	大学院理工学研究科	〃	Ryo Ninohira	Tokyo University of Science
22	トポロジカル絶縁体の輸送特性	矢口　宏	東京理科大学	理工学部	Transport properties of topological insulators	Hiroshi Yaguchi	Tokyo University of Science
23	〃	北澤　翔一	東京理科大学	大学院理工学研究科	〃	Kitazawa Shouichi	Tokyo University of Science
担当所員：山下　穣							
24	超流動 ^{3}He 中のスピン流と電場の交差相関の探索	山口　明	兵庫県立大学	大学院物質理学研究科	Study of cross-correlation between spin flow and electric field in superfluid ^{3}He	Akira Yamaguchi	University of Hyogo
25	〃	白濱　圭也	慶應義塾大学	理工学部	〃	Keiya Shirahama	Keio University
26	〃	互井　通裕	慶應義塾大学	大学院理学研究科	〃	Michihiro Tagai	Keio University
27	〃	村川　智	東京大学	低温センター	〃	Satoshi Murakawa	The University of Tokyo
28	三角格子構造をもつ有機導体の電荷グラス状態における熱伝導率測定	橋本　顕一郎	東北大学	金属材料研究所	Thermal conductivity measurements in a charge-glass state of an organic compound with a triangular lattice	Kenichiro Hashimoto	Tohoku University
29	〃	小林　亮太	東北大学	大学院理学研究科	〃	Ryota Kobayashi	Tohoku University
30	制限空間内で回転する超流動ヘリウム３－Ａ相の量子渦の研究	石川　修六	大阪市立大学	大学院理学研究科	Study on quantum vortices of superfluid ^{3}He-A phase in the confined geometry	Osamu Ishikawa	Osaka Prefecture University
31	〃	小原　顕	大阪市立大学	大学院理学研究科	〃	Ken Obara	Osaka Prefecture University
32	超低温における dHvA 効果測定	宍戸　寛明	大阪府立大学	大学院工学研究科	dHvA effect measurements at ultra-low temperatures	Hiroaki Shishido	Osaka Prefecture University
担当所員：勝本　信吾							
33	ナノセンシングデバイスに関する研究	割澤　伸一	東京大学	大学院新領域創成科学研究科	Research on nano sensing devices	Shinichi Warisawa	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
34	〃	松木　孝憲	東京大学	大学院新領域創成科学研究科	〃	Takanori Matsuki	The University of Tokyo
35	〃	中村　高道	東京大学	大学院新領域創成科学研究科	〃	Takamichi Nakamura	The University of Tokyo
36	〃	方　琦	東京大学	大学院新領域創成科学研究科	〃	Qi Fang	The University of Tokyo
37	〃	根本　啓行	東京大学	大学院新領域創成科学研究科	〃	Hiroyuki Nemoto	The University of Tokyo
38	〃	上木　瞭太郎	東京大学	大学院新領域創成科学研究科	〃	Ryotaro Ueki	The University of Tokyo
39	Pb 置換 Bi 系超伝導体のホール係数測定 (4)	神戸　士郎	山形大学	大学院理工学研究科	Hall coefficient measurement of Pb-substituted Bi-based superconductor	Shiro Kambe	Yamagata University
40	〃	鈴木　健弘	山形大学	大学院理工学研究科	〃	Takehiro Suzuki	Yamagata university
41	〃	増川　拓未	山形大学	大学院理工学研究科	〃	Takumi Masukawa	Yamagata University
42	〃	魏　毓良	山形大学	大学院理工学研究科	〃	Wei Yuliang	Yamagata university
担当所員：小森　文夫							
43	金属／半導体表面上へのナノ構造を持つ超薄膜の形成とその磁気ダイナミックスの磁気光学的測定	河村　紀一	日本放送協会放送技術研究所	新機能デバイス研究部	Study on magnetic dynamics of ultra-thin films and nano-structures on metal / semiconductor surfaces	Norikazu Kawamura	NHK　Science and Technology Research Laboratories
44	レアメタルフリー磁性材料 L10-FeCo の磁気特性の解析	小嗣　真人	東京理科大学	基礎工学部	Analysis of magnetic properties of rare-metal-free super magnet "L10-FeCo"	Masato Kotsugi	Tokyo University of Science
45	Si(111)$\sqrt{3}\times\sqrt{3}$ B 基板上に成長した Bi(110) 超薄膜の電子状態	中辻　寛	東京工業大学	物質理工学院	Electronic structure of Bi(110) thin films grown on Si(111)$\sqrt{3}\times\sqrt{3}$ B substrates	Kan Nakatsuji	Tokyo Institute of Technology
46	Al-Pd-Ru 準結晶・近似結晶における空孔濃度の研究	金沢　育三	東京学芸大学	自然科学系	Positron-annihilation studies of Al-Pd-Mn quasicrystal and its approximant crystals	Ikuzo Kanazawa	Tokyo Gakugei University
47	〃	中島　諒	東京学芸大学	大学院教育学研究科	〃	Makoto Nakajima	Tokyo Gakugei University
48	Al-Pd-Ru 準結晶・近似結晶における空孔濃度の研究	木村　薫	東京大学	大学院新領域創成科学研究科	Positron-annihilation studies of Al-Pd-Mn quasicrystal and its approximant crystals	Kaoru Kimura	The University of Tokyo
49	〃	大島　永康	産業技術総合研究所	分析計測標準研究部門	〃	Nagayasu Oshima	National Institute of Advanced Industrial Science and Technology

No.	課題名	氏名	所属		Title	Name	Organization
担当所員：長谷川　幸雄							
50	STM による $FeSe_{1-x}Te_x$ の電子状態のドープ依存性	柏木　隆成	筑波大学	大学院数理物質科	STM study of doping x dependence of $FeSe_{1-x}Te_x$	Takanari Kashiwagi	University of Tsukuba
51	〃	寺尾　耕太郎	筑波大学	大学院数理物質科	〃	Kotaro Terao	University of Tsukuba
52	二ホウ化物薄膜上エピタキシャルシリセン及びゲルマネンの低温走査トンネル顕微鏡観察	高村　由起子	北陸先端科学技術大学院大学	マテリアルサイエンス系	Low temp. STM investigation of epitaxial silicene and germanene on diboride	Yukiko Takamura	Japan Advanced Institute of Science and Technology
53	〃	アントワーヌ　フロランス	北陸先端科学技術大学院大学	マテリアルサイエンス系	〃	Antoine Fleurence	Japan Advanced Institute of Science and Technology
54	STM/STS 測定による Tl/Si(111) 表面超構造における超伝導特性の解明	高山　あかり	東京大学	大学院理学系研究科	Superconducting properties of surface-superstructure Tl/Si(111) studied by STM and STS	Akari Takayama	The University of Tokyo
55	〃	一ノ倉　聖	東京大学	大学院理学系研究科	〃	Satoru Ichinokura	The University of Tokyo
56	重い電子系超伝導の実空間観察のための超低温・強磁場の小型 STM の開発	河江　達也	九州大学	大学院工学研究院	Development of a miniature STM for low-temperature and high-eld measurements of heavy fermion superconductors	Tatsuya Kawae	Kyushu University
57	〃	高田　弘樹	九州大学	大学院工学府	〃	Hiroki Takata	Kyushu University
58	〃	志賀　雅亘	九州大学	大学院工学府	〃	Masanobu Shiga	Kyushu University
59	〃	梶原　裕太	九州大学	大学院工学府	〃	Yuta Kajiwara	Kyushu University
60	サイズ制御したナノクラスーの低温 STM による物性評価	江口　豊明	東北大学	大学院理学研究科	Low-temperature STM study of size-controlled nanoclusters	Toyoaki Eguchi	Tohoku University
担当所員：リップマー　ミック							
61	金属的伝導性を示す $LaAlO_3/SrTiO_3$ ヘテロ界面金属層における 3d 遷移金属ドープの影響	李　美希	奈良先端科学技術大学院大学	大学院物質創成科学研究科	Effects of the doped 3d or 5d transition metal in the $LaAlO_3/SrTiO_3$ metallic interface	Mihee Lee	Nara Insttitute of Science and Technology
62	新規ウルツァイト型四面体強誘電体材料の創成 (III)	安井　伸太郎	東京工業大学	フロンティア材料研究所	The creation of novel wurtzite-type tetrahedral ferroelectric materials (III)	Shintaro Yasui	Tokyo Institute of Technology
担当所員：吉信　淳							
63	n 型半導体光触媒物質表面への p 型半導体膜の作製と評価	山田　太郎	東京大学	大学院工学系研究科	Fabrication and physical investigation of p-type semiconductive film on n-type photocatalytic material surfaces	Taro Yamada	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
64	〃	岩瀬　元希	明治大学	研究・知財戦略機構	〃	Motoki Iwase	Meiji University
65	〃	坂井　延寿	東京大学	大学院工学系研究科	〃	Enju Sakai	The University of Tokyo
66	〃	西山　洋	東京大学	大学院工学系研究科	〃	Hiroshi Nishiyama	The University of Tokyo
67	Si(001) 表面上の準安定共吸着過程の透過 FTIR 測定	大野　真也	横浜国立大学	大学院工学研究院	FTIR measurements of metastable physisorption processes on Si(001)	Shinya Ohno	Yokohama National University
68	〃	小川　新	横浜国立大学	大学院工学府	〃	Arata Ogawa	Yokohama national university
69	SiO_2 上のスピロピラン SAMs の赤外吸収測定	田島　裕之	兵庫県立大学	大学院物質理学研究科	IR measurements for spiropyran SAMs on SiO_2	Hiroyuki Tajima	Univesity of Hyogo
70	〃	角屋　智史	兵庫県立大学	大学院物質理学研究科	〃	Tomofumi Kadoya	University of Hyogo
71	〃	大塚　理人	兵庫県立大学	大学院物質理学研究科	〃	Masato Otsuka	University of Hyogo
72	水素終端 Si(110)-(1×1) 及び Si(111)-(1×1) 表面の表面形態の形成メカニズムの解明	須藤　彰三	東北大学	大学院理学研究科	The morphology and the mechanism of the hydrogen terminated Si(110) and Si(111) surfaces	Shozo Suto	Tohoku University
73	〃	川本　絵里奈	東北大学	大学院理学研究科	〃	Erina Kawamoto	Tohoku University
74	〃	河野　純子	東北大学	大学院理学研究科	〃	Junko Kono	Tohoku University
担当所員：秋山　英文							
75	GaPN 混晶のアップコンバージョン発光機構に関する研究	矢口　裕之	埼玉大学	大学院理工学研究科	Upconversion emission mechanism of GaPN alloys	Hiroyuki Yaguchi	Saitama University
76	〃	五十嵐　大輔	埼玉大学	大学院理工学研究科	〃	Daisuke Igarashi	Saitama University
77	〃	高宮　健吾	埼玉大学	総合技術支援センター	〃	Kengo Takamiya	Saitama University
担当所員：上床　美也							
78	有機分子性導体の高圧物性の研究	鳥塚　潔	武蔵野大学	教育学部	Studies on High Pressure Properties of Organic Molecular Conductors	Kiyoshi Torizuka	Musashino University

No.	課題名	氏名	所属		Title	Name	Organization
79	充填スクッテルダイト超伝導体の磁気特性	川村　幸裕	室蘭工業大学	大学院工学研究科	Magnetic properties of filled skutterudite superconductor.	Yukihiro Kawamura	Muroran Institute of Technology
80	YbH_{2}+x の磁性と伝導	中村　修	岡山理科大学	研究連携支援センター	Magnetic and transport properties in YbH_{2}+x	Osamu Nakamura	Okayama University of Science
81	多形化合物 RIr_2Si_2(R= 希土類）の結晶育成と物質評価	繁岡　透	山口大学	大学院創成科学研究科	Crystal growth and characterization of polymorphic compounds RIr_2Si_2(R=rare earth)	Toru Shigeoka	Yamaguchi University
82	〃	内間　清晴	沖縄キリスト教短期大学	総合教育系	〃	Kiyoharu Uchima	Okinawa Christian Junior College
83	多形化合物 $GdIr_2Si_2$ の磁気特性	繁岡　透	山口大学	大学院創成科学研究科	Magnetic characteristics of polymorphic compound $GdIr_2Si_2$	Toru Shigeoka	Yamaguchi University
84	〃	内間　清晴	沖縄キリスト教短期大学	総合教育系	〃	Kiyoharu Uchima	Okinawa Christian Junior College
85	1 GPa 以下でのキュービックアンビルによる高圧技術の探索	村田　惠三	大阪経済法科大学	２１世紀社会総合研究センター	Development of High Pressure Technique under 1 GPa	Keizo Murata	Osaka　University of Economics and Law
86	(Ho, La)Rh_2Si_2 の磁気特性	内間　清晴	沖縄キリスト教短期大学	総合教育系	Magnetic characteristics of (Ho, La)Rh_2Si_2	Kiyoharu Uchima	Okinawa Christian Junior College
87	〃	繁岡　透	山口大学	大学院創成科学研究科	〃	Toru Shigeoka	Yamaguchi University
88	導電性ラングミュア・ブロジェット膜の高圧下の電気的性質に関する研究	三浦　康弘	桐蔭横浜大学	大学院工学研究科	Studies on Electrical Properties of Conductive Langmuir-Blodgett Films under High Pressure	Yasuhiro Miura	Toin University of Yokohama
89	重い電子系 $Yb_2Pt_6Al_{15}$ の高圧下電気抵抗測定	松本　裕司	名古屋工業大学	大学院工学研究科	Electrical resistivity measurements of heavy fermion $Yb_2Pt_6Al_{15}$ under high pressure	Yuji Matsumoto	Nagoya Institute of Technology
90	〃	兵藤　一志	名古屋工業大学	大学院工学研究科	〃	Kazushi Hyodo	Nagoya Institute of Technology
91	高圧下における準結晶の電気抵抗に関する研究	田村　隆治	東京理科大学	大学院基礎工学研究科	Electrical resistivity of quasicrystals under high pressure	Ryuji Tamura	Tokyo University of Science
92	〃	田中　祐二郎	東京理科大学	大学院基礎工学研究科	〃	Yujiro Tanaka	Tokyo University of Science
93	磁気相転移過程の実時間追跡	元屋　清一郎	東京理科大学	理工学部	Real time observation of magnetic phase transitions	Kiyoichiro Motoya	Tokyo University of Science
94	Co 基ホイスラー合金における圧力誘起マルテンサイト変態に関する研究	重田　出	鹿児島大学	大学院理工学研究科	Study on pressure-induced martensitic phase transformation in Co-based Heusler alloys	Iduru Shigeta	Kagoshima University
95	〃	大岡　隆太郎	鹿児島大学	大学院理工学研究科	〃	Ryutaro Ooka	Kagoshima University

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96	三角格子反強磁性体の低温磁性	柄木　良友	琉球大学	教育学部	Low temperature magnetism of triangular antiferromagnets	Yoshitomo Karaki	University of the Ryukyus
97	Mn_2Sb 基化合物の磁気相転移とアレスト効果	三井　好古	鹿児島大学	大学院理工学研究科	Magnetic phase transition and the arrested effect for Mn_2Sb-based compounds	Yoshifuru Mitsui	Kagoshima University
98	〃	若森　太音	鹿児島大学	大学院理工学研究科	〃	Taoto Wakamori	Kagoshima University
99	遍歴電子強磁性体 CrAlGe 基化合物の磁気特性	三井　好古	鹿児島大学	大学院理工学研究科	Magnetic properties of itinerant electron ferromagnet CrAlGe-based compound	Yoshifuru Mitsui	Kagoshima University
100	〃	吉永　総志	鹿児島大学	大学院理工学研究科	〃	Soshi Yoshinaga	Kagoshima University
101	Mn_2Sb 基メタ磁性体の基礎磁気特性	小山　佳一	鹿児島大学	大学院理工学研究科	Basic magnetic properties of Mn_2Sb-based metamagnets	Keiichi Koyama	Kagoshima University
102	〃	アッドライン　ンゴジ　ムウッド	鹿児島大学	大学院理工学研究科	〃	Adline Ngozi Nwodo	Kagoshima University
103	希土類ラーベス化合物 RAl_2 の異方的磁気体積効果	大橋　政司	金沢大学	理工研究域	Anisotropic magnetovolume effect of rare earth Laves compound RAl_2	Masashi Ohashi	Kanazawa University
104	〃	宮川　昌大	金沢大学	大学院自然科学研究科	〃	Masahiro Miyagawa	Kanazawa University
105	強相関電子系化合物における圧力および磁場誘起量子相転移の探索	大橋　政司	金沢大学	理工研究域	Pressure and field induced quantum phase transition in strongly correlated electron systems	Masashi Ohashi	Kanazawa University
106	〃	大橋　康平	金沢大学	大学院自然科学研究科	〃	Kouhei Oohashi	Kanazawa university
107	鉄カルコゲナイド化合物の圧力効果	久田　旭彦	徳島大学	大学院理工学研究部	Pressure effect on iron-chalcogenide compound	Hisada Akihiko	Tokushima University
108	〃	齋藤　あゆみ	徳島大学	大学院総合科学教育部	〃	Ayumi Saito	Tokushima University
109	強相関物質における価数揺らぎの物質探索と圧力効果	中野　智仁	新潟大学	大学院自然科学研究科	Investigation valence fluctuation phenomena in strongly correlated electron system.	Tomohito Nakano	Niigata University
110	〃	福原　慶	新潟大学	大学院自然科学研究科	〃	Kei Fukuhara	Niigata University
111	層状強相関電子系化合物における新奇量子臨界現象の探索とその圧力効果	中野　智仁	新潟大学	大学院自然科学研究科	Investigation of novel quantum critical phenomena in layered strongly correlated electron systems and its pressure effect	Tomohito Nakano	Niigata University
112	〃	松本 紘祐	新潟大学	大学院自然科学研究科	〃	Kosuke Matsumoto	Niigata University

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113	空間反転対称性を欠く系 $CeNiC_2$ の圧力下での磁性と超伝導の相関	片野　進	埼玉大学	大学院理工学研究科	Interplay between magnetism and superconductivity of the non-centrosymmetric system $CeNiC_2$ under high pressure	Susumu Katano	Saitama University
114	梯子格子反強磁性体 $BaFe_2Se_3$ の圧力下超伝導相の探索	青山　拓也	東北大学	大学院理学研究科	Exploration of the pressure-induced superconductivity in the iron-based ladder compound, $BaFe_2Se_3$	Takuya Aoyama	Tohoku University
115	圧力誘起価数転移の探索と高圧下輸送特性	辺土　正人	琉球大学	理学部	Searching of pressure-induced valence transition and transport properties under high pressure	Masato Hedo	University of the Ryukyus
116	〃	安次富　洋介	琉球大学	大学院理工学研究科	〃	Yousuke Ashitomi	University of the Ryukyus
117	空間反転対称性のない遷移金属間化合物とその関連物質の高圧下輸送特性	辺土　正人	琉球大学	理学部	Transport properties of non-centrosymmetric transition metals compounds under high pressure	Masato Hedo	University of the Ryukyus
118	〃	垣花　将司	琉球大学	大学院理工学研究科	〃	Masashi Kakihana	University of the Ryukyus
119	〃	西村　健吾	琉球大学	大学院理工学研究科	〃	Kengo Nishimura	University of the Ryukyus
120	ホイスラー化合物強磁性体 Fe_2MnSi の高圧化磁化測定	伊藤　昌和	鹿児島大学	学術研究院理工学域	Magnetization of Heusler compound Fe_2MnSi under pressure	Masakazu Ito	Kagoshima University
121	〃	園田　一貴	鹿児島大学	大学院理工学研究科	〃	Kazuki Sonoda	Kagoshima University
122	高圧下における Eu 化合物の価数転移の探索	本多　史憲	東北大学	金属材料研究所	Investigation of valence transition on Eu compounds under high pressure	Honda Fuminori	Tohoku University
123	〃	大貫　惇睦	琉球大学	理学部	〃	Yoshichika Onuki	University of the Ryukyus
124	〃	仲村　愛	東北大学	金属材料研究所	〃	Ai Nakamura	Tohoku University
125	一次元電荷秩序系有機導体 δ'C-(BPDT-TTF)$_2$ICl$_2$ の温度圧力相図の研究	橋本　顕一郎	東北大学	金属材料研究所	Study of the Temperature-Pressure Phase Diagram of the One-dimensional Charge-ordered Organic Compound δ'C-(BPDT-TTF)$_2$ICl$_2$	Kenichiro Hashimoto	Tohoku University
126	〃	小林　亮太	東北大学	大学院理学研究科	〃	Ryota Kobayashi	Tohoku University
127	UT_2X_2 (T: 遷移金属 , X: Si, Ge) の反強磁性の圧力効果	仲村　愛	東北大学	金属材料研究所	Effect of Pressure on the antiferromagnetism of UT_2X_2 (T: transition metal, X: Si, Ge)	Ai Nakamura	Tohoku University
128	〃	本多　史憲	東北大学	金属材料研究所	〃	Fuminori Honda	Tohoku University
129	回転希釈冷凍機を用いた量子液体・固体研究	白濱　圭也	慶應義塾大学	理工学部	Study of quantum fluids and solids using rotating dilution refrigerator	Keiya Shirahama	Keio University

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130	〃	立木　智也	慶應義塾大学	大学院理工学研究科	〃	Tomoya Tsuiki	Keio University
131	〃	高橋　大輔	足利工業大学	共通教育センター	〃	Daisuke Takahashi	Ashikaga Institute of Technology
132	〃	村川　智	東京大学	低温センター	〃	Satoshi Murakawa	The University of Tokyo
133	近藤格子系 Ce_3RuSn_6 の圧力下電気抵抗測定	脇舎　和平	横浜国立大学	工学研究院	Electrical resistivity of Ce_3RuSn_6 under applied pressure	Kazuhei Wakiya	Yokohama National University
134	価数揺動物質の高圧力中輸送特性の研究	仲間　隆男	琉球大学	理学部	Transport properties of valence fluctuating compounds under pressure	Takao Nakama	University of the Ryukyus
135	〃	屋良　朝之	琉球大学	大学院理工学研究科	〃	Tomoyuki Yara	University of the Ryukyus
136	遷移金属化合物の高圧力下の輸送特性	仲間　隆男	琉球大学	理学部	Pressure effect on transport properties of transition metal compounds	Takao Nakama	University of the Ryukyus
137	〃	鈴木　史記	琉球大学	大学院理工学研究科	〃	Fuminori Suzuki	University of the Ryukyus
138	ホイスラー型強磁性形状記憶合金の電気抵抗測定による転移温度の高圧効果	安達　義也	山形大学	大学院理工学研究科	Pressure effect of the transition temperature by the measurements of the electrical resistivity for the Heusler type ferromagnetic shape memory alloys	Yoshiya Adachi	Yamagata University
139	〃	小木　雄貴	山形大学	大学院理工学研究科	〃	Yuki Ogi	Yamagata University
140	新奇 Ce 三元系化合物の圧力下測定	本山　岳	島根大学	大学院総合理工学研究科	Physical property measurements of new Ce heavy fermion compound under pressure	Gaku Motoyama	Shimane University
141	〃	瀬崎　眞澄	島根大学	大学院総合理工学研究科	〃	Masumi Sezaki	Shimane University
142	強相関型セリウム合金の磁性と超伝導	雨海　有佑	室蘭工業大学	大学院工学研究科	Magnetism and superconductivity in the strongly correlated Ce alloys	Yusuke Amakai	Muroran Institute of Technology
143	強相関型セリウム化合物の量子相転移と磁気的性質	村山　茂幸	室蘭工業大学	大学院工学研究科	Quantum phase transition and magnetic properties in the strongly correlated Ce compounds	Shigeyuki Murayama	Muroran Institute of Technology
144	新規三元化合物 $EuCuP_2$ の輸送特性の圧力効果	藤原　哲也	山口大学	大学院創成科学研究科	Pressure effect on the transport property of the novel ternary compound $EuCuP_2$	Tetsuya Fujiwara	Yamaguchi University
145	〃	平山　拓斗	山口大学	大学院創成科学研究科	〃	Takuto Hirayama	Yamaguchi University
146	Pr-Zn-Ge 三元系新規化合物の磁化特性	藤原　哲也	山口大学	大学院創成科学研究科	Magnetic property of Pr-Zn-Ge novel ternary intermetallics	Tetsuya Fujiwara	Yamaguchi University

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147	〃	園部　太暉	山口大学	大学院創成科学研究科	〃	Taiki Sonobe	Yamaguchi University
148	$EuMn_2Ge_2$ の磁化特性	藤原　哲也	山口大学	大学院創成科学研究科	Magnetic property of $EuMn_2Ge_2$	Tetsuya Fujiwara	Yamaguchi University
149	〃	平山　拓斗	山口大学	大学院創成科学研究科	〃	Takuto Hirayama	Yamaguchi University
150	$LaFe_2P_2$ の高圧力下電気抵抗測 (2)	藤原　哲也	山口大学	大学院創成科学研究科	Resistivity measurement of $LaFe_2P_2$ under high pressure II	Tetsuya Fujiwara	Yamaguchi University
151	〃	園部　太暉	山口大学	大学院創成科学研究科	〃	Taiki Sonobe	Yamaguchi University
152	$YbCo_2Zn_{20}$ の Co 元素位置の置換効果 IV	阿曽　尚文	琉球大学	理学部	Substitution effect at Co elements in $YbCo_2Zn_{20}$ IV	Naofumi Aso	University of the Ryukyus
153	〃	小林　理気	琉球大学	理学部	〃	Riki Kobayashi	University of the Ryukyus
154	$YbCo_2Zn_{20}$ の Zn 元素位置の置換効果 IV	阿曽　尚文	琉球大学	理学部	Substitution effect at Zn elements in $YbCo_2Zn_{20}$ IV	Naofumi Aso	University of the Ryukyus
155	〃	小林　理気	琉球大学	理学部	〃	Riki Kobayashi	University of the Ryukyus
156	〃	高村　治希	琉球大学	大学院理工学研究科	〃	Haruki Takamura	University of the Ryukyus
157	$CeRu_2Al_{10}$ の Rh 置換効果の研究	小林　理気	琉球大学	理学部	Study of Rh-doping effect in $CeRu_2Al_{10}$	RIGHT	University of the Ryukyus
158	ウラン化合物反強磁性体 UIrGe の圧力効果	芳賀　芳範	日本原子力研究開発機構	先端基礎研究センター	Effect of pressure on antiferromagnetism in uranium compound UIrGe	Yoshinori Haga	Japan Atomic Energy Agency
159	〃	Jiri Pospisil	日本原子力研究開発機構	先端基礎研究センター	〃	Jiri Pospisil	Japan Atomic Energy Agency
担当所員：川島　直輝							
160	テンソルネットワーク法のライブラリ開発	原田　健自	京都大学	大学院情報学研究科	Development of tensor network library	Kenji Harada	Kyoto University
161	蜂の巣格子 Heisenberg-Kitaev 磁性体の有限温度下磁気励起	鈴木　隆史	兵庫県立大学	大学院工学研究科	Magnetic excitations of honeycomb-lattice Heisenberg-Kitaev magnets at a finite temperature	Takafumi Suzuki	University of Hyogo
担当所員：吉澤　英樹							

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162	電荷注入された量子スピン鎖におけるスピン - 電荷ダイナミクスの研究	横尾　哲也	高エネルギー加速器研究機構	物質構造科学研究所	Research of hole dynamics in quantum spin chain	Tetsuya Yokoo	High Energy Accelerator Reserach Organization
163	〃	羽合　孝文	高エネルギー加速器研究機構	物質構造科学研究所	〃	Takafumi Hawai	High Energy Accelerator Reserach Organization
164	比熱測定による $FeTe_{1-x}S_x$ における O_2 アニール効果の評価	山崎　照夫	東京理科大学	理工学部	Evaluation of O_2-annealing effects in $FeTe_{1-x}S_x$ by means of specific heat measurements.	Teruo Yamazaki	Tokyo University of Science
165	〃	飯泉　武顕	東京理科大学	大学院理工学研究科	〃	Takeaki Iizumi	Tokyo University of Science
166	ヨウ素輸送法により育成した $FeTe_{1-x}S_x$ の物性	山崎　照夫	東京理科大学	大学院理工学研究科	Physical properties of $FeTe_{1-x}S_x$ grown by iodine transport method	Teruo Yamazaki	Tokyo University of Science
167	〃	矢口　宏	東京理科大学	大学院理工学研究科	〃	Hiroshi Yaguchi	Tokyo University of Science
168	〃	山本　和典	東京理科大学	理工学部	〃	Kazunori Yamamoto	Tokyo University of Science
169	Sr_2RuO_4 における捻れによる塑性変形で誘起される超伝導	山崎　照夫	東京理科大学	理工学部	Superconductivity induced by plastic deformation with torsion in Sr_2RuO_4	Teruo Yamazaki	Tokyo University of Science
170	〃	三村　拓哉	東京理科大学	大学院理工学研究科	〃	Takuya Mimura	Tokyo University of Science
171	$YbCo_2Zn_{20}$ 置換系試料の極低温比熱測定 III	小林　理気	琉球大学	理学部	Specific heat measurement at very low temperature on $YbCo_2Zn_{20}$ systems III	Riki Kobayashi	University of the Ryukyus
172	〃	阿曽　尚文	琉球大学	理学部	〃	Naofumi Aso	University of the Ryukyus
173	〃	高村　治希	琉球大学	大学院理工学研究科	〃	Haruki Takamura	University of the Ryukyus
担当所員：益田　隆嗣							
174	磁性不純物による三角スピンチューブのスピンダイナミクスの変化	真中　浩貴	鹿児島大学	学術研究院理工学域工学系	Magnetic impurity effect on spin dynamics of triangular spin tubes	Hiroki Manaka	Kagoshima University
175	$Ba_3Fe_2O_5Cl_2$ の中性子非弾性散乱実験に向けた軸立て	阿部　伸行	東京大学	大学院新領域創成科学研究科	Preparation of single crystalline $Ba_3Fe_2O_5Cl_2$ for the measurement of inelastic neutron scattering	Nobuyuki Abe	The University of Tokyo
176	〃	松浦　慧介	東京大学	大学院新領域創成科学研究科	〃	Keisuke Matsuura	The University of Tokyo
177	〃	近江　毅志	東京大学	大学院新領域創成科学研究科	〃	Tsuoshi Omi	The University of Tokyo

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担当所員：嶽山　正二郎							
178	磁気光学測定を用いたハロゲン化金属ペロブスカイト型結晶の励起子特性の研究	中村　唯我	東京大学	大学院工学系研究科	Study on excitonic properties of organometallic lead halide perovskite using magneto-optic measurement	Yuiga Nakamura	The University of Tokyo
179	キラルフェリ磁性体における磁気キラル二色性	有馬　孝尚	東京大学	大学院新領域創成科学研究科	Magneto-chiral dichroism in a chiral ferrimagnet	Takanao Ariam	The University of Tokyo
180	〃	徳永　祐介	東京大学	大学院新領域創成科学研究科	〃	Yusuke Tokunaga	The University of Tokyo
181	〃	阿部　伸行	東京大学	大学院新領域創成科学研究科	〃	Nobuyuki Abe	The University of Tokyo
182	〃	豊田　新悟	東京大学	大学院新領域創成科学研究科	〃	Shingo Toyoda	The University of Tokyo
183	〃	近江　毅志	東京大学	大学院新領域創成科学研究科	〃	Tsuyoshi Omi	The University of Tokyo
184	〃	中川　直己	東京大学	大学院新領域創成科学研究科	〃	Naoki Nakagawa	The University of Tokyo
185	〃	荒木　勇介	東京大学	大学院新領域創成科学研究科	〃	Yusuke Araki	The University of Tokyo
186	〃	徳村　謙祐	東京大学	大学院新領域創成科学研究科	〃	Tokumura Kensuke	The University of Tokyo
187	フラストレーションが強い S=1 スピンダイマー系 $Ba_2NiSi_2O_6Cl_2$ の超強磁場磁化測定	田中　秀数	東京工業大学	大学院理学院	Ultra-high-magnetic-field magnetization measurement on S=1 fully frustrated dimerized quantum magnet $Ba_2NiSi_2O_6Cl_2$	Hidekazu Tanaka	Tokyo Institute of Technology
担当所員：金道　浩一							
188	幾何学的フラストレート磁性体の強磁場磁化測定	菊池　彦光	福井大学	学術研究院工学系部門	Magnetization measurements of the frustrated magnets	Hikomitsu Kikuchi	University of Fukui
189	〃	笠松　直幸	福井大学	大学院工学研究科	〃	Naoyuki Kasamatsu	University of Fukui
190	重い電子系化合物が示す非従来型超伝導と磁性の相関	横山　淳	茨城大学	理学部	Interplay between unconventional superconductivity and magnetism in heavy-fermion compounds	Makoto Yokoyama	Ibaraki University
191	〃	川崎　郁斗	兵庫県立大学	大学院物質理学研究科	〃	Kawasaki Ikuto	University of Hyogo
192	BiCh2 系超伝導体の上部臨界磁場の決定	加瀬　直樹	新潟大学	大学院自然科学研究科	Decision of the upper critical field of the BiCh-based superconductors	Naoki Kase	Niigata University

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193	〃	照井　祐輔	新潟大学	大学院自然科学研究科	〃	Yusuke Terui	Niigata University
194	Yb 系化合物 YbT_6Ge_6 (T= Cr, Co) の強磁場磁化過程と磁気相図	道岡　千城	京都大学	大学院理学研究科	High-field magnetization measurements and magnetic phase diagram of YbT_6Ge_6(T= Cr, Co)	Chishiro Michioka	Kyoto University
195	〃	原口　祐哉	京都大学	大学院理学研究科	〃	Yuya Haraguchi	Kyoto University
196	〃	山田　真二	京都大学	大学院理学研究科	〃	Shinji Yamada	Kyoto University
197	Fe 基並びに Cu 基スピネルの高磁場物性	伊藤　昌和	鹿児島大学	学術研究院理工学域	Magnetic properties of Fe and Cu based spinel in high magnetic field	Masakazu Ito	Kagoshima University
198	〃	園田　一貴	鹿児島大学	大学院理工学研究科	〃	Kazuki Sonoda	Kagoshima University
199	金属ナノ結晶の磁化特性	稲田　貢	関西大学	システム理工学部	Magnetic properties of metal nanocrystals	Mitsuru Inada	Kansai University
200	〃	越田　樹	関西大学	大学院理工学研究科	〃	Tastuo Koshida	Kansai University
201	重い電子系超伝導体 $(U,Th)Be_{13}$ の非フェルミ液体状態における強磁場効果	清水　悠晴	東北大学	金属材料研究所	High-magnetic-field effects on the non-Fermi-liquid heavy-fermion superconductor $(U,Th)Be_{13}$	Yusei Shimizu	Tohoku University
202	金属ナノクラスターネットワークの磁気抵抗測定	稲田　貢	関西大学	システム理工学部	Electronic transport properties of metal cluster networks under high-magnetic field	Mitsuru Inada	Kansai University
203	〃	小笠原　尚貴	関西大学	システム理工学部	〃	Naoki Ogasahara	Kansai University
204	有機／無機低次元スピン系の強磁場中における量子相転移現象	小野　俊雄	大阪府立大学	大学院理学系研究科	Field induced quantum phase transitions in low dimensional organic and inorganic spin systems	Toshio Ono	Osaka Prefecture University
205	〃	遠藤　耀司	大阪府立大学	大学院理学系研究科	〃	Youji Endo	Osaka Prefecture University
206	希土類金属間化合物の強磁場物性研究	海老原　孝雄	静岡大学	理学部	Physical properties in rare earth intermetallic compounds at high magnetic fields	Takao Ebihara	Shizuoka University
207	〃	ジュマエダ　ジャトミカ	静岡大学	大学院創造科学技術研究科	〃	Jumaeda Jatmika	Shizuoka University
担当所員：徳永　将史							
208	強磁場を利用した FeMn 基形状記憶合金の物性調査	キョ　キョウ	東北大学	大学院工学研究科	Investigation on physical properties of FeMn-based shape memory alloys	Xiao Xu	Tohoku University

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209	$U_2Rh_3Ge_5$ およびその関連物質の強磁場下における磁気相図の研究	李　徳新	東北大学	金属材料研究所	Study of magnetic phase diagram on $U_2Rh_3Ge_5$ and related compounds under high magnetic field	Dexin Li	Tohoku University
210	〃	本多　史憲	東北大学	金属材料研究所	〃	Fuminori Honda	Tohoku University
211	EuP_3 の強磁場輸送特性	高橋　英史	東京大学	大学院工学系研究科	Magnetotransport properties of EuP_3	Hidefumi Takahashi	The University of Tokyo
212	磁性ディラック電子 EuP_3 強磁場輸送特性	野本　敦朗	東京大学	大学院工学系研究科	Magnetotransport properties of EuP_3	Atsuro Nomoto	The University of Tokyo
213	Kyanite 構造を持つ M_2GeO_5(M=Cr, V) の強磁場磁化測定	香取　浩子	東京農工大学	大学院工学研究院	High-field magnetization measurements of M_2GeO_5(M=Cr, V) with Kyanite structure	Hiroko Katori	Tokyo University of Agriculture and Technology
214	〃	高田　早紀	東京農工大学	大学院工学府	〃	Takada Saki	Tokyo University of Agriculture and Technology
215	遍歴電子化合物 $Ln_2Co_{12}P_7$ および関連物質の強磁場磁化過程	太田　寛人	東京農工大学	大学院工学研究院	High field magnetization of itinerant electronic ferromagnets $Ln_2Co_{12}P_7$ and its related compounds	Hiroto Ohta	Tokyo University of Agriculture and Technology
216	〃	加藤　優典	東京農工大学	大学院工学府	〃	Yusuke Kato	Tokyo University of Agriculture and Technology
217	$FeTe_{1-x}S_x$ における O_2 アニールで誘起される超伝導状態の磁気光学イメージングによる観測	山崎　照夫	東京理科大学	理工学部	Observation of superconducting state induced by O_2-annealing in $FeTe_{1-x}S_x$ by MO imaging	Teruo Yamazaki	Tokyo University of Science
218	〃	矢口　宏	東京理科大学	理工学部	〃	Hiroshi Yaguchi	Tokyo University of Science
219	〃	飯泉　武顕	東京理科大学	大学院理工学研究科	〃	Takeaki Iizumi	Tokyo University of Science
220	半金属における磁場誘起電子相転移	矢口　宏	東京理科大学	理工学部	Magnetic-Field-Induced Electronic Phase Transitions in Semimetals	Hiroshi Yaguchi	Tokyo University of Science
221	〃	仁野平　諒	東京理科大学	大学院理工学研究科	〃	Ryo Ninohira	Tokyo University of Science
222	ディラック電子系磁性体における角度依存量子振動と巨大磁気抵抗効果の測定	酒井　英明	大阪大学	大学院理学研究科	Observation of angle-dependent quantum oscillations and magnetoresistance in Dirac magnets	Hideaki Sakai	Osaka University
223	〃	鶴田　圭吾	大阪大学	大学院理学研究科	〃	Keigo Tsuruda	Osaka University
224	$PrPd_2Ge_2$ の強磁場下におけるメタ磁性の研究	本多　史憲	東北大学	金属材料研究所	Investigation of metamagnetism of $PrPd_2Ge_2$ under high magnetic field	Fuminori Honda	Tohoku University
225	〃	モーリヤ　アルビン	東北大学	金属材料研究所	〃	Maurya Arvind	Tohoku University

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226	サブメガガウス領域での希土類物性研究	海老原 孝雄	静岡大学	理学部	Physical property of rare earth compounds at pulse magnet	Ebihara Takao	Shizuoka University
227	〃	ジュマエダ ジャトミカ	静岡大学	大学院創造科学技術研究科	〃	Jumaeda Jatmika	Shizuoka University
228	ホイスラー合金 NiCoMnGa の強磁場誘起逆マルテンサイト変態に伴う磁気熱量効果測定	木原 工	東北大学	金属材料研究所	Direct measurement of magneto-caloric effects associated with magnetic-field-induced martensitic transformation in Heusler alloy NiCoMnGa	Takumi Kihara	Tohoku University
229	ブリージングパイロクロア格子をもつスピネル硫化物の強磁場磁化過程	岡本 佳比古	名古屋大学	大学院工学研究科	High Field Magnetization Measurements of Breathing Pyrochlore Sulfides	Yoshihiko Okamoto	Nagoya University
230	EuMnBi$_2$ の強磁場下偏光顕微鏡観察	増田 英俊	東京大学	大学院工学系研究科	Polarization microscopy of EuMnBi$_2$ under high magnetic field	Hidetoshi Masuda	The University of Tokyo
231	２次元有機超伝導体における磁場誘起超伝導状態の探索	井原 慶彦	北海道大学	大学院理学研究院	Study of field induced superconducting state in 2 dimensional organic superconductor	Yoshihiko Ihara	Hokkaido University
232	水素置換鉄系超伝導体の２つの超伝導相における上部臨界磁場	山浦 淳一	東京工業大学	元素戦略研究センター	Upper critical fields in two superconducting phases of hydrogen-substituted iron pnictides	Junichi Yamaura	Tokyo Institute of Technology
233	正四角台塔型反強磁性体の強磁場中電気分極測定	木村 健太	大阪大学	大学院基礎工学研究科	High-field electric polarization measurements of a square-cupola antiferromagnet	Kenta Kimura	Osaka University
234	Ge$_x$Fe$_{3-x}$O$_4$(0≤x≤1) における磁気ドメイン構造の観察	香取 浩子	東京農工大学	大学院工学研究院	Observation of magnetic domain structures in Ge$_x$Fe$_{3-x}$O$_4$(0≤x≤1)	Hiroko Katori	Tokyo University of Agriculture and Technology
235	〃	磯崎 勝哉	東京農工大学	大学院工学府	〃	Katsuya Isozaki	Tokyo University of Agriculture and Technology
236	強相関ウラン化合物 UTGe(T:Co,Rh,Ir) における磁場誘起相転移	芳賀 芳範	日本原子力研究開発機構	先端基礎研究センター	Field-induced phase transition in strongly correlated uranium compounds UTGe (T:Co,Rh,Ir)	Yoshinori Haga	Japan Atomic Energy Agency
237	〃	Jiri Pospisil	日本原子力研究開発機構	先端基礎研究センター	〃	Jiri Pospisil	Japan Atomic Energy Agency
担当所員：辛 埴							
238	遷移金属ダイカルコゲナイドの時間分解光電子分光	下志万 貴博	東京大学	工学部	Time-resolved photo-emission study on transition metal dichalcogenides	Takahiro Shimojima	The University of Tokyo
239	〃	三石 夏樹	東京大学	大学院工学系研究科	〃	Natsuki Mitsuishi	The University of Tokyo
240	磁性元素をインターカレートした遷移金属ダイカルコゲナイドにおけるスピン分極の観測	石坂 香子	東京大学	大学院工学系研究科	Investigation of spin polarization in intercalated transition-metal dichalcogenide	Kyoko Ishizaka	The University of Tokyo
241	〃	吉田 訓	東京大学	大学院工学系研究科	〃	Satoshi Yoshida	The University of Tokyo

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242	時間分解光電子分光による遷移金属ナノシートの局在状態の研究	吉田　鉄平	京都大学	大学院人間・環境学研究科	Time-resolved photoemission study of the localization behavior in transition metal nanosheets	Teppei Yoshida	Kyoto University
243	〃	大槻　太毅	京都大学	大学院人間・環境学研究科	〃	Ootsuki Daiki	Kyoto University
244	バルク敏感高分解能スピン分解光電子分光を用いた酸化物ハーフメタル強磁性体の本質的電子状態の研究	藤原　弘和	岡山大学	大学院自然科学研究科	Studies of intrinsic electronic states of half-metallic ferromagnet oxides by bulk-sensitive high-resolution spin-resolved photoemission spectroscopy	Hirokazu Fujiwara	Okayama University
245	理想的なワイル半金属の非平衡ダイナミクスの解明	木村　昭夫	広島大学	大学院理学研究科	Nonequilibrium electron dynamics of ideal Weyl semimetals	Akio Kimura	Hiroshima University
246	〃	吉川　智己	広島大学	大学院理学研究科	〃	Tomoki Yoshikawa	Hiroshima University
247	トポロジカル絶縁体表面ディラック粒子の温度励起パウリブロッキングと非平衡ダイナミクスの関係性の解明	角田　一樹	広島大学	大学院理学研究科	Unveiling the relationship between a Pauli blocking and nonequilibrium Dirac fermion dynamics in the p-type topological insulators	Kazuki Sumida	Hiroshima University
248	スピン分解角度分解光電子分光による $TaSi_2$ のスピン構造の研究	伊藤　孝寛	名古屋大学	シンクロトロン光研究センター	Spin-resolved angle-resolved photoemission study of spin texture of $TaSi_2$	Takahiro Ito	Nagoya University
249	時間反転対称性を破るワイル半金属の非平衡ダイナミクスの解明	陳　家華	広島大学	大学院理学研究科	Nonequilibrium electron dynamics of time-reversal breaking Weyl semimetals	Chen Jiahua	Hiroshima University
250	アルカリ吸着した黒リンに現れるディラック電子非平衡キャリアダイナミクス	ムニサ　ヌルママティ	広島大学	大学院理学研究科	Nonequilibrium Dirac fermion dynamics in alkari-metal adsorbed black phosphorus	Munisa Nurmamat	Hiroshima University
251	スピン分解角度分解光電子分光による $TaSi_2$ のスピン構造の研究	長崎　一也	名古屋大学	大学院工学研究科	Spin-resolved angle-resolved photoemission study of spin texture of $TaSi_2$	Kazuyuki Nagasaki	Nagoya University
252	理想的なワイル半金属のレーザースピン分解ARPES	木村　昭夫	広島大学	大学院理学研究科	Spin resolved laser ARPES study of ideal Weyl semimetals	Akio Kimura	Hiroshima University
253	〃	吉川　智己	広島大学	大学院理学研究科	〃	Tomoki Yoshikawa	Hiroshima University
254	超巨大磁気抵抗を示すトポロジカル物質のレーザースピン分解 ARPES	陳　家華	広島大学	大学院理学研究科	Spin resolved laser-ARPES of topological extreme magneto-resistance materials	Chen Joahua	Hiroshima University
255	トポロジカル絶縁体薄膜のレーザー励起角度光電子分光による表面状態の観察	黒田　眞司	筑波大学	数理物質系	Observation of surface state on thin films of topological insulator using laser photoemission spectroscopy	Shinji Kuroda	University of Tsukuba
256	〃	山口　智也	筑波大学	大学院数理物質科学研究科	〃	Tomonari Yamaguchi	University of Tsukuba
257	〃	大滝　祐輔	筑波大学	大学院数理物質科学研究科	〃	Yusuke Otaki	University of Tsukuba

担当所員：小林　洋平

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258	モードロックレーザーの開発	井手口　拓郎	東京大学	大学院理学系研究科	Development of mode-locked laser	Takuro Ideguchi	The University of Tokyo
259	超高速発光分光用ファイバーレーザーの試作	末元　徹	豊田理化学研究所		Development of a fiber laser for ultrafast luminescence spectroscopy	Tohru Suemoto	Toyota Physical and Chemical Research Institute
担当所員：板谷　治郎							
260	テラヘルツ分光装置を用いた酸化物磁性材料の研究	大越　慎一	東京大学	大学院理学系研究科	Study of magnetic oxide using terahertz spectroscopy	Ohkoshi Shinichi	The University of Tokyo
261	〃	生井　飛鳥	東京大学	大学院理学系研究科	〃	Asuka Namai	The University of Tokyo
262	〃	吉清　まりえ	東京大学	大学院理学系研究科	〃	Marie Yoshikiyo	The University of Tokyo
263	グラフェンナノ構造における時間分解コヒーレントフォノン分光	牧野　哲征	福井大学	学術研究院工学系部門	Time-resolved coherent phonon spectroscopy in graphene-based nanostructures	Takayuki Makino	University of Fukui
264	〃	伊藤　竜一	福井大学	大学院工学研究科	〃	Ryuichi Ito	University of Fukui
大阪大学 先端強磁場科学研究センター / Center for Advanced High Magnetic Field Science, Osaka University							
265	パルス磁場を用いたマルテンサイト変態のカイネティクスに関する研究	福田　隆	大阪大学	大学院工学研究科	A study on kinetics of martensitic transformations using pulsed magnetic field	Takashi Fukuda	Osaka University
266	三角スピンチューブの多周波電子スピン共鳴	真中　浩貴	鹿児島大学	学術研究院理工学域工学系	Multi-frequency electron spin resonance measurements on triangular spin tubes	Hirotaka Manaka	Kagoshima University
267	高出力テラヘルツ光源 (ジャイロトロン) を光源とする 高周波 ESR 分光 の研究	出原　敏孝	福井大学	遠赤外領域開発研究センター	Study on high frequency ESR spectroscopy using high power THz radiation sources - Gyrotrons	Toshitaka Idehara	University of Fukui
268	擬テトラヘドラル４配位構造を持つ２価コバルト単核単分子磁石のゼロ磁場分裂定数の決定	福田　貴光	大阪大学	大学院理学研究科	Determination of zero-field splitting parameters of a novel mononuclear divalent cobalt single molecule magnet having the pseudo-tetrahedral coordination geometry	Takamitsu Fukuda	Osaka University
269	パルス強磁場用極低温実験装置の開発	野口　悟	大阪府立大学	２１世紀科学研究機構	Development of the cryostat for pulsed high magnetic field	Satoru Noguchi	Osaka Prefecture University
270	〃	石打　翔馬	大阪府立大学	大学院工学研究科	〃	Shoma Ishiuchi	Osaka Prefecture University
271	多重極限環境下の電子スピン共鳴計測に用いる高出力ミリ波・サブミリ波伝送系の開発研究	光藤　誠太郎	福井大学	遠赤外領域開発研究センター	Development of high-power millimeter and submillimeter wave transmission system for electron spin resonance measurement under multiple extreme environment	Seitaro Mitsudo	University of Fukui
272	〃	藤井　裕	福井大学	遠赤外領域開発研究センター	〃	Yutaka Fujii	University of Fukui

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273	〃	石川　裕也	福井大学	大学院工学研究科	〃	Yuya Ishikawa	University of Fukui
274	双安定性を有する磁性体の強磁場効果	浅野　貴行	福井大学	学術研究院工学系部門	High-magnetic-field effect on magnetic materials with bistability	Takayuki Asano	University of Fukui
275	〃	横山　太紀	福井大学	大学院工学研究科	〃	Taiki Yokoyama	University of Fukui
276	ジャイロトロンを用いた圧力下強磁場 ESR 装置の開発	櫻井　敬博	神戸大学	研究基盤センター	Development of high pressure and high field ESR system using gyrotron	Takahiro Sakurai	Kobe University
277	カゴメ格子反強磁性体の強磁場磁化過程測定	吉田　紘行	北海道大学	大学院理学研究院	High-field magnetization measurements on kagome lattice antiferromagnets	Hiroyuki Yoshida	Hokkaido University
278	三角格子反強磁性体の強磁場磁化過程測定	吉田　紘行	北海道大学	大学院理学研究院	High-field magnetization measurements on triangular lattice antiferromagnets	Hiroyuki Yoshida	Hokkaido University
279	パルス強磁場を用いた高周波 ESR 測定による低次元磁性体のスピンネマチック相の研究	大久保　晋	神戸大学	分子フォトサイエンス研究センター	High-frequency ESR measurements of spin nematic phase of low-dimensional magnet using pulsed magnetic field	Susumu Okubo	Kobe University
280	フラストレーションが強い S=1 スピンダイマー系 $Ba_2NiSi_2O_6Cl_2$ の強磁場 ESR	田中　秀数	東京工業大学	大学院理学院	High-magnetic-field ESR in S=1 strongly frustrated dimerized quantum magnet $Ba_2NiSi_2O_6Cl_2$	Hidekazu Tanaka	Tokyo Institute of Technology
281	フラストレーションが完全なスピンダイマー系 $Ba_2CoSi_2O_6Cl_2$ の強磁場 ESR	田中　秀数	東京工業大学	大学院理学院	High-magnetic-field ESR in fully frustrated dimerized magnet $Ba_2CoSi_2O_2Cl_2$	Hidekazu Tanaka	Tokyo Institute of Technology
282	フタロシアニン系分子混晶における巨大磁気抵抗の局在スピン効果	花咲　徳亮	大阪大学	大学院理学研究科	Local moment effect on giant magnetoresistance in phthalocyanine mixed crystal	Noriaki Hanasaki	Osaka university
283	〃	石井　龍太	大阪大学	大学院理学研究科	〃	Ryuta Ishii	Osaka university
284	SmB_6 薄膜の強磁場中磁化輸送係数測定	宍戸　寛明	大阪府立大学	大学院工学研究科	Magnetization and transport measurements for SmB_6 thin films under high magnetic field	Hiroaki Shishido	Osaka Prefecture University
285	電荷分離型イオン性固体の磁性転換機構の解明	山田　美穂子	大阪大学	大学院理学研究科	Elucidation of the magnetic conversion mechanism of charge-separated-type ionic solids	Mihoko Yamada	Osaka University
286	パルス強磁場を用いた強相関電子系物質の強磁場物性の研究	竹内　徹也	大阪大学	低温センター	Physical properties of strongly correlated electron systems under pulsed high magnetic field	Tetsuya Takeuchi	Osaka University
287	〃	大貫　惇睦	琉球大学	理学部	〃	Yoshichika Onuki	University of the Ryukyus
288	$CaBaCo_4O_7$ 及び $CaBaFe_4O_7$ 単結晶試料の強磁場下での磁化・電気分極・ESR 測定	桑原　英樹	上智大学	理工学部	Magnetization, electric polarization, and ESR measurements for $CaBaCo_4O_7$ and $CaBaFe_4O_7$ single crystals in pulsed high magnetic fields.	Hideki Kuwahara	Sophia University
289	〃	小田　涼佑	上智大学	大学院理工学研究科	〃	Ryosuke Oda	Sophia University

No.	課題名	氏名	所属		Title	Name	Organization
290	単軸性キラル磁性体の磁気特性測定−磁気トルクと磁気共鳴測定−	戸川　欣彦	大阪府立大学	大学院工学研究科	Magnetic property of monoaxial chiral magnetic materials examined by means of magnetic torque and resonance measurements	Yoshihiko Togawa	Osaka Prefecture University
291	フラストレート系新物質の強磁場磁性	山口　博則	大阪府立大学	大学院理学系研究科	High-field magnetic properties of new frustrated materials	Hironori Yamaguchi	Osaka Prefecture University
292	$Sr(TiO)Cu_4(PO_4)_4$ の強磁場 ESR	木村　健太	大阪大学	大学院基礎工学研究科	High-field ESR study of $Sr(TiO)Cu_4(PO_4)_4$	Kenta Kimura	Osaka University
293	$GaFeO_3$ におけるスピン波の非相反性	有馬　孝尚	東京大学	大学院新領域創成科学研究科	Nonreciprocal spin waves in $GaFeO_3$	Takahisa Arima	The University of Tokyo
294	〃	阿部　伸行	東京大学	大学院新領域創成科学研究科	〃	Nobuyuki Abe	The University of Tokyo
295	〃	近江　毅志	東京大学	大学院新領域創成科学研究科	〃	Tsuyoshi Omi	The University of Tokyo
296	〃	木村　尚次郎	東北大学	金属材料研究所	〃	Shojiro Kimura	Tohoku University
297	高移動度半金属が示す量子輸送特性と巨大磁気抵抗効果の研究	村川　寛	大阪大学	大学院理学研究科	High magnetic field study of transport properties of ultra high mobility semimetals	Hiroshi Murakawa	Osaka University
298	酸化還元活性配位子を有するニオブ錯体を用いた炭素―ハロゲン結合の切断に関する研究	長江　春樹	大阪大学	大学院基礎工学研究科	C-X bond cleavage mediated by niobium complex bearing redox active ligand	Haruki Nagae	Osaka University

物質合成・評価設備 P クラス / Materials Synthesis and Characterization P Class Researcher

No.	課題名	氏名	所属		Title	Name	Organization
1	n 型半導体光触媒物質表面への p 型半導体膜の作製と評価	山田　太郎	東京大学	大学院工学系研究科	Fabrication and physical investigation of p-type semiconductive lm on n-type photocatalytic material surfaces	Taro Yamada	The University of Tokyo
2	〃	岩瀬　元希	明治大学	研究・知財戦略機構	〃	Motoki Iwase	Meiji University
3	〃	坂井　延寿	東京大学	大学院工学系研究科	〃	Enju Sakai	The University of Tokyo
4	幾何学的フラストレート系物質の単結晶育成と新奇物性の研究	松平　和之	九州工業大学	大学院工学研究院	Single crystal growth and study of novel phenomena of geometrically frustrated materials	Kazuyuki Matsuhira	Kyushu Institute of Technology
5	〃	安國　友貴	九州工業大学	大学院工学研究院	〃	Yuki Yasukuni	Kyushu Institute of Technology
6	電子が複合自由度を持つ遷移金属系物質の合成と物性評価	片山　尚幸	名古屋大学	大学院工学研究科	Growth of the transition metal compounds with charge, orbital and spin degrees of freedom	Naoyuki Katayama	Nagoya University

No.	課題名	氏名	所属		Title	Name	Organization
7	〃	田村　慎也	名古屋大学	大学院工学研究科	〃	Shinya　Tamura	Nagoya University

物質合成・評価設備 G クラス / Materials Synthesis and Characterization G Class Researcher

No.	課題名	氏名	所属		Title	Name	Organization
1	高温高圧水中における固体触媒の酸性質の定量	大島　義人	東京大学	大学院新領域創成科学研究科	Quantitative evaluation of solid catalysts' acidity in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
2	〃	井上　拓紀	東京大学	大学院新領域創成科学研究科	〃	Hiroki Inoue	The University of Tokyo
3	高温高圧水中の固体酸・塩基触媒反応の速度論的解析	大島　義人	東京大学	大学院新領域創成科学研究科	Kinetic analysis of solid acid and base catalyzed reactions in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
4	〃	秋月　信	東京大学	大学院新領域創成科学研究科	〃	Makoto Akizuki	The University of Tokyo
5	高圧高温水を反応場とした有機合成反応	大島　義人	東京大学	大学院新領域創成科学研究科	Organic synthesis in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
6	〃	伊藤 光基	東京大学	大学院新領域創成科学研究科	〃	Koki Ito	The University of Tokyo
7	固体酸触媒を利用した超臨界水中の Prins 反応に関する研究	大島　義人	東京大学	大学院新領域創成科学研究科	Research on Prins reactions using solid acid catalyst in supercritical water	Yoshito Oshima	The University of Tokyo
8	〃	単　しん	東京大学	大学院新領域創成科学研究科	〃	Shan Xin	The University of Tokyo
9	海洋生物の炭酸塩骨格を用いた古気候復元に関する研究	田中　健太郎	東京大学	大気海洋研究所	Study on paleoceanography using marine carbonate	Kentaro Tanaka	The University of Tokyo
10	泥岩が示す不完全な半透膜性に関する研究	徳永　朋祥	東京大学	大学院新領域創成科学研究科	Research of incomplete semipermeable properties of mudstones	Tomochika Tokunaga	The University of Tokyo
11	〃	廣田　翔伍	東京大学	大学院新領域創成科学研究科	〃	Shogo Hirota	The University of Tokyo
12	ケミカルループ法における高活性酸素キャリア複合粒子の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of oxygen carrier composite particles with high activity in chemical looping systems	Junichiro Otomo	The University of Tokyo
13	〃	味谷　和之	東京大学	大学院新領域創成科学研究科	〃	Miya Kazuyuki	The University of Tokyo
14	プロトン伝導性固体電解質を用いたアンモニア電解合成と速度論解析	大友　順一郎	東京大学	大学院新領域創成科学研究科	Electrochemical Synthesis of Ammonia using Proton Conducting Solid Electrolyte and its Kinetic Analysis	Junichiro Otomo	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
15	〃	中村　剛久	東京大学	大学院新領域創成科学研究科	〃	Takehisa Nakamura	The University of Tokyo
16	ケミカルループ法における酸素キャリア材料の劣化因子の解明及び長期安定性の評価	大友　順一郎	東京大学	大学院新領域創成科学研究科	Evaluation of degradation factor and development of oxygen carrier particle with long lifetime for chemical loop systems	Junichiro Otomo	The University of Tokyo
17	〃	斉藤　佑耶	東京大学	大学院新領域創成科学研究科	〃	Yuya Saito	The University of Tokyo
18	新規プロトン - 電子混合伝導体の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of proton-electron mixed conductor	Junichiro Otomo	The University of Tokyo
19	〃	小城　元	東京大学	大学院新領域創成科学研究科	〃	Kojo Gen	The University of Tokyo
20	プロトン伝導型 SOFC の新規セルデザインおよび性能評価	大友　順一郎	東京大学	大学院新領域創成科学研究科	Evaluation of new cell design and performance of proton conducting SOFC	Junichiro Otomo	The University of Tokyo
21	〃	橋本　隼輔	東京大学	大学院新領域創成科学研究科	〃	Hashimoto Shunsuke	The University of Tokyo
22	プロトン伝導性固体電解質を用いた電解合成反応における電極触媒開発と速度論的解析	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of electrode catalysts and kinetic analysis for electrolysis using proton conducting fuel cells	Junichiro Otomo	The University of Tokyo
23	〃	高坂　文彦	東京大学	大学院新領域創成科学研究科	〃	Fumihiko Kosaka	The University of Tokyo
24	ケミカルループ法における高活性かつ長期安定性に長けた酸素キャリア材料の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of oxygen carrier materials with high activity and high durability for chemical looping systems.	Junichiro Otomo	The University of Tokyo
25	〃	岡　輝	東京大学	大学院新領域創成科学研究科	〃	Hikaru Oka	The University of Tokyo
26	高温高圧水を反応場とした層状固体触媒反応	大島　義人	東京大学	大学院新領域創成科学研究科	Study of layered solid catalyzed reaction in sub- and supercritical water	Yoshito Oshima	The University of Tokyo
27	〃	佐々木　栞	東京大学	大学院新領域創成科学研究科	〃	Shiori Sasaki	The University of Tokyo
28	二酸化炭素と窒素の電気化学還元による燃料合成	大友　順一郎	東京大学	大学院新領域創成科学研究科	Electrochemical Reduction of Carbon Dioxide and Nitrogen for Producing Fuels	Junichiro Otomo	The University of Tokyo
29	〃	李　建毅	東京大学	大学院新領域創成科学研究科	〃	Li Chieni	The University of Tokyo
30	プロトン伝導型固体酸化物燃料電池の材料物性評価及びセル化技術の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Study on Material Properties and Fabrication Processes for Proton-conducting Type Solid Oxide Fuel cells	Junichiro Otomo	The University of Tokyo
31	〃	月村　玲菜	東京大学	大学院新領域創成科学研究科	〃	Reina Tsukimura	The University of Tokyo

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32	超臨界水中におけるゼオライトの安定性に関する研究	大島　義人	東京大学	大学院新領域創成科学研究科	The stability of zeolites in supercritical water condition	Yoshito Oshima	The University of Tokyo
33	〃	アピバンボリラク　チャンウィット	東京大学	大学院新領域創成科学研究科	〃	Apibanboriak Chanwit	The University of Tokyo
34	再生型燃料電池における水電解反応の電極反応評価	大友　順一郎	東京大学	大学院新領域創成科学研究科	Investigation of electrode reaction of steam electrolysis in reversible fuel cells	Junichiro Otomo	The University of Tokyo
35	〃	松岡　修平	東京大学	大学院新領域創成科学研究科	〃	Shuhei Mastuoka	The University of Tokyo
36	走査型顕微鏡 (SPM) を用いた固体酸化物形燃料電池微小電極の電気化学測定	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of electrochemical measurements of micro electrodes for Solid Oxide Fuel Cell by scanning probe microscope	Junichiro Otomo	The University of Tokyo
37	〃	岡村　晋太郎	東京大学	大学院新領域創成科学研究科	〃	Shintaro Okamura	The University of Tokyo
38	ペロブスカイト型酸化物を用いたケミカルルーピングシステムの開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Preparation of perovskite oxides as supports for MeO (Me: Cu, Ni) oxygen carrier materials for chemical looping systems	Junichiro Otomo	The University of Tokyo
39	〃	オーチェン　ジェームズ　オーチェン	東京大学	大学院新領域創成科学研究科	〃	Ochieng James Ochieng	The University of Tokyo
40	生体鉱物の結晶化と組織化を支配する要因の解明	甕　聡子	東京大学	大気海洋研究所	The study clarifying factors associated with crystallization and/or organization in the process forming biominerals	Motai Satoko	The University of Tokyo
41	六方晶鉄酸化物の化学組成と磁気異方性	植田　浩明	京都大学	大学院理学研究科	Chemical composition and magnetic anisotropy of hexagonal ferrites	Hiroaki Ueda	Kyoto University
42	〃	後藤　真人	京都大学	大学院理学研究科	〃	Masato Goto	Kyoto University
43	〃	谷奥　泰明	京都大学	大学院理学研究科	〃	Yasuaki Tanioku	Kyoto University
44	超臨界水を反応場とした酸化物ナノ粒子の合成	大島　義人	東京大学	大学院新領域創成科学研究科	Synthesis of oxide nanoparticles using supercritical water as a reaction medium	Yoshito Oshima	The University of Tokyo
45	〃	横　哲	東京大学	大学院新領域創成科学研究科	〃	Akira Yoko	The University of Tokyo
46	アンモニア電気化学的合成反応における新規電極触媒開発と速度論解析	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of electro-catalysts and kinetic analysis for electrochemical synthesis of ammonia	Junichiro Otomo	The University of Tokyo
47	〃	及川　暁雄	東京大学	大学院新領域創成科学研究科	〃	Akio Oikawa	The University of Tokyo
48	超臨界水熱合成を利用した微粒子の in situ 有機修飾技術の開発	大島　義人	東京大学	大学院新領域創成科学研究科	The development of the in situ organic surface modification technology on nanoparticles under supercritical hydrothermal synthesis	Yoshito Oshima	The University of Tokyo

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49	〃	原田　拓真	東京大学	大学院新領域創成科学研究科	〃	Harada Takuma	The University of Tokyo
50	超臨界水熱合成による担持金属酸化物微粒子の合成	大島　義人	東京大学	大学院新領域創成科学研究科	Synthesis of metal oxide particles on the surface of supports using supercritical water	Yoshito Oshima	The University of Tokyo
51	〃	李　夢亭	東京大学	大学院新領域創成科学研究科	〃	li mengting	The University of Tokyo
52	メソポーラスマテリアル・グラフェンオキサイドに担持した金属触媒のキャラクタリゼーション	佐々木　岳彦	東京大学	大学院新領域創成科学研究科	Characterization of metal catalysts supported on mesoporous materials and graphene oxide	Takehiko Sasaki	The University of Tokyo
53	〃	Etty Nurlia Kusumawati	東京大学	大学院理学系研究科	〃	Etty Nurlia Kusumawati	The University of Tokyo
54	スピン・電荷・軌道の自由度をもつ遷移金属化合物の物性評価	小林　慎太郎	名古屋大学	大学院工学研究科	Characterization of transition metal compounds with spin, charge, and orbital degrees of freedom	Shintaro Kobayashi	Nagoya University
55	正 20 面体クラスター固体の伝導と磁性	木村　薫	東京大学	大学院新領域創成科学研究科	Transport and magnetic properties of Icosahedral Cluster Solids	Kaoru Kimura	The University of Tokyo
56	〃	廣戸　孝信	東京大学	大学院新領域創成科学研究科	〃	Takanobu Hiroto	The University of Tokyo
57	触媒反応の insitu ラマン散乱測定	佐々木　岳彦	東京大学	大学院新領域創成科学研究科	in situ measurement of Raman scattering for heterogeneous catalytic reactions	Takehiko Sasaki	The University of Tokyo
58	〃	板子　健太郎	東京大学	大学院新領域創成科学研究科	〃	kentaro Itako	The University of Tokyo
59	層状バナジウム酸水素化物における圧力効果	山本　隆文	京都大学	大学院工学研究科	Pressure Effect on Layered Vanadium Oxyhydrides	Takafumi Yamamoto	Kyoto University
60	〃	竹入　史隆	京都大学	大学院工学研究科	〃	Fumitaka Takeiri	Kyoto University
61	〃	村上　泰斗	京都大学	大学院工学研究科	〃	Taito Murakami	Kyoto University
62	〃	松本　勇輝	京都大学	大学院工学研究科	〃	Matsumoto Yuki	Kyoto University
63	イッテルビウムを充填したスクッテルダイト型熱電材料の高圧合成	関根　ちひろ	室蘭工業大学	大学院工学研究科	High-pressure synthesis of Yb-filled skutterudite-type thermoelectric materials	Chihiro Sekine	Muroran Institute of Technology
64	〃	住岡　和也	室蘭工業大学	大学院工学研究科	〃	Kazuya Sumioka	Muroran Institute of Technology
65	超高圧プレスを用いた新規プロトニクス酸化物のソフト化学的合成法の検討	山口　周	東京大学	大学院工学系研究科	Oxide-Protonics materials synthesis by combined use of soft chemical method and high pressure	Shu Yamaguchi	The University of Tokyo

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66	〃	田中　和彦	東京大学	大学院工学系研究科	〃	Kazuhiko Tanaka	The University of Tokyo
67	〃	本多　慶一郎	東京大学	大学院工学系研究科	〃	Keiichiro Honda	The University of Tokyo
68	溶融亜鉛メッキ合金相の応力誘起変態	山口　周	東京大学	大学院工学系研究科	Stress-induced phase transformation of Fe-Zn alloy formed in hot-dip process	Shu Yamaguchi	The University of Tokyo
69	〃	田中　和彦	東京大学	大学院工学系研究科	〃	Kazuhiko Tanaka	The University of Tokyo
70	高圧下での $MoSi_2$ 型構造の $FeAl_2$ 結晶の作製	木村　薫	東京大学	大学院新領域創成科学研究科	High pressure synthesis of $MoSi_2$ type iron aluminide, $FeAl_2$ crystal	Kaoru Kimura	The University of Tokyo
71	〃	飛田 一樹	東京大学	大学院新領域創成科学研究科	〃	Kazuki Tobita	The University of Tokyo
72	高圧印加による Li ドープ α 菱面体晶ボロンの作製	木村　薫	東京大学	大学院新領域創成科学研究科	Synthesis of Li-dope alpha-rhombohedral boron by high-pressurization	Kaoru Kimura	The University of Tokyo
73	〃	張　禎桓	東京大学	大学院新領域創成科学研究科	〃	Jang Jeonghwan	The University of Tokyo
74	一次元トンネル構造を持つナトリウム遷移金属酸化物の合成	廣瀬　瑛一	名古屋大学	大学院工学研究科	Synthesis of sodium transition metal oxides having a one-dimensional tunnel structure	Eiichi Hirose	Nagoya University
75	超硬質遷移金属多窒化物の高圧合成	丹羽　健	名古屋大学	大学院工学研究科	Ultra-high pressure synthesis of superhard transition metal nitrides	Ken Niwa	Nagoya University
76	〃	高山　新	名古屋大学	大学院工学研究科	〃	Shin Takayama	Nagoya University
77	新規ペロブスカイト型遷移金属窒化物の超高圧合成と結晶化学	丹羽　健	名古屋大学	大学院工学研究科	High pressure synthesis and crystal chemistry of perovskite-type transition metal nitrides	Ken Niwa	Nagoya University
78	〃	山田　祥吾	名古屋大学	大学院工学研究科	〃	Shogo Yamada	Nagoya University
79	フタラジンの圧力誘起重合反応	篠崎　彩子	北海道大学	大学院理学研究院	Pressure-induced oligomerization of phthalazine	Ayako Shinozaki	Hokkaido University
80	アラニンの高圧下におけるペプチド化反応の観察	藤本　千賀子	東京大学	大学院理学系研究科	Peptide formation of alanine under high pressure	Chikako Fujimoto	The University of Tokyo
81	天然鉱物の微細組織と結晶性の実態	永嶌　真理子	山口大学	大学院創成科学研究科	Evaluation of micro-texture and crystallinity of natural minerals	Mariko Nagashima	Yamaguchi University
82	ナノ材料を用いた二次電池材料開発	細野　英司	産業技術総合研究所	省エネルギー研究部門	Development of secondary battery materials by using nano-materials	Eiji Hosono	National Institute of Advanced Industrial Science and Technology

No.	課題名	氏名	所属		Title	Name	Organization
83	ナノ構造制御した二次電池材料の作製	牧之瀬　佑旗	産業技術総合研究所	省エネルギー研究部門	Synthesis of secondary battery materials having controlled nanostrucutre	Yuki Makinose	National Institute of Advanced Industrial Science and Technology
84	新規磁石材料の微細構造解析	齋藤　哲治	千葉工業大学	工学部	Microstructural studies of new permanent magnet materials	Tetsuji Saito	Chiba Institute of Technology
85	アーク加熱風洞を用いた宇宙往還機の熱防御システム (TPS) の動的酸化に関する研究	桃沢　愛	東京都市大学	工学部	Dynamic oxidation of thermal protection system using arc-heater	Ai Momozawa	Tokyo City University
86	〃	佐野　宗一郎	東京大学	大学院工学系研究科	〃	Soichiro Sano	The University of Tokyo
87	〃	曽我　遼太	東京大学	大学院工学系研究科	〃	Ryota Soga	The University of Tokyo
88	準結晶・近似結晶の磁性に関する研究	田村　隆治	東京理科大学	大学院基礎工学研究科	Magnetism of quasicrystals and approximants	Ryuji Tamura	Tokyo University of Science
89	〃	石川　明日香	東京理科大学	大学院基礎工学研究科	〃	Asuka Ishikawa	Tokyo University of Science
90	$A_{1-x}Sr_xFeO_3$ (A：ランタノイド) の高温における磁性と熱電特性に関する研究	中津川　博	横浜国立大学	大学院工学研究院	Magnetism and thermoelectric properties at high temperature in $A_{1-x}Sr_xFeO_3$(A：lanthanoid)	Hiroshi Nakatsugawa	Yokohama National University
91	重元素の 5d 電子系における新超伝導体の探索	岡本　佳比古	名古屋大学	大学院工学研究科	Novel superconducting 5d-electron system with heavy transition metal elements	Yoshihiko Okamoto	Nagoya University
92	Ruddlesden popper 型酸フッ化物ペロブスカイト $Pb_3Fe_2O_5F_2$ における高温磁気転移の解明	岡　研吾	中央大学	理工学部	Investigation of the magnetic property of Ruddlesden popper type perovskite oxyfluoride, $Pb_3Fe_2O_5F_2$, at high-temperature	Kengo Oka	Chuo University
93	ハーフメタル型ホイスラー合金の磁性と輸送特性に関する研究	重田 出	鹿児島大学	大学院理工学研究科	Study on the magnetic and transport properties of half-metallic Heusler alloys	Iduru Shigeta	Kagoshima University
94	〃	大岡　隆太郎	鹿児島大学	大学院理工学研究科	〃	Ryutaro Ooka	Kagoshima University
95	ホイスラー型化合物の磁性と伝導の研究	廣井　政彦	鹿児島大学	大学院理工学研究科	Study on the magnetic and electrical properties of Heusler compounds	Masahiko Hiroi	Kagoshima University
96	新規ジントル相の超高圧合成と結晶化学および物性	長谷川　正	名古屋大学	大学院工学研究科	High pressure synthesis, crystal chemistry and physical properties of novel Zintl phases	Masashi Hasegawa	Nagoya University
97	〃	濱口　朋之	名古屋大学	大学院工学研究科	〃	Hamaguchi Tomoyuki	Nagoya University
98	新規水素化物の超高圧合成と結晶化学	長谷川　正	名古屋大学	大学院工学研究科	High pressure synthesis, crystal chemistry of novel hydrides	Masashi Hasegawa	Nagoya University
99	〃	深井 俊史	名古屋大学	大学院工学研究科	〃	Fukai Toshifumi	Nagoya University

No.	課題名	氏名	所属		Title	Name	Organization
100	高周波磁気共鳴を有する単結晶希土類オルソフェライトのテラヘルツ波分光	中嶋　誠	大阪大学	レーザーエネルギー学研究センター	Terahertz spectroscopy for single crystal of rare-earth orthoferrite with high frequency magnetic resonance	Makoto Nakajima	Osaka University
101	〃	加藤　康作	大阪大学	レーザーエネルギー学研究センター	〃	Kosaku Kato	Osaka University
102	〃	邱　紅松	大阪大学	レーザーエネルギー学研究センター	〃	Hongsong Qiu	Osaka University
103	〃	弘田　和將	大阪大学	レーザーエネルギー学研究センター	〃	Kazumasa Hirota	Osaka University
104	新規フェロイック物質の開発	有馬　孝尚	東京大学	大学院新領域創成科学研究科	Exploration of new ferroics	Takahisa Arima	The University of Tokyo
105	〃	徳永　祐介	東京大学	大学院新領域創成科学研究科	〃	Yusuke Tokunaga	The University of Tokyo
106	〃	阿部　伸行	東京大学	大学院新領域創成科学研究科	〃	Nobuyuki Abe	The University of Tokyo
107	〃	豊田　新悟	東京大学	大学院新領域創成科学研究科	〃	Shingo Toyoda	The University of Tokyo
108	〃	松浦　慧介	東京大学	大学院新領域創成科学研究科	〃	Keisuke Matsuura	The University of Tokyo
109	〃	藤間　友理	東京大学	大学院新領域創成科学研究科	〃	Yuri Fujima	The University of Tokyo
110	〃	近江　毅志	東京大学	大学院新領域創成科学研究科	〃	Tsuyoshi Omi	The University of Tokyo
111	〃	中川　直己	東京大学	大学院新領域創成科学研究科	〃	Naoki Nakagawa	The University of Tokyo
112	〃	小池　仁希	東京大学	大学院新領域創成科学研究科	〃	Yoshiki Koike	The University of Tokyo
113	〃	荒木　勇介	東京大学	大学院新領域創成科学研究科	〃	Yusuke Araki	The University of Tokyo
114	〃	徳村　謙祐	東京大学	大学院新領域創成科学研究科	〃	Kensuke Tokumura	The University of Tokyo
115	Cu－Ni－X（X=Co,Fe）系単結晶性合金中の磁性微粒子析出過程と磁気特性の関係	竹田　真帆人	横浜国立大学	大学院工学研究院	Precipitation behavior and magnetic properties of fine magnetic particles in single Crystals of Cu - Ni base alloys	Mahoto Takeda	Yokohama National University
116	〃	坂倉　響	横浜国立大学	大学院工学府	〃	Hibiki Sakakura	Yokohama National University

No.	課題名	氏名	所属		Title	Name	Organization
117	Cu－Ni－X（X=Co,Fe）系単結晶性合金中の磁性微粒子析出過程と磁気特性の関係	金　俊燮	横浜国立大学	大学院工学研究院	Precipitation behavior and magnetic properties of fine magnetic particles in single Crystals of Cu - Ni base alloys	Kim Junseop	Yokohama National University

物質合成・評価設備 U クラス / Materials Synthesis and Characterization U Class Researcher

No.	課題名	氏名	所属		Title	Name	Organization
1	異常原子価ビスマス正方格子を持つ層状酸化物の構造相転移の探索	清　良輔	東北大学	大学院理学研究科	Exploration of structural phase transition in layered oxide with unusual valence Bi square net	Ryosuke Sei	The University of Tokyo
2	超臨界水中における L- システインおよびタウリンの分解挙動に関する検討	布浦　鉄兵	東京大学	環境安全研究センター	Degradation behavior of L-cysteine and taurine in supercritical water	Teppei Nunoura	The University of Tokyo
3	〃	鈴木　萌	東京大学	大学院新領域創成科学研究科	〃	Moe Suzuki	The University of Tokyo
4	イリジウム酸化物薄膜の構造評価	平岡　奈緒香	東京大学	大学院理学系研究科	Evaluation of structure of iridate thin films	Naoka Hiraoka	The University of Tokyo
5	〃	根岸　真通	東京大学	大学院理学系研究科	〃	Masamichi Negishi	The University of Tokyo
6	精密比熱測定装置のアデンダ用微小ファイバーの作製	水上　雄太	東京大学	大学院新領域創成科学研究科	Fabrication of fibers for addenda of specific heat measurement system	Yuta Mizukami	The University of Tokyo
7	銅酸化物高温超伝導体及び鉄カルコゲナイド超伝導体における X 線回折	芝内　孝禎	東京大学	大学院新領域創成科学研究科	X-ray diffraction on cuprates and iron-chalcogenide superconductors	Takasada Shibauchi	The University of Tokyo
8	〃	水上　雄太	東京大学	大学院新領域創成科学研究科	〃	Yuta Mizukami	The University of Tokyo
9	〃	細井　優	東京大学	大学院新領域創成科学研究科	〃	Suguru Hosoi	The University of Tokyo
10	〃	石田　浩祐	東京大学	大学院新領域創成科学研究科	〃	Kousuke Ishida	The University of Tokyo
11	ポリアニリンとブロック共重合体からなるナノコンポジット材料の自己組織化構造の解明	前田　利菜	東京大学	大学院新領域創成科学研究科	Study on the self-assembled structure in polyaniline/block copolymer nanocomposite	Rina Maeda	The University of Tokyo
12	ポリロタキサンが構築する自己組織化構造	前田　利菜	東京大学	大学院新領域創成科学研究科	Self-assembled structure of polyrotaxane	Rina Maeda	The University of Tokyo
13	Andalusite 構造を持つ $(Al,Fe)_2GeO_5$ を中心としたスピングラス磁性体の磁化測定	太田　寛人	東京農工大学	大学院工学研究院	Magnetization measurements of spin glass compounds including Andalusite-type compounds $(Al,Fe)_2GeO_5$	Hiroto Ohta	Tokyo University of Agriculture and Technology
14	〃	高田　早紀	東京農工大学	大学院工学府	〃	Saki Takada	Tokyo University of Agriculture and Technology

No.	課題名	氏名	所属		Title	Name	Organization
15	ブリッジマン法による遍歴らせん磁性体 MnP の大型単結晶育成	小野瀬　佳文	東京大学	大学院総合文化研究科	Large crystal growth of itinerant helical magnet MnP by means of Bidgman method	Yoshinori Onose	The University of Tokyo
16	〃	新居　陽一	東京大学	大学院総合文化研究科	〃	Yoichi Nii	The University of Tokyo
17	〃	蒋　男	東京大学	大学院総合文化研究科	〃	Jiang Nan	The University of Tokyo
18	水中プラズマを用いたナノ粒子合成	後藤　拓	東京大学	大学院新領域創成科学研究科	Synthesis of nanoparticles via plasma processing in liquid	Taku Goto	The University of Tokyo
19	ケミカルループ法における高性能酸素キャリア材料の開発	大友　順一郎	東京大学	大学院新領域創成科学研究科	Development of oxygen carrier materials with high activity and durability for chemical looping systems	Junichiro Otomo	The University of Tokyo
20	〃	マーチン ケラー	東京大学	大学院新領域創成科学研究科	〃	Martin Keller	The University of Tokyo
21	鉄系超伝導体 Fe(Se,S) における磁化測定	水上　雄太	東京大学	大学院新領域創成科学研究科	Magnetization measurements on iron-based superconductors Fe(Se,S)	Yuta Mizukam	The University of Tokyo

平成 28 年度　中性子科学研究施設　共同利用課題一覧 / Joint Research List of Neutron Scattering Researcher 2016

No.	課題名	氏名	所属		Title	Name	Organization
・申請装置 4G: GPTAS							
1	GPTAS（汎用 3 軸中性子分光器）IRT 課題	佐藤　卓	東北大学	多元物質科学研究所	IRT project of GPTAS	Taku J Sato	Tohoku University
2	素励起に対する反転対称性の破れの影響	佐藤　卓	東北大学	多元物質科学研究所	Effect of non-centrosymmetricity to dispersions of elementary excitations	Taku J Sato	Tohoku University
3	s = 1/2 三角格子反強磁性体 $LiZn_2Mo_3O_8$ の磁気励起	佐藤　卓	東北大学	多元物質科学研究所	Spin excitations in the s = 1/2 triangular lattice compound $LiZn_2Mo_3O_8$	Taku J Sato	Tohoku University
4	酸化物磁性体 $Ba_2Zn_2Fe_{12}O_{22}$ および $BaFe_{12}O_{19}$ の超交換相互作用	内海　重宜	諏訪東京理科大学	工学部機械工学科	Superexchange interaction of magnetic oxides $Ba_2Zn_2Fe_{12}O_{22}$ and $BaFe_{12}O_{19}$	Shigenori Utsumi	Tokyo University of Science, Suwa
5	強磁性超伝導体における磁性と超伝導の研究	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	A study of magnetic state in ferromagnetic superconductors.	Hazuki Furukawa	Ochanomizu University
6	Sr_2Ruo4 の非弾性散乱	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	Inelastic neutron scattering experiments on Sr_2RuO_4	Hazuki Furukawa	Ochanomizu University
7	$CeRhIn_5$ の圧力下中性子回折実験による磁性と超伝導の相関の研究	小林　理気	琉球大学	理学部	Neutron Diffraction Study on $CeRhIn_5$ under Pressure	Riki Kobayashi	University of the Ryukyus
8	一軸応力により誘起する遍歴強磁性量子相転移の研究	清水　悠晴	東京大学	物性研究所	Study of Itinerant Ferromagnetic Quantum Phase Transition Induced by Uniaxial Stress	Yusei Shimizu	The University of Tokyo
9	$EuCo_2P_2$ の磁気構造解析	藤原　哲也	山口大学	大学院理工学研究科	Magnetic structure analysis of $EuCo_2P_2$	Tetsuya Fujiwara	Yamaguchi University
10	$EuRu_2P_2$ の磁気構造解析	藤原　哲也	山口大学	大学院理工学研究科	Magnetic structure analysis of $EuRu_2P_2$	Tetsuya Fujiwara	Yamaguchi University
11	強誘電体の相転移機構（変位型及び秩序−無秩序型）に関する統一的理解の確立	重松　宏武	山口大学	教育学部	Establishment of the unified explanation about the phase transition mechanism (displacive and orderdisorder type) in Ferroelectrics	Hirotake Shigematsu	Yamaguchi University
12	スピンアイスにおけるトポロジカル相転移	門脇　広明	首都大学東京	理工学研究科物理学専攻	Topological phase transition in spin ice	Hiroaki Kadowaki	Tokyo Metoropolitan University
13	時間分割中性子散乱測定による磁気構造変化過程の実時間追跡	元屋　清一郎	東京理科大学	理工学部物理学科	Real-time observation of magnetic structural change by means of time-resolved neutron scattering experiments	Kiyoichiro Motoya	Tokyo University of Science
14	Chiral magnetic structure determination in non-centrosymmetric $Pr_5Ru_3Al_2$	奥山　大輔	東北大学	多元物質科学研究所	Chiral magnetic structure determination in non-centrosymmetric $Pr_5Ru_3Al_2$	Daisuke Okuyama	Tohoku University
15	新規構造鉄系超伝導体 $CaKFe_4As_4$ における磁気励起	飯田　一樹	総合科学研究機構	研究開発部	Magnetic excitations in a new-structure-type Fe-based superconducting material $CaKFe_4As_4$	Kazuki Iida	CROSS

No.	課題名	氏名	所属		Title	Name	Organization
・申請装置 5G: PONTA							
16	PONTA（高性能偏極中性子散乱装置）IRT 課題	益田　隆嗣	東京大学	物性研究所	IRT project of PONTA	Takatsugu Masuda	The University of Tokyo
17	２次元正方格子系 $K_2MeV_2O_7$(Me=Co and Mn) の磁気構造	左右田　稔	東京大学	物性研究所	Magnetic Structure in $K_2MeV_2O_7$(Me=Co and Mn)	Minoru Soda	The University of Tokyo
18	$SmRu_4P_{12}$ における磁場誘起電荷秩序状態の観測	松村　武	広島大学	大学院先端物質科学研究科	Field induced charge order in $SmRu_4P_{12}$	Takeshi Matsumura	Hiroshima University
19	一次元フラストレート鎖物質 $NaCuMoO_4(OH)$ のスピン密度波	浅井　晋一郎	東京大学	物性研究所	Spin-density-wave of 1D frustrated chain compound $NaCuMoO_4(OH)$	Shinichiro Asai	The University of Tokyo
20	分子性量子磁性体における磁気秩序の中性子散乱研究	浅井　晋一郎	東京大学	物性研究所	Neutron Scattering for Magnetically Ordered State in Molecular Quantum Magnet	Shinichiro Asai	The University of Tokyo
21	偏極中性子散乱による $LaCo_{0.8}Rh_{0.2}O_3$ の新奇な強磁性磁気秩序の研究	浅井　晋一郎	東京大学	物性研究所	Polarized neutron diffraction study on a novel type of ferromagnetic order in $LaCo_{0.8}Rh_{0.2}O_3$	Shinichiro Asai	The University of Tokyo
22	一軸応力により誘起する遍歴強磁性量子相転移の研究	清水　悠晴	東京大学	物性研究所	Study of Itinerant Ferromagnetic Quantum Phase Transition Induced by Uniaxial Stress	Yusei Shimizu	The University of Tokyo
23	マルチフェロイック物質 $Ba_2MnGe_2O_7$ の磁気モーメントの電場制御	益田　隆嗣	東京大学	物性研究所	Electrical control of magnetic moment on multiferroics $Ba_2MnGe_2O_7$	Takatsugu Masuda	The University of Tokyo
24	$CsFeCl_3$ の圧力誘起磁気秩序相における磁気構造解析	益田　隆嗣	東京大学	物性研究所	Magnetic structure of pressure-induced ordered state in $CsFeCl_3$	Takatsugu Masuda	The University of Tokyo
25	URu_2Si_2 の隠れた秩序に伴う多重極秩序の直接観測	高阪　勇輔	広島大学	大学院理学研究科	Direct Observation of the "Hidden Order" due to Multipole Ordering in URu_2Si_2	Yusuke Kousaka	Hiroshima University
26	カイラル磁性体 $CsCuCl_3$ のカイラルらせん磁気構造の検出	高阪　勇輔	広島大学	大学院理学研究科	Chiral Helimagnetic Structure in Chiral Inorganic Compound $CsCuCl_3$	Yusuke Kousaka	Hiroshima University
27	鉄系超伝導体のスピンレゾナンスのスピン空間異方性	李　哲虎	産業技術総合研究所	省エネルギー研究部門	Spin space anisotropic of spin resonance in iron-based superconductors	Chul-Ho Lee	National Institute of Advanced Industrial Science and Technology
28	磁場中の中性子回折を利用した $Cu_3(P_2O_6OD)_2$ の基底状態の研究	長谷　正司	物質・材料研究機構	中性子散乱グループ	The investigation on the ground state of $Cu_3(P_2O_6OD)_2$ using neutron diffraction in magnetic fields	Masashi Hase	National Institute for Materials Science
29	時間分割中性子散乱測定による磁気構造変化過程の実時間追跡	元屋　清一郎	東京理科大学	理工学部　物理学科	Real-time observation of magnetic structural change by means of time-resolved neutron scattering experiments	Kiyoichiro Motoya	Tokyo University of Science
30	カゴメ・三角格子を持つ $LuBaCo_4O_7$ の磁気散漫散乱	左右田　稔	東京大学	物性研究所	Magnetic Diffuse Scattering of $LuBaCo_4O_7$ with kagome and triangular lattices	Minoru Soda	The University of Tokyo
31	吸着酸素磁性の磁気励起	益田　隆嗣	東京大学	物性研究所	Magnetic excitation in Oxygen molecule adsorbed in nanoporous metal complex	Takatsugu Masuda	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
32	偏極中性子回折による鉄過剰育成した $YbFe_2+xO_4$ の磁気相関の研究	加倉井　和久	一般財団法人総合科学研究機構	中性子科学センター (CROSS 東海)	Polarized neutron diffraction investigation of magnetic correlations in Fe excess grown $YbFe_2+xO_4$	Kazuhisa Kakurai	CROSS-Tokai
・申請装置 6G: TOPAN							
33	TOPAN（東北大理：３軸型偏極中性子分光器）IRT 課題	岩佐　和晃	東北大学	大学院理学研究科	IRT project of TOPAN (Tohoku Univ. Triple-Axis Polarized Neutron Spectrometer)	Kazuaki Iwasa	Tohoku University
34	質量勾配をもつ非一様系での偏在的原子振動モードであるグレードンの検証	岩佐　和晃	東北大学	大学院理学研究科	Gradon as a localized atomic motion in mass-graded inhomogeneous systems	Kazuaki Iwasa	Tohoku University
35	全対称型多極子秩序による金属–非金属転移に対する磁気不純物効果	岩佐　和晃	東北大学	大学院理学研究科	Magnetic Impurity Effect on the Metal-Nonmetal Transition Associated with Totally-Symmetric Electron Multipole Ordering	Kazuaki Iwasa	Tohoku University
36	$Ce_3T_4Sn_{13}$ (T = Co, Rh) におけるカイラルフェルミオンの磁気励起	岩佐　和晃	東北大学	大学院理学研究科	Magnetic excitations of chiral fermions in $Ce_3T_4Sn_{13}$ (T = Co, Rh)	Kazuaki Iwasa	Tohoku University
37	PrT_2X_{20} (T = Ru, Rh, Os, Ir, X = Al, Zn) における２チャンネル近藤効果	岩佐　和晃	東北大学	大学院理学研究科	Two-channel Kondo effect in PrT_2X_{20} (T = Ru, Rh, Os, Ir, X = Al, Zn)	Kazuaki Iwasa	Tohoku University
38	$SmRu_4P_{12}$ における磁場誘起電荷秩序状態の観測	松村　武	広島大学	大学院先端物質科学研究科	Field induced charge order in $SmRu_4P_{12}$	Takeshi Matsumura	Hiroshima University
39	新規 T' 構造ホールドープ銅酸化物 $Pr_{2-x}Ca_xCuO_4$ における磁気相関の研究	藤田　全基	東北大学	金属材料研究所	Study of spin correlations in novel T'-structured cuprate oxide $Pr_{2-x}Ca_xCuO_4$	Masaki Fujita	Tohoku University
40	高精度測定による Fe-LSCO の異方的磁気秩序ピークの起源の研究	藤田　全基	東北大学	金属材料研究所	Origin of anisotropic magnetic peak in Fe-LSCO studied by high resolution neutron-scattering measurement	Masaki Fujita	Tohoku University
・申請装置 C1-1: HER							
41	HER (高エネルギー分解能３軸型中性子分光器) IRT 課題	益田　隆嗣	東京大学	物性研究所	IRT project of HER	Takatsugu Masuda	The University of Tokyo
42	Low energy spin wave excitations of the long periodic modulation in $CaBaCo_2Fe_2O_7$	レイム　ヨハネス	東北大学	IMRAM	Low energy spin wave excitations of the long periodic modulation in $CaBaCo_2Fe_2O_7$	Johannes Reim	Tohoku University
43	素励起に対する反転対称性の破れの影響	佐藤　卓	東北大学	多元物質科学研究所	Effect of non-centrosymmetricity to dispersions of elementary excitations	Taku J Sato	Tohoku University
44	s = 1/2 三角格子反強磁性体 $LiZn_2Mo_3O_8$ の磁気励起	佐藤　卓	東北大学	多元物質科学研究所	Spin excitations in the s = 1/2 triangular lattice compound $LiZn_2Mo_3O_8$	Taku J Sato	Tohoku University
45	鉄系梯子型物質 $BaFe_2Se_3$ の磁気揺動	南部　雄亮	東北大学	金属材料研究所	Spin dynamics of the iron-based ladder compound $BaFe_2Se_3$	Yusuke Nambu	Tohoku University
46	全対称型多極子秩序による金属–非金属転移に対する磁気不純物効果	岩佐　和晃	東北大学	大学院理学研究科	Magnetic Impurity Effect on the Metal-Nonmetal Transition Associated with Totally-Symmetric Electron Multipole Ordering	Kazuaki Iwasa	Tohoku University

No.	課題名	氏名	所属		Title	Name	Organization
47	$Ce_3T_4Sn_{13}$ (T = Co, Rh) におけるカイラルフェルミオンの磁気励起	岩佐　和晃	東北大学	大学院理学研究科	Magnetic excitations of chiral fermions in $Ce_3T_4Sn_{13}$ (T = Co, Rh)	Kazuaki Iwasa	Tohoku University
48	PrT_2X_{20} (T = Ru, Rh, Os, Ir, X = Al, Zn) における２チャンネル近藤効果	岩佐　和晃	東北大学	大学院理学研究科	Two-channel Kondo effect in PrT_2X_{20} (T = Ru, Rh, Os, Ir, X = Al, Zn)	Kazuaki Iwasa	Tohoku University
49	$DyFe_2Zn_{20}$ における磁気異方性増強を伴う逐次磁気相転移	岩佐　和晃	東北大学	大学院理学研究科	Successive magnetic phase transition with enhancement in magnetic anisotropy of $DyFe_2Zn_{20}$	Kazuaki Iwasa	Tohoku University
50	新規 T' 構造ホールドープ銅酸化物 $Pr_{2-x}Ca_xCuO_4$ における磁気相関の研究	藤田　全基	東北大学	金属材料研究所	Study of spin correlations in novel T'-structured cuprate oxide $Pr_{2-x}Ca_xCuO_4$	Masaki Fujita	Tohoku University
51	高精度測定による Fe-LSCO の異方的磁気秩序ピークの起源の研究	藤田　全基	東北大学	金属材料研究所	Origin of anisotropic magnetic peak in Fe-LSCO studied by high resolution neutron-scattering measurement	Masaki Fujita	Tohoku University
52	量子スピン液体の研究	門脇　広明	首都大学東京	理工学研究科物理学専攻	Quantum spin liquid	Hiroaki Kadowaki	Tokyo Metoropolitan University
53	量子臨界点近傍にある $YbCo_2Zn_{20}$ の磁気励起	阿曽　尚文	琉球大学	理学部物質地球科学科	Magnetic excitations in $YbCo_2Zn_{20}$ in vicinity of a quantum critical point	Naofumi Aso	University of the Ryukyus
54	空間反転対称性をもたない超伝導体 $CeRhSi_3$ の磁気励起	阿曽　尚文	琉球大学	理学部物質地球科学科	Magnetic Fluctuations in a Non-Centrosymmetric Superconductor $CeRhSi_3$	Naofumi Aso	University of the Ryukyus
55	S = 3/2 パーフェクトカゴメ系 $Li_2Cr_3SbO_8$ の磁気相関	飯田　一樹	総合科学研究機構	利用促進部	Spin correlation in S = 3/2 perfect kagome compound $Li_2Cr_3SbO_8$	Iida Kazuki	CROSS
56	$La_5Mo_4O_{16}$ における長時間磁化緩和と悪魔の階段	飯田　一樹	総合科学研究機構	利用促進部	Long-time magnetization decay and devil's staircase in $La_5Mo_4O_{16}$	Kazuki Iida	CROSS
57	新一次元量子スピン系 $K_2Cu_3O(SO_4)_3$ の基底状態	藤原　理賀	東京理科大学	理学部第一部物理学科	Investigation of the magnetic ground state in a new one-dimensional quantum spin system $K_2Cu_3O(SO_4)_3$	masayoshi Fujihara	Tokyo University of Science
58	kapelasite における量子スピン液体状態の磁気励起	飯田　一樹	総合科学研究機構	研究開発部	Spin dynamics of quantum spin liquid state in kapelasite	Kazuki Iida	CROSS
59	スピントロニクス物質 YIG の低エネルギー磁気励起	南部　雄亮	東北大学	金属材料研究所	Low-energy magnetic excitations in YIG	Yusuke Nambu	Tohoku University
・申請装置 C1-2: SANS-U							
60	SANS-U（二次元位置測定小角散乱装置）IRT 課題	柴山　充弘	東京大学	物性研究所	IRT project of SANS-U	Mitsuhiro Shibayama	The University of Tokyo
61	電場下での荷電性高分子の構造	Li　Xiang	東京大学	物性研究所中性子科学研究施設	Structure of Polyelectrolytes under Electric Field	Xiang Li	The University of Tokyo
62	プロパノール＋イミダゾリウム系イオン液体二成分溶液の相分離メカニズムの解明	下村　拓也	室蘭工業大学	大学院工学研究科	Phase separation of propanol+imidazolium-based ionic liquid binary solutions	Takuya Shimomura	Muroran Institute of Technology

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63	イミダゾリウム系イオン液体とグライムの混合状態	下村　拓也	室蘭工業大学	大学院工学研究科	Mixing state of imidazolium-based ionic liquid+glyme solutions	Takuya Shimomura	Muroran Institute of Technology
64	ナノディスクの構造と集積化挙動の評価	中野　実	富山大学	大学院医学薬学研究部	Structure and Stacking Behavior of Nanodiscs	Minoru Nakano	University of Toyama
65	膜貫通ペプチドのフリップフロップ誘起能の評価	中野　実	富山大学	大学院医学薬学研究部	Induction of Flip-Flop by Transmembrane Peptides	Minoru Nakano	University of Toyama
66	膜脂質のダイナミクスに及ぼす膜の曲率の評価	中野　実	富山大学	大学院医学薬学研究部	Effects of Curvature on Dynamics of Membrane Lipids	Minoru Nakano	University of Toyama
67	末端残基の切断がアルファクリスタリンのサブユニット交換に及ぼす影響	井上　倫太郎	京都大学	原子炉実験所	Effect of terminal truncation on subunit exchange in alpha-crystallin	Rintaro Inoue	Kyoto University
68	中性子小角散乱による植物性食品タンパク質凝集体の階層構造解析	佐藤　信浩	京都大学	原子炉実験所	Hierarchical structure in plant food protein assemblies as revealed by small-angle neutron scattering	Nobuhiro Sato	Kyoto University
69	中性子小角散乱実験による Sr_2RuO_4 の異常金属状態の研究	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	Anomalous vortex state in Sr_2RuO_4 studied by SANS experiments	Hazuki Furukawa	Ochanomizu University
70	空間反転対称性の破れた超伝導体のヘリカル磁束格子の観測	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	Herical vortex phase on non-centrosymmetric superconductors	Hazuki Furukawa	Ochanomizu University
71	Fe 系超伝導体の磁束研究	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	Vortex study on Fe-based superconductors	Hazuki Furukawa	Ochanomizu University
72	希釈冷凍機温度領域における $CeCoIn_5$ の磁束構造の磁場方向依存性	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	Field direction dependence of vortex lattice structure on $CeCoIn_5$ in Dilution temperature	Hazuki Furukawa	Ochanomizu University
73	強磁性超伝導体における自発的磁束格子構造の研究	古川　はづき	お茶の水女子大学	基幹研究院 自然科学系	Spontaneous vortex phase in ferromagnetic superconductors	Hazuki Furukawa	Ochanomizu University
74	HPT 加工により発現する巨大磁気異方性の起源	大場　洋次郎	京都大学	原子炉実験所	Large magnetic anisotropy induced by high-pressure torsion	Yojiro Oba	Kyoto University
75	Small angle neutron study in chiral magnet $Pr_5Ru_3Al_2$	奥山　大輔	東北大学	多元物質科学研究所	Small angle neutron study in chiral magnet $Pr_5Ru_3Al_2$	Daisuke Okuyama	Tohoku University
76	4 分岐ポリマーの末端架橋により合成されるモデル高分子電解質ゲルの構造	守島　健	東京大学	物性研究所	Structural study of model polyelectrolyte gel synthesized by end-linking tetra-arm polymers	Ken Morishima	The University of Tokyo
77	金属ヘリカル磁性体 MnP における長周期磁気ドメイン構造の観測	山崎　照夫	東京理科大学	理工学部	Observation of the long period magnetic domain structure in metallic helimagnet MnP	Teruo Yamazaki	Tokyo University of Science
78	Rheo-SANS を用いたずり応力場におけるグリース増ちょう剤の構造解析	平山　朋子	同志社大学	理工学部	Structural Analysis of Thickener in Grease under Shear Stress by Means of Rheo-SANS	Tomoko Hirayama	Doshisha University
79	Rheo-SANS を用いた温度場およびずり応力場における粘度指数向上剤の等価径測定	平山　朋子	同志社大学	理工学部	Equivalent Diameter of Polymers as Viscosity Index Improvers under High Temperature and Shear Stress Estimated by Rheo-SANS	Tomoko Hirayama	Doshisha University

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80	高分子 / イオン液体溶液系における温度応答性相分離に関する熱力学的研究	柴山　充弘	東京大学	物性研究所	Thermodynamical Study on Phase Behavior of Thermo-responsive Polymer in Hydrophobic Ionic Liquids	Mitsuhiro Shibayama	The University of Tokyo
81	全イオン性ポリイオンコンプレックスミセルのナノ構造と刺激応答	松岡　秀樹	京都大学	工学研究科高分子化学専攻	Nanostructure and Stimulli-responsibility of Totally Ionic Polyion Complex Micelles	Hideki Matsuoka	Kyoto University
82	Structure of imidaozlium-based ionic liquid under shear flow	根本　文也	高エネルギー加速器研究機構	物質構造科学研究所	Structure of imidaozlium-based ionic liquid under shear flow	Fumiya Nemoto	High energy accelerator research organization
83	中性子散乱による液晶・高分子溶液の異方的相分離構造と配向相関の解析	根本　文也	高エネルギー加速器研究機構	物質構造科学研究所	Analysis on the structure of anisotropic phase separation and the alignment correlation in liquid crystal - polymer mixtures observed by neutron scattering	Fumiya Nemoto	High energy accelerator research organization
84	界面不活性の働きをする界面活性剤	貞包　浩一朗	同志社大学	生命医科学部医情報学科	Surfactant molecules behaving as a surface-inactive agent	Koichiro Sadakane	Doshisha University
85	高圧条件下における２成分混合溶液の新奇な臨界挙動	貞包　浩一朗	同志社大学	生命医科学部医情報学科	Novel critical behavior in a mixture of water / organic solvent under high-pressure condition	Koichiro Sadakane	Doshisha University
86	HPT 加工した純鉄の磁気構造に及ぼす高密度格子欠陥の影響	足立　望	豊橋技術科学大学	機械工学系	Influence of high density lattice defects on the magnetic structure of pure Fe deformed by high-pressure torsion process	Nozomu Adachi	Toyohashi University of Technology
87	小角中性子散乱によるポリ（キノキサリン -2,3-ジイル）のらせん反転メカニズムの解明	長田　裕也	京都大学	工学研究科	Elucidation of the Mechanism of the Solvent-Dependent Switch of Helical Main-Chain Chirality of Poly(quinoxaline-2,3-diyl)s by Small-angle Neutron Scattering	Nagata Yuya	Kyoto University
88	ポリマーブレンドの相溶性に及ぼす成分ポリマーの一次構造（トポロジー）の影響	高野　敦志	名古屋大学	工学研究科　化学・生物工学専攻	Influence of topology on the miscibility of a polymer blend	Atsushi Takano	Nagoya University
89	エリスロポエチン受容体のドメインダイナミクスの解析	中川　洋	日本原子力研究開発機構	階層構造研究グループ	Analysis of Domain Dynamics of Erythropoetin Receptor	Hiroshi Nakagawa	Japan Atomic Energy Agency
90	非膨潤性ハイドロゲルの構造に関する研究	中川　慎太郎	東京大学	物性研究所	Structural study on "non-swellable" hydrogels	Shintaro Nakagawa	The University of Tokyo
91	均一な網目構造を有する温度応答性ハイドロゲルの構造	中川　慎太郎	東京大学	物性研究所	Structure of thermo-responsive hydrogels with homogeneous network structure	Shintaro Nakagawa	The University of Tokyo
・申請装置 C1-3: mf-SANS							
92	C1-3（小型集束型小角散乱装置）IRT 課題	古坂　道弘	北海道大学	大学院工学研究科	IRT project of mf-SANS	Michihiro Furusaka	Hokkaido University
93	新規ニッケルフリーオーステナイト系 ODS 鋼中のナノ析出粒子の研究	間宮　広明	物質材料研究機構	先端材料解析研究拠点	Investigation of nanoparticles in ODS Ni-free austenitic steel	Hiroaki Mamiya	National Institute for Materials Science
・申請装置 C1-3: ULS							
94	ULS（極小角散乱装置）IRT 課題	吉沢　英樹	東京大学	物性研究所　附属中性子科学研究施設	IRT project of ULS	Hideki Yoshizawa	The University of Tokyo

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95	結晶内電場を用いた中性子電気双極子能率探索のための結晶評価	北口　雅暁	名古屋大学	現象解析研究センター	Study of crystal-diffraction for search of neutron EDM	Masaaki Kitaguchi	Nagoya University
・申請装置 C2-3-1: iNSE							
96	C2-3-1（中性子スピンエコー分光器）IRT 課題	柴山　充弘	東京大学	物性研究所	IRT project of iNSE	Mitsuhiro Shibayama	The University of Tokyo
97	鉄系梯子型物質 $BaFe_2Se_3$ の中性子スピンエコー	南部　雄亮	東北大学	金属材料研究所	Neutron spin echo measurements on the iron-based ladder compound $BaFe_2Se_3$	Yusuke Nambu	Tohoku University
98	中性子散乱による液晶・高分子溶液の異方的相分離構造と配向相関の解析	根本　文也	高エネルギー加速器研究機構	物質構造科学研究所	Analysis on the structure of anisotropic phase separation and the alignment correlation in liquid crystal - polymer mixtures observed by neutron scattering	Fumiya Nemoto	High energy accelerator research organization
99	界面不活性の働きをする界面活性剤	貞包　浩一朗	同志社大学	生命医科学部医情報学科	Surfactant molecules behaving as a surface-inactive agent	Koichiro Sadakane	Doshisha University
100	エリスロポエチン受容体のドメインダイナミクスの解析	中川　洋	日本原子力研究開発機構	階層構造研究グループ	Analysis of Domain Dynamics of Erythropoetin Receptor	Hiroshi Nakagawa	Japan Atomic Energy Agency
・申請装置 C3-1-1: AGNES							
101	AGNES（高分解能パルス冷中性子分光器）IRT 課題	山室　修	東京大学	物性研究所	IRT project of AGNES	Osamu Yamamuro	The University of Tokyo
102	Zn-Ln-Zn 単分子磁石のスピンダイナミクス	古府　麻衣子	東京大学	物性研究所	Spin dynamics in Zn-Ln-Zn single-molecule magnets	Maiko Kofu	The University of Tokyo
103	パラジウム水素化物ナノ結晶における水素の振動状態	古府　麻衣子	東京大学	物性研究所	Vibrational state of H atoms in nanocrystalline palladium hydride	Maiko Kofu	The University of Tokyo
104	柔粘性結晶相をもつイオン液体の速いダイナミクス	山室　修	東京大学	物性研究所	Fast Dynamics of Ionic Liquids with Plastic-crystalline Phases	Osamu Yamamuro	The University of Tokyo
105	配位高分子ホスト $[CuZn(CN)_4]$- に包接された K+ 水溶液のダイナミクス	錦織　紳一	東京大学	総合文化研究科　広域科学専攻	Dynamics of the K+ aqueous solution confined in a coordination polymer host $[CuZn(CN)_4]$-	Shinichi Nishikiori	The University of Tokyo
106	スピントロニクス物質 YIG の偏極中性子非弾性散乱	南部　雄亮	東北大学	金属材料研究所	Polarized neutron scattering investigation of the spin wave excitations in YIG	Yusuke Nambu	Tohoku University
・申請装置 C3-1-2: MINE1							
107	MINE1（京大炉：多層膜中性子干渉計・反射率計）IRT 課題	日野　正裕	京都大学	原子炉実験所	MINE1 (Multilayer neutron interferometer and reflectmeter)	Masahiro Hino	Kyoto University
108	冷中性子集光ミラー開発	日野　正裕	京都大学	原子炉実験所	Development of focusing neutron mirror	Masahiro Hino	Kyoto University

No.	課題名	氏名	所属		Title	Name	Organization
・申請装置 C3-1-2: MINE2							
109	MINE2（京大炉：多層膜中性子干渉計・反射率計）IRT 課題	日野　正裕	京都大学	原子炉実験所	MINE2 (Multilayer neutron interferometer and reflectmeter)	Masahiro Hino	Kyoto University
110	超冷中性子・熱外中性子光学のためのデバイス開発	北口　雅暁	名古屋大学	現象解析研究センター	Development of optical devices for ultra cold and epithermal neutrons	Masaaki Kitaguchi	Nagoya University
111	冷中性子集光ミラー開発	日野　正裕	京都大学	原子炉実験所	Development of focusing neutron mirror	Masahiro Hino	Kyoto University
112	高分子 / 水界面における生体分子の吸着状態の解析	松野　寿生	九州大学	大学院工学研究院応用化学部門	Analyses of adsorbed biomolecules at the polymer/water interface	Hisao Matsuno	Kyushu University
113	混合液体中における高分子薄膜の膨潤挙動	田中　敬二	九州大学	工学研究院　応用化学部門	Swelling Behavior of Polymer Thin Films in Mixed Non-solvents	Keiji Tanaka	Kyushu University
・申請装置 T1-1: HQR							
114	HQR（高分解能中性子散乱装置）IRT 課題	吉沢　英樹	東京大学	物性研究所　附属中性子科学研究施設	IRT project of HQR	Hideki Yoshizawa	The University of Tokyo
115	$CeRhIn_5$ の圧力下中性子回折実験による磁性と超伝導の相関の研究	小林　理気	琉球大学	理学部	Neutron Diffraction Study on $CeRhIn_5$ under Pressure	Riki Kobayashi	University of the Ryukyus
116	２次元正方格子系 $K_2MeV_2O_7$(Me=Co and Mn) の磁気構造	左右田　稔	東京大学	物性研究所	Magnetic Structure in $K_2MeV_2O_7$(Me=Co and Mn)	Minoru Soda	The University of Tokyo
117	一軸応力により誘起する遍歴強磁性量子相転移の研究	清水　悠晴	東京大学	物性研究所	Study of Itinerant Ferromagnetic Quantum Phase Transition Induced by Uniaxial Stress	Yusei Shimizu	The University of Tokyo
118	空間反転対称性を欠く二次元的系 $CeNiC_2$ の磁気構造	片野　進	埼玉大学	理工学研究科	Magnetic structures of the non-centrosymmetrical 2D system $CeNiC_2$	Susumu Katano	Saitama University
119	$EuCo_2P_2$ の磁気構造解析	藤原　哲也	山口大学	大学院理工学研究科	Magnetic structure analysis of $EuCo_2P_2$	Tetsuya Fujiwara	Yamaguchi University
120	$EuRu_2P_2$ の磁気構造解析	藤原　哲也	山口大学	大学院理工学研究科	Magnetic structure analysis of $EuRu_2P_2$	Tetsuya Fujiwara	Yamaguchi University
121	Rb_2MoO_4 における多形転移とソフトフォノン	重松　宏武	山口大学	教育学部	Polymorph Transition and Soft Phonon in Rb_2MoO_4	Hirotake Shigematsu	Yamaguchi University
122	強誘電体の相転移機構（変位型及び秩序−無秩序型）に関する統一的理解の確立	重松　宏武	山口大学	教育学部	Establishment of the unified explanation about the phase transition mechanism (displacive and orderdisorder type) in Ferroelectrics	Hirotake Shigematsu	Yamaguchi University
123	鉄系超伝導体のスピンレゾナンスのスピン空間異方性	李　哲虎	産業技術総合研究所	省エネルギー研究部門	Spin space anisotropic of spin resonance in iron-based superconductors	Chul-Ho Lee	National Institute of Advanced Industrial Science and Technology

No.	課題名	氏名	所属		Title	Name	Organization
124	時間分割中性子散乱測定による磁気構造変化過程の実時間追跡	元屋　清一郎	東京理科大学	理工学部　物理学科	Real-time observation of magnetic structural change by means of time-resolved neutron scattering experiments	Kiyoichiro Motoya	Tokyo University of Science
125	マルチフェロイック $CuFeO_2$ における強誘電性の一軸応力制御	満田　節生	東京理科大学	理学部　物理	Uniaxial-pressure control of ferroelectricity in a spin-driven magneto-electric multiferroic $CuFeO_2$	Setsuo Mitsuda	Tokyo University of Science
126	一軸応力による 2 等辺三角格子反強磁性体 $CoNb_2O_6$ の交換相互作用定数の制御	満田　節生	東京理科大学	理学部　物理	Uniaxial pressure effect on magnetic ordering in a frustrated isosceles triangular lattice Ising antiferromagnet $CoNb_2O_6$	Setsuo Mitsuda	Tokyo University of Science
・申請装置 T1-2: AKANE							
127	AKANE（東北大金研：三軸型中性子分光器 ）IRT 課題	藤田　全基	東北大学	金属材料研究所	IRT project of AKANE	Masaki Fujita	Tohoku University
128	新規 T' 構造ホールドープ銅酸化物 $Pr_{2-x}Ca_xCuO_4$ における磁気相関の研究	藤田　全基	東北大学	金属材料研究所	Study of spin correlations in novel T'-structured cuprate oxide $Pr_{2-x}Ca_xCuO_4$	Masaki Fujita	Tohoku University
129	高精度測定による Fe-LSCO の異方的磁気秩序ピークの起源の研究	藤田　全基	東北大学	金属材料研究所	Origin of anisotropic magnetic peak in Fe-LSCO studied by high resolution neutron-scattering measurement	Masaki Fujita	Tohoku University
130	MPO_4 (M: 遷移金属) のカイラル磁気構造の検証	高阪　勇輔	広島大学	大学院理学研究科	Chiral Magnetism in New Chiral Magnetic Compounds MPO_4 (M: Transition Metal)	Yusuke Kousaka	Hiroshima University
131	CrX (Cr=Si, Ge) のカイラル磁気構造の検証	高阪　勇輔	広島大学	大学院理学研究科	Chiral Magnetic Structure in CrX (X=Si, Ge)	Yusuke Kousaka	Hiroshima University
132	幾何学的フラストレート系 $(Mn,Mg)Cr_2O_4$ におけるらせん磁気構造のクロスオーバー	高阪　勇輔	広島大学	大学院理学研究科	Crossover between conical and screw magnetic phase in $(Mn,Mg)Cr_2O_4$	Yusuke Kousaka	Hiroshima University
・申請装置 T1-3 HERMES							
133	HERMES（東北大金研：中性子粉末回折装置）IRT 課題	南部　雄亮	東北大学	金属材料研究所	IRT project of HERMES	Yusuke Nambu	Tohoku University
134	層状ペロブスカイト型酸化物の結晶構造とイオン拡散経路	八島　正知	東京工業大学	大学院理工学研究科・物質科学専攻	Crystal structure and ion-diffusion path of layered perovskite-type oxides	Masatomo Yashima	Tokyo Institute of Technology
135	二層三角格子反強磁性体 $Fe_2Ga_2S_5$ の結晶構造と磁気構造	南部　雄亮	東北大学	金属材料研究所	Crystal and magnetic structures of the bilayer triangular antiferromagnet $Fe_2Ga_2S_5$	Yusuke Nambu	Tohoku University
136	希土類–遷移金属複合酸化物の磁気構造	土井　貴弘	北海道大学	大学院理学研究院化学部門	Magnetic structure of lanthanide-transition metal oxides	Yoshihiro Doi	Hokkaido University
137	Ni 一次元鎖構造を持つ $AM_2Ni_6Te_3O_{18}$ の磁気構造	土井　貴弘	北海道大学	大学院理学研究院化学部門	Magnetic structure of Ni chain compounds $AM_2Ni_6Te_3O_{18}$	Yoshihiro Doi	Hokkaido University
138	ペロブスカイト型酸窒化物に対する水素化物イオン挿入	小林　洋治	京都大学	工学研究科　物質エネルギー化学専攻	Hydride Insertion into Perovskite Oxynitrides	Yoji Kobayashi	Kyoto University

No.	課題名	氏名	所属		Title	Name	Organization
139	$YbCo_2Zn_{20}$ の置換系試料の結晶・磁気構造解析	小林　理気	琉球大学	理学部	Determination of Crystal and Magnetic Structure in $Yb(Co_{1-x}T_x)_2(Zn_{1-x}X_x)_{20}$ system	Riki Kobayashi	University of the Ryukyus
140	Pd/Ru ナノ合金の構造	山室　修	東京大学	物性研究所	Structures of Pd/Ru nano-alloys	Osamu Yamamuro	The University of Tokyo
141	高温トポケミカル反応による新規酸窒化物の合成	山本　隆文	京都大学	工学研究科	Synthesize of Novel $O_x$ynitride with High – Temperature Topochemical Reaction	Takafumi Yamamoto	Kyoto university
142	正方格子反強磁性体 $Sr_2CuSi_2O_7$ の磁気構造解析	益田　隆嗣	東京大学	物性研究所	Magnetic Structure Study on a Square Lattice Antiferromagnet $Sr_2CuSi_2O_7$	Takatsugu Masuda	The University of Tokyo
143	新規ペロブスカイト関連 AA'BO_4 型構造をもつ酸化物イオン伝導体の結晶構造とイオン伝導経路の解明	藤井　孝太郎	東京工業大学		Structural Investigation of the Novel Perovskite related AA'BO_4-type Materials ?Oxide-Ionic and Electronic Conducting Materials?	Kotaro Fujii	Tokyo Institute of Technology
144	新規 T' 構造ホールドープ銅酸化物 $Pr_{2-x}Ca_xCuO_4$ の結晶構造	藤田　全基	東北大学	金属材料研究所	Study of crystal structure in novel T'-structured cuprate oxide $Pr_{2-x}Ca_xCuO_4$	Masaki Fujita	Tohoku University
145	ホイスラー合金 Ru_2CrSi の反強磁性状態	重田　出	鹿児島大学	大学院理工学研究科	Antiferromagnetic state of Heusler alloy Ru_2CrSi	Iduru Shigeta	Kagoshima University
146	新規カイラル磁性体 MPO_4 (M: 遷移金属) の磁気構造解析	高阪　勇輔	広島大学	大学院理学研究科	Magnetic Structure Analysis in New Chiral Magnetic Compounds MPO_4 (M: Transition Metal)	Yusuke Kousaka	Hiroshima University
147	新規カイラル磁性体 CrX(X: Si, Ge) の磁気構造解析	高阪　勇輔	広島大学	大学院理学研究科	Magnetic Structure Analysis in New Chiral Magnetic Compounds CrX (X: Si, Ge)	Yusuke Kousaka	Hiroshima University
148	粉末中性子回折法による平面４配位構造亜鉛層状酸塩化物の精密構造解析	辻本　吉廣	物質材料研究機構	先端材料プロセスユニット	Crystal structure determination of new square-planar coordinated Zn oxychloride by neutron powder diffraction	Yoshihiro Tsujimoto	National Institute for Materials Science
149	新規正方格子磁性体 Sr_2CrO_3X (X = F and Cl) の磁気構造解析	辻本　吉廣	物質材料研究機構	先端材料プロセスユニット	Magnetic structure determination of new square-lattice antiferromagnets Sr_2CrO_3X (X = F and Cl)	Yoshihiro Tsujimoto	National Institute for Materials Science
150	S = 1/2 正方格子量子磁性体ニッケル酸ハロゲン化物 Sr_2NiO_3Cl の磁気構造	辻本　吉廣	物質材料研究機構	先端材料プロセスユニット	Magnetic structure determination of S = 1/2 square lattice antiferromagnet Sr_2NiO_3Cl	Yoshihiro Tsujimoto	National Institute for Materials Science
151	マルチフェロイック物質 $CeFe_3(BO_3)_4$ の磁気構造	益田　隆嗣	東京大学	物性研究所	Magnetic structure of multiferroics $CeFe_3(BO_3)$$	Takatsugu Masuda	The University of Tokyo
152	鉄欠損を制御した $LuFe_2O_4$ の磁気基底状態の研究	池田　直	岡山大学	自然科学研究科	Magnetic correlations in Fe excess grown $LuFe_2$+xO_4	Naoshi Ikeda	Okayama University
・申請装置 T2-2: FONDER							
153	FONDER(中性子４軸回折装置)IRT 課題	木村　宏之	東北大学	多元物質科学研究所	IRT proposal for FONDER (Neutron 4-circle diffractometer)	Hiroyuki Kimura	Tohoku University
154	塑性歪みを加えた Pt_3Fe 反強磁性体における強磁性の発現機構	小林　悟	岩手大学	工学部マテリアル工学科	Mechanism of ferromagnetism in plastically deformed Pt_3Fe antiferromagnet	Satoru Kobayashi	Iwate University

No.	課題名	氏名	所属		Title	Name	Organization
155	スピン三重項超伝導体 Sr_2RuO_4 の一軸圧力下中性子散乱実験	山崎　照夫	東京理科大学	理工学部	Neutron scattering of the triplet superconductor Sr_2RuO_4 under uniaxial pressures	Teruo Yamazaki	Tokyo University of Science
156	$DyFe_2Zn_{20}$ における磁気異方性増強を伴う逐次磁気相転移	岩佐　和晃	東北大学	大学院理学研究科	Successive magnetic phase transition with enhancement in magnetic anisotropy of $DyFe_2Zn_{20}$	Kazuaki Iwasa	Tohoku University
・申請装置 Accessory							
157	アクセサリー IRT 課題	上床　美也	東京大学	物性研究所	IRT project of Accessory	Yoshiya Uwatoko	The University of Tokyo

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1	オペランド軟 X 線分光の協奏・高度化が拓く触媒科学	吉信 淳	東京大学	物性研究所	New Frontier of Catalysis Science Opened by Synergy and Development of Operando Soft X-ray Spectroscopies	Jun Yoshinobu	The University of Tokyo
2	省エネ・創エネ・蓄電デバイスのオペランドナノ分光	尾嶋 正治	東京大学	放射光連携研究機構	Operando nano-spectroscopy for energy efficient, power generation and energy storage devices	Masaharu Oshima	The University of Tokyo
3	偏光スイッチングを利用した非自明な磁気構造とスピンダイナミクスの観測	和達 大樹	東京大学	物性研究所	Observation of nontrivial magnetic structures and spin dynamics by using polarization switching	Hiroki Wadati	The University of Tokyo
4	高分解能 X 線発光分光による $LaCoO_3$ 薄膜のスピン状態の観測	山崎 裕一	東京大学	マテリアル工学科	X-ray emission spectroscopy study of spin-state of $LaCoO_3$ thin films	Yuichi Yamazaki	Tohoku University
5	グリーン ICT の実現に向けた超高品質グラフェン /SiC 系のキャリア・ダイナミクスの包括的な理解 (I) ナノ秒スケールで起こるグラフェン -SiC 界面電子移動のキャリアダイナミクスの解明	吹留 博一	東北大学	電気通信研究所	Integrated understanding of carrier dynamics at the interface between ultrahigh quality graphene and SiC for realizing green ICT (I) Clarification of nanosecond carrier dynamics of interfacial electron transfer between graphene and SiC	Hirokazu Fukidome	Tohoku University
6	有機－酸化物接合材料における光励起キャリア挙動に及ぼす界面の影響	小澤 健一	東京工業大学	理工学研究科物質科学専攻	Influence of Interfaces of Organic-Oxide Adhesive Materials on Photoexcited Carrier Behavior	Kenichi Ozawa	Tokyo Institute of Technology
7	時間分解共鳴軟 X 線回折による超伝導体 $IrTe_2$ の電荷と構造のダイナミクスの研究	田久保 耕	東京大学	物性研究所	Dynamics of charge and lattice dynamics of $IrTe_2$ probed by time-resolved soft x-ray scattering	Kou Takubo	The University of Tokyo
8	角度分解共鳴非弾性軟 X 線散乱システムの開発	宮脇 淳	東京大学	物性研究所	Development of Angle-Resolved Resonant Inelastic Soft X-ray Scattering System	Jun Miyawaki	The University of Tokyo
9					Investigating the Electronic Structure of the Nitrogenase Enzyme by 2p3d RIXS	Van Kuiken Benjamin	Max Planck Institute for Chemical Energy Conversion
10	ナノ空間に閉じ込められた水の機能と電子状態：軟 X 線吸収 / 発光分光によるアプローチ	田中 賢	九州大学	先導物質化学研究所	Electronic states reveal the function of water encapsulated in nano-spaces : soft X-ray absorption/emission study	Masaru Tanaka	Kyushu University
11	プルシアンブルー類似体 $(Co_xMn_{1-x})[Cr(CN)_6]_{2/3}$・$zH_2O$ の湿度制御型磁化発現機構の解明	所 裕子	筑波大学	数理物質系物質科学研究科	Study on the mechanism of humidity-induced magnetization of Prussian blue analogues $(Co_xMn_{1-x})[Cr(CN)_6]_{2/3}$・$zH_2O$	Yuko Tokoro	University of Tsukuba
12					Understand Energy-level alignment in Donor-Acceptor binary systems from Core level shifts	Xiaonan Sun	University of Paris diderot
13	ホールドープ型銅酸化物超伝導体における電荷秩序に関連した電荷励起	石井 賢司	量子科学技術研究開発機構		Charge excitations related to charge order in hole-doped cuprate superconductors	Kenji Ishii	National Institutes for Quantum and Radiological Science and Technology
14	オペランド軟 X 線吸収 / 発光分光によるリチウムイオン電池用電極材料の電子状態解析、および充放電反応に対する配位子軽元素の寄与の解明　その 3	朝倉 大輔	産業技術総合研究所	省エネルギー研究部門	Operando soft x-ray absorption/emission spectroscopy studies of electrode materials for Li-ion batteries and investigation of the role of ligand elements against the charge-discharge reaction III	Daisuke Asakura	National Institute of Advanced Industrial Science and Technology
15	ハーフメタル型電子状態を有する Mn_2VAl ホイスラー合金単結晶の共鳴非弾性軟 X 線散乱の磁場効果	梅津 理恵	東北大学	金属材料研究所	Magnetic field dependence of resonant inelastic soft X-ray scattering of Mn_2VAl Heusler single crystal alloys with half metal-type electronic state	Rie Umedu	Tohoku University

No.	課題名	氏名	所属		Title	Name	Organization
16	THz 帯動作を突破するグラフェン・トランジスタの界面電子状態のオペランド顕微分光 (I) デュアル・ゲート型グラフェン・トランジスタのアクセス領域の電子状態観察	吹留　博一	東北大学	電気通信研究所	Operando spectromicroscopy on interface electronic states of a graphene transistor that breaks through a THz operation: (I) Observation of electronic states in access regions of a dual-gate type graphene transistor	Hirokazu Fukidome	Tohoku University
17	THz 帯動作を突破するグラフェン・トランジスタの界面電子状態のオペランド顕微分光 (I) デュアル・ゲート型グラフェン・トランジスタのアクセス領域の電子状態観察	末光　眞希	東北大学		Operando spectromicroscopy on interface electronic states of a graphene transistor that breaks through a THz operation: (I) Observation of electronic states in access regions of a dual-gate type graphene transistor	Maki Suemitsu	Tohoku University
18	高分解能共鳴非弾性軟 X 線散乱による $LaCoO_3$ 薄膜での励起子絶縁体状態の探索	山崎　裕一	東京大学	マテリアル工学科	Research for Excitonic Insulating State in $LaCoO_3$ thin film via Resonant Inelastic Soft X-ray Scattering	Yuichi Yamazaki	Tohoku University
19	層状酸化物系ナトリウムイオン電池正極材料の大気非曝露・高分解能軟 X 線発光分光	大久保　將史	東京大学	工学系研究科化学システム工学専攻	High-energy-resolution soft x-ray emission spectroscopy studies of layered-oxide-type cathode materials for Na-ion batteries using a sample transfer system without air exposure	Masashi Okubo	The University of Tokyo
20	ポリアニオン系リチウムイオン電池正極材料のオペランド軟 X 線吸収 / 発光分光	朝倉　大輔	産業技術総合研究所		Operando soft x-ray absorption/emission spectroscopy studies of polyanion-type cathode materials for Li-ion batteries	Daisuke Asakura	National Institute of Advanced Industrial Science and Technology
21	時間分解 X 線吸収分光による $EuNi_2(Si_{1-x}Ge_x)_2$ の光誘起価数転移の観測	平田　靖透	東京大学	物性研究所	Observation of photo-induced valence transition in $EuNi_2(Si_{1-x}Ge_x)_2$ with time-resolved x-ray absorption spectroscopy	Yasuhide Hirata	The University of Tokyo
22	11-type 鉄系超電導体の角度分解共鳴非弾性軟 X 線散乱	宮脇　淳	東京大学	物性研究所	Angle-Resolved Resonant Inelastic Soft X-ray Scattering of 11-type Fe-base superconductors	Jun Miyawaki	The University of Tokyo
23	$SrTiO_3$ と $La_{0.5}Sr_{1.5}MnO_3$ の相転移ダイナミクスの時間分解二次元光電子回折による研究	大門　寛	奈良先端科学技術大学院		Study on the Dynamics of Phase Transition in $SrTiO_3$ and $La_{0.5}Sr_{1.5}MnO_3$ Using Time-resolved Two-dimensional X-Ray Photoelectron Diffraction	Hiroshi Daimon	Nara Institute of Science and Technology
24					Guanidinium Ion Pairing and Complex Formation in Aqueous Solution	Rubensson Jan-Erik	Uppsala University
25					Unraveling the synergic effect between Ni and Mn during the water oxidation reaction of nickel and manganese-based oxides by 2p3d RIXS	Al Samarai Mustafa	Max Planck Institute for Chemical Energy Conversion
26					Charge transfer and surface carrier dynamics of C_60-adsorbed WSe_2 studied by time-resolved X-ray photoelectron spectroscopy	Chiang Tai	University of Illinois

柏キャンパス E 棟 / Laser and Synchrotron Research Laboratory in Kashiwa

No.	課題名	氏名	所属		Title	Name	Organization
1	III-V 族半導体基板上に作成したビスマス 1 次元構造のスピン偏極電子状態	大坪　嘉之	大阪大学	生命機能研究科	Electronic structure and its spin polarization of one-dimensional bismuth surface layers grown of III-V semiconductor substrates	Yoshiyuki Ohtsubo	Osaka University
2	バルク敏感高分解能スピン分解光電子分光を用いた酸化物ハーフメタル強磁性体の本質的電子状態の観測	横谷　尚睦	岡山大学	大学院自然科学研究科	Observation of intrinsic electronic states of half-metallic ferromagnet oxides studied by bulk-sensitive high-resolution spin-resolved photoemission spectroscopy	Takayoshi Yokoya	Okayama University
3	軽ニクトゲンのスピン軌道相互作用	石田　行章	東京大学	物性研究所	Polarization-dependent ARPES on Bi(111)/Si	Yukiaki Ishida	The University of Tokyo
4	カーボンナノチューブの電子状態	石田　行章	東京大学	物性研究所	Electronic structure study of carbon nanotubes	Yukiaki Ishida	The University of Tokyo

No.	課題名	氏名	所属		Title	Name	Organization
5	グラファイト上に成長させた Bi 薄膜の偏光依存 ARPES	石田　行章	東京大学	物性研究所	Polarization dependent ARPES of oriented Bi thin film grown on graphite	Yukiaki Ishida	The University of Tokyo
6	Ln(O,F)Bi(S,Se) 超伝導体における複雑な超伝導ギャップ異方性とスピンの関連性の研究	大田　由一	東京大学	物性研究所	Study of spin contribution to the SC gap anisotropy on Ln(O,F) Bi(S,Se) superconductor	Yoshikazu Ohta	The University of Tokyo
7	銀の量子井戸状態の光電子分光	近藤　猛	東京大学	物性研究所	Controls of spin-orbit interband coupling in heavy atoms on quantum well states	Takeshi Kondo	The University of Tokyo
8		張　鵬	東京大学	物性研究所	Search for topological surface states in iron-based superconductors	Peng Zhang	The University of Tokyo
9	カイラル半導体テルル単体におけるスピン偏極バンド構造	坂野　昌人	東京大学	物性研究所	Spin-polarized band structure in chiral semiconductor tellurium	Masato Sakano	The University of Tokyo
10	キラルな結晶構造を有するビスマス・パラジウム化合物超伝導体のスピン偏極バンド構造	坂野　昌人	東京大学	物性研究所	Spin polarized band structure of bismuth-palladium compound superconductor with chiral crystal structure	Masato Sakano	The University of Tokyo
11	Pb/Ge(111) 表面のレーザースピン分解光電子分光	矢治　光一郎	東京大学	物性研究所	Laser-SARPES measurement of spin-polarized surface states on Pb/Ge(111)-β	Koichiro Yaji	The University of Tokyo
12	Bi/Cu(111) のバンド構造の Bi の吸着量依存性	矢治　光一郎	東京大学	物性研究所	Modification of electronic band structure on Bi/Cu(111) by excess Bi adsorption	Koichiro Yaji	The University of Tokyo
13	貴金属 (111) 表面電子状態の高分解能スピン・角度分解光電子分光	矢治　光一郎	東京大学	物性研究所	High-resolution spin- and angle-resolved photoemission spectroscopy of electronic structure on noble metal surface	Koichiro Yaji	The University of Tokyo
14	近藤絶縁体 YbB_{12} のスピン分解光電子分光	矢治　光一郎	東京大学	物性研究所	Laser-SARPES measurements of Kondo insulator YbB_{12}	Koichiro Yaji	The University of Tokyo
15	薄膜スピン分裂状態のバンド間スピン軌道混成の研究	黒田　健太	東京大学	物性研究所	Interband spin-orbital hybridization in spin-split states of thin films	Kenta Kuroda	The University of Tokyo
16	擬一次元新型トポロジカルスピン分裂表面状態の直接観測	黒田　健太	東京大学	物性研究所	Direct investigation of the spin-polarized Dirac surface state in a quasi-one dimensional material beta-Bi_4I_4	Kenta Kuroda	The University of Tokyo
17	強相関トポロジカル絶縁体候補セリウムモノプニクタイドにおける表面状態のスピンテクスチャーの決定	黒田　健太	東京大学	物性研究所	Investigations of topologically protected surface state in Ce based monpnictides	Kenta Kuroda	The University of Tokyo
18	ルテニウム酸化物 Sr_2RuO_4 の表面電子スピン偏極	黒田　健太	東京大学	物性研究所	Spin-polarized surface electrons in Sr_2RuO_4	Kenta Kuroda	The University of Tokyo
19	微傾斜グラフェンのスピン・角度分解光電子分光	小森　文夫	東京大学	物性研究所	SARPES study of graphene on a SiC macrofacet	Fumio Komori	The University of Tokyo
20	Ag(111) 表面電子状態の高分解能スピン・角度分解光電子分光	原沢　あゆみ	東京大学	物性研究所	High-resolution spin- and angle-resolved photoemission spectroscopy of electronic structure on Ag(111) surface	Ayumi Harasawa	The University of Tokyo
21	テトラテトラコンタンを用いた Au(111) の表面状態の制御	金井　要	東京理科大学	大学院理工学研究科	Manipulation of Au(111) surface states by tetratetracontane adsorption	Kaname Kanai	Tokyo University of Science

No.	課題名	氏名	所属		Title	Name	Organization
22	スピン分解角度分解光電子分光による $TaSi_2$ のスピン構造の研究	伊藤　孝寛	名古屋大学	シンクロトロン光研究センター	Spin-resolved angle-resolved photoemission study of spin texture of $TaSi_2$	Takahiro Ito	Nagoya University
23	超巨大磁気抵抗を示すトポロジカル物質のレーザースピン分解 ARPES	木村　昭夫	広島大学	大学院理学研究科	Spin resolved laser-ARPES of topological extreme magneto-resistance materials	Akio Kimura	Hiroshima University
24		马　均章			Spin structure of hour-glass topological insulator KHgSb	Junzhang Ma	Chinese Academy of Sciences

平成 28 年度　スーパーコンピュータ　共同利用課題一覧 / Joint Research List of Supercomputer System 2016

No.	課題名	氏名	所属	Title	Name	Organization
1. 第一原理計算 / First-Principles Calculation of Materials Properties						
1	第一原理電子状態計算と統計力学的手法を組み合わせた不均一触媒反応解析	森川　良忠	大阪大学 大学院工学研究科 精密科学・応用物理学専攻	Analysis of heterogeneous catalysts by combining first-principles simulations and statistical mechanics	Yoshitada Morikawa	Osaka University
2	ハード及びソフトナノ物質の原子構造と電子物性	押山　淳	東京大学工学系研究科	Atomic Structures and Electronic Properties of Hard- and Soft-Nano Materials	Atsushi Oshiyama	The University of Tokyo
3	ハード及びソフトなの物質の原子構造と電子物性	押山　淳	東京大学工学系研究科	Atomic Structures and Electronic Properties of Hard- and Soft-Nanomaterials	Atsushi Oshiyama	The University of Tokyo
4	大規模第一原理 GW+Bethe-Salpeter 計算	野口　良史	東京大学物性研究所	Large scale first-principles GW+Bethe-Salpeter calculations	Yoshifumi Noguchi	The University of Tokyo
5	スピントロニクス材料および分子性磁性体の原子構造、磁気状態、電子状態の解析	小田　竜樹	金沢大学理工研究域数物科学系	Analyses on atomic structure, magnetism, and electronic structure in spintronics materials and molecular magnets	Tatsuki Oda	Kanazawa University
6	スピントロニクス材料および分子性磁性体の原子構造、磁気状態、電子状態の解析	小田　竜樹	金沢大学理工研究域数物科学系	Analyses on atomic structure, magnetism, and electronic structure in spintronics materials and molecular magnets	Tatsuki Oda	Kanazawa University
7	大規模時空シミュレーションのための第一原理計算手法の開発と応用	常行　真司	東京大学大学院理学系研究科物理学専攻	Development and Application of First-Principles Methods for Spatiotemporally Large-Scale Simulation of Materials	Shinji Tsuneyuki	The University of Tokyo
8	実空間差分法に基づく大規模第一原理電子状態・輸送特性計算手法の開発とシミュレーション	小野　倫也	筑波大学計算科学研究センター	Development of first-principles electronic-structure and transport calculation method based on real-space finite-difference approach	Tomoya Ono	University of Tsukuba
9	反応座標自動探索法をとりいれたタンパク質折りたたみ過程の量子論的解析	重田　育照	筑波大学大学院数理物質科学研究科	First-principles analyses on protein folding processes using an automatic detection of effective reaction coordinates	Yasuteru Shigeta	University of Tsukuba
10	実空間差分法に基づく大規模第一原理電子状態・輸送特性計算手法の開発とシミュレーション	小野　倫也	筑波大学計算科学研究センター	Development of first-principles electronic-structure and transport calculation method based on real-space finite-difference approach	Tomoya Ono	University of Tsukuba
11	タンパク質の構造変化の量子解析	重田　育照	筑波大学大学院数理物質科学研究科	First-principles analyses on structural changes of proteins	Yasuteru Shigeta	University of Tsukuba
12	機能性材料粒界の原子構造と選択的偏析の研究	幾原　雄一	東京大学大学院工学系研究科総合研究機構	Study of Atomic Structures and Selective Segregation Behavior at Grain Boundaries in Functional Materials	Yuichi Ikuhara	The University of Tokyo
13	進化的アルゴリズムを用いたトポロジカル物質の探索と設計	山内　邦彦	大阪大学産業科学研究所	Search and design for topological materials based on evolutionary algorithm	Kunihiko Yamauchi	Osaka University
14	ナノ構造の量子伝導の第一原理計算	小林　伸彦	筑波大学 数理物質系　物理工学域	First-principles study of quantum transport in nanostructures	Nobuhiko Kobayashi	University of Tsukuba
15	電池・触媒の界面反応に関する第一原理サンプリング研究	館山　佳尚	物質・材料研究機構　国際ナノアーキテクトニクス研究拠点	DFT sampling studies on interfacial reactions in catalysts and batteries	Yoshitaka Tateyama	National Institute for Materials Science

No.	課題名	氏名	所属	Title	Name	Organization
16	酸化物系材料における水素および酸素の表面反応	ディニョ　ウィルソン アジェリコ	大阪大学大学院 工学研究科 応用物理学専攻	Surface reactions of hydrogen and oxygen on oxide materials	Wilson Agerico Dino	Osaka University
17	第一原理電子状態計算による拡張アンサンブル計算手法の開発とその応用	洗平　昌晃	名古屋大学未来材料・システム研究所	Development and Application of Extended Ensemble Method Coupled With First-Principles Electronic Structure Calculations	Masaaki Araidai	Nagoya University
18	ナノ構造のイオン輸送特性、電気特性および界面電子状態の理論解析	渡邉　聡	東京大学大学院工学系研究科マテリアル工学専攻	Theoretical Analyses on Ionic Transport Properties, Electrical Properties and Interfacial Electronic States of Nanostructures	Satoshi Watanabe	The University of Tokyo
19	非平衡輸送現象の大規模計算シミュレーション	浅井　美博	産業技術総合研究所	Large scale computational simulations of non-equilibrium transport phenomena	Yoshihiro Asai	National Institute of Advanced Industrial Science and Technology
20	第一原理計算およびバイオインフォマティックス手法を用いた合理的創薬手法の開発およびその応用	常盤　広明	立教大学理学部化学科未来分子研究センター	Development & Application of Rational Drug Design Method using First-Principles Calculations & Bioinfomatics	Hiroaki Tokiwa	Rikkyo University
21	電池・触媒の界面反応に関する第一原理サンプリング研究	館山　佳尚	物質・材料研究機構　国際ナノアーキテクトニクス研究拠点	DFT sampling studies on interfacial reactions in catalysts and batteries	Yoshitaka Tateyama	National Institute for Materials Science
22	第一原理メタダイナミックス計算による CARE 加工プロセスの解明 -Pt と材料表面の間で生じる水分子分解反応 -	稲垣　耕司	大阪大学大学院工学研究科	First-principles meta-dynamics analysis of Catalyst Referred Etching method (dissociative adsorption reaction barrier at interface between Pt and material surface)	Kouji Inagaki	Osaka University
23	有機半導体結晶の電子構造に関する理論的研究	柳澤　将	琉球大学理学部物質地球科学科物理系	Theoretical investigation on electronic structure of organic semiconductor solids	Susumu Yanagisawa	University of the Ryukyus
24	ナノ構造のイオン輸送特性、電気特性および界面電子状態の理論解析	渡邉　聡	東京大学大学院工学系研究科マテリアル工学専攻	Theoretical Analyses on Ionic Transport Properties, Electrical Properties and Interfacial Electronic States of Nanostructures	Satoshi Watanabe	The University of Tokyo
25	ナノ構造の量子伝導の第一原理計算	小林　伸彦	筑波大学 数理物質系　物理工学域	First-principles study of quantum transport in nanostructures	Nobuhiko Kobayashi	University of Tsukuba
26	酸化物系酸塩基触媒水和表面のプロトン活性に関する研究	山口　周	東京大学大学院工学系研究科	Research about Protonic Activity on the hydrated surface of acid-base oxide catalysts	Shu Yamaguchi	The University of Tokyo
27	第一原理計算による豊富元素を利用した触媒設計	武次　徹也	北海道大学大学院理学研究院化学部門	Ab initio study for designer catalysis based on abundant elements	Tetsuya Taketsugu	Hokkaido University
28	硫化水素系超伝導体における電子フォノン結合の精密評価	明石　遼介	東京大学大学院理学系研究科物理学専攻	Accurate evaluation of electron-phonon coupling in sulfur-hydride superconductors	Ryosuke Akashi	The University of Tokyo
29	第一原理及び古典分子動力学計算による固体と接する液体の構造とダイナミクスの解析	福井　賢一	大阪大学大学院基礎工学研究科	Microscopic Structure and Dynamics of Solutions Faced to Solid Materials Using First-Principles and Classical Molecular Dynamics	Ken-ichi Fukui	Osaka University
30	第一原理量子論による次世代新原理メモリの設計指針の獲得	白石　賢二	名古屋大学　未来材料・システム研究所	First Principles Studies toward Guiding Principles of Future New-Types of Memories	Kenji Shiraishi	Nagoya University
31	グラフェン・水界面の第一原理分子動力学シミュレーション	大戸　達彦	大阪大学大学院基礎工学研究科	Ab initio molecular dynamics simulation of graphene/water interfaces	Tatsuhiko Ohto	Osaka University
32	フォノン物性における非調和効果の第一原理計算	只野　央将	東京大学大学院工学系研究科	First-principles calculation of anharmonic effects of phonons and related properties in solids	Terumasa Tadano	The University of Tokyo

No.	課題名	氏名	所属	Title	Name	Organization
33	金属酸化物の性質を特徴付ける構造単位の探索	赤木　和人	東北大学材料科学高等研究所	Exploration of structure motifs characterizing the metal oxides	Kazuto Akagi	Tohoku University
34	固体中ミュオン及び陽電子の第一原理計算	斎藤　峯雄	金沢大学理工研究域数物科学系	First Principles Calculations of Muon and Positron in Solids	Mineo Saito	Kanazawa University
35	非自明な電子構造の第一原理研究	小鷹　浩毅	京都大学 ESICB	First-principles study of nontrivial electronic structure	Hiroki Kotaka	Kyoto University
36	高圧力下における共有結合性液体・ガラスの構造と電子状態の第一原理計算	下條　冬樹	熊本大学大学院自然科学研究科	First-Principles Molecular-Dynamics Study of Structural and Electronic Properties of Covalent Liquids and Glass under Pressure	Fuyuki Shimojo	Kumamoto University
37	太陽光エネルギー変換における基礎過程の研究と材料設計指針獲得のための大規模第一原理計算	山下　晃一	東京大学大学院工学系研究科	Large scale ab initio calculations on the fundamental processes of solar energy convergence devices and on designing principles for new materials	Koichi Yamashita	The University of Tokyo
38	磁性体の第一原理計算	獅子堂　達也	広島大学大学院先端物質科学研究科	First-principles study of magnetic materials	Tatsuya Shishidou	ADSM, Hiroshima University
39	固体中ミュオン及び陽電子の第一原理計算	斎藤　峯雄	金沢大学理工研究域数物科学系	First Principles Calculations of Muon and Positron in Solids	Mineo Saito	Kanazawa University
40	ナノ構造の励起電子動力学と表面陽電子状態の第一原理計算	渡辺　一之	東京理科大学理学部	First-Principles Study of Excited Electron Dynamics of Nanostructures and Positron States at Surfaces	Kazuyuki Watanabe	Tokyo University of Science
41	界面欠陥構造が誘電応答に及ぼす影響の第一原理的研究	笠松　秀輔	東京大学物性研究所	First-principles analysis of the dielectric response of defective interfaces	Shusuke Kasamatsu	The University of Tokyo
42	半導体中の軽原子不純物がつくる分子性リドベルグ状態の理論：トンネル電流と強発光特性	中山　隆史	千葉大学理学部物理学科	Theory of molecular Rydberg states by light-mass impurities in semiconductors: tunneling current and strong luminescence properties	Takashi Nakayama	Chiba University
43	燃料電池電極触媒及び酸素吸蔵材料の省貴金化	國貞　雄治	北海道大学大学院工学研究院　附属エネルギー・マテリアル融合領域研究センター	Reduction of Rare Metals in Fuel Cel Catalysts and Oxygen Sorption Materials	Yuji Kunisada	Hokkaido University
44	金属酸化物の性質を特徴付ける構造単位の探索	赤木　和人	東北大学材料科学高等研究所	Exploration of structure motifs characterizing the metal oxides	Kazuto Akagi	Tohoku University
45	超並列電子状態計算とデータ科学の融合による大規模デバイス材料研究	星　健夫	鳥取大学大学院工学研究科機械宇宙工学専攻応用数理工学講座	Large-scale device-material research by massively parallel electronic structure calculation and data science	Takeo Hoshi	Tottori University
46	ナノ構造の励起電子動力学と表面陽電子状態の第一原理計算	渡辺　一之	東京理科大学理学部	First-Principles Study of Excited Electron Dynamics of Nanostructures and Positron States at Surfaces	Kazuyuki Watanabe	Tokyo University of Science
47	ベリー曲率ランドス ケープに基づく熱電物質の第一 原理デザイン	石井　史之	金沢大学理工研究域数物科学系	First-principles design of thermoelectric materials based on Berry curvature landscape	Fumiyuki Ishii	Kanazawa University
48	マテリアルズ・インフォマティクスに基づいた磁石・スピントロニクス物質の探索	山下　智樹	国立研究開発法人物質・材料研究機構	Search for magnet and spintronics materials based on materials informatics	Tomoki Yamashita	National Institute for Materials Science (NIMS)
49	第一原理計算による Pd(100) 超薄膜に生じた自発歪みと強磁性に関する研究	佐藤　徹哉	慶應義塾大学理工学部	Study of spontaneous distortion and ferromagnetism in Pd(100) ultrathin films by first-principles calculation	Tetsuya Sato	Keio University

No.	課題名	氏名	所属	Title	Name	Organization
50	Li イオン２次電池材料における機械特性の第一原理計算	桑原　彰秀	ファインセラミックスセンター	First-principles calculations of mechanical properties of Li-ion battery materials	Akihide Kuwabara	Japan Fine Ceramics Center
51	新規ナトリウムイオン電池電極材料の第一原理計算	山田　淳夫	東京大学工学系研究科	Theoretical study on electrode materials for sodium ion batteries	Atsuo Yamada	The University of Tokyo
52	電子・スピンデバイス材料の第一原理計算	籾田　浩義	大阪大学産業科学研究所	First-principles calculations of electron and spin device materials	Hiroyoshi Momida	Osaka University
53	第一原理計算による二酸化チタンの構造解析	吉澤　香奈子	高度情報科学技術研究機構	Structural analysis of titanium dioxide by first-principles calculation	Kanako Yoshizawa	Research Organization for Information Science & Technology
54	第一原理計算を用いた Nd-Fe-B 磁石副相の構造同定	立津　慶幸	東京工業大学	Identification of sub phase structures in Nd-Fe-B magnets by first-principles calculations	Yasutomi Tatetsu	Tokyo Institute of Technology
55	ルチル型 TiO_2(110) 還元表面での O_2 分子吸着反応における格子間チタンの役割解明	泰岡　顕治	慶應義塾大学理工学部機械工学科	The role of Ti interstitial in adsorption of O_2 on reduced rutile TiO_2 (110) surface	Kenji Yasuoka	Keio University
56	大規模 GW 計算コードの開発と応用	濱田　幾太郎	物質・材料研究機構	Development and application of the large-scale GW calculation code	Ikutaro Hamada	National Institute for Materials Science
57	異常熱電効果の第一原理的研究	石井　史之	金沢大学理工研究域数物科学系	First-principles study of anomalous thermoelectric effect	Fumiyuki Ishii	Kanazawa University
58	第一原理分子動力学法に基づくガラスの静的構造に関する研究	高良　明英	熊本大学学生支援部	Ab initio molecular dynamics study of static structure of glasses	Akihide Koura	Student Affairs Office, Kumamoto University
59	固体表面、微粒子の新規電子物性の探索と実現	稲岡　毅	琉球大学理学部	Search and realization of novel electronic properties of solid surfaces and small particles	Takeshi Inaoka	University of the Ryukyus
60	第一原理分子動力学シミュレーションによる原始地球における生体有機分子発生機構の解明	島村　孝平	神戸大学大学院システム情報学研究科	Generation Mechanism of Organic/Biological Molecules on Early Earth: Ab Initio Molecular Dynamics Simulation	Kohei Shimamura	Kobe University
61	超高圧環境下における液体金属の新奇構造：第一原理分子動力学計算	大村　訓史	広島工業大学　工学部	Novel Structures of Liquid Metal under Ultrahigh Pressures: ab initio Molecular-Dynamics Simulations	Satoshi Ohmura	Hiroshima Institute of Technology
62	ハイブリッド ab initio QM/MM 計算による生体高分子の解析	舘野　賢	兵庫県立大学大学院　生命理学研究科	Hybrid ab initio QM/MM calculations of biological systems	Masaru Tateno	University of Hyogo
63	新しい IV 族半導体混晶に関する第一原理計算	黒澤　昌志	名古屋大学 未来材料・システム研究所	First-Principles Study on New Group-IV Semiconductor Alloys	Masashi Kurosawa	Nagoya University
64	ルチル型 TiO_2(110) 上での酸素分子吸着における余剰電子の役割解明	泰岡　顕治	慶應義塾大学理工学部機械工学科	The role of excess electrons in adsorption of O_2 on rutile TiO_2 (110) surface	Kenji Yasuoka	Keio University
65	第一原理計算によるリアルモデル触媒の活性点の探索	水上　渉	九州大学総合理工学研究院	Exploring active sites of "Real" model catalysis via first principle calculations	Wataru Mizukami	Kyushu University
66	第一原理計算によるグラフェン担持 Pt クラスターに対する格子欠陥の影響	濱本　雄治	大阪大学 大学院工学研究科 精密科学・応用物理学専攻	First principles study of the influence of lattice defects on Pt cluster supported on graphene	Yuji Hamamoto	Osaka University

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67	３次元電場内の液晶分子の配向	鈴木　雄二	東京大学大学院工学系研究科機械工学専攻	Orientation of Liquid Crystal Molecules in 3D Electrical Field	Yuji Suzuki	The University of Tokyo
68	磁気双極子モーメント相互作用に基づく磁化過程	小畑　修二	東京電機大学理工学部	Magnetization Processes Based on Magnetic Dipole Moments	Shuji Obata	Tokyo Denki University
69	磁性金属超薄膜・有機金属錯体の電子構造と磁性、電界効果に関する第一原理計算	中村　浩次	三重大学大学院工学研究科物理工学専攻	First principles calculations of electronic structures, magnetism, and electric field effects in metal thin films and organometallic complexes	Kohji Nakamura	Mie University
70	超短パルスレーザーに誘起されるスピン・電荷ダイナミクスの第一原理計算	篠原　康	東京大学工学系研究科附属光量子科学研究センター	First-principles calculation for spin-charge dynamics induced by ultrashort laser pulse	Yasushi Shinohara	The University of Tokyo
71	有機半導体の第一原理分子動力学	西館　数芽	岩手大学工学部	Molecular Dynamics Simulation of Organic Semiconductors	Kazume Nishidate	IWATE University
72	第一原理多体摂動計算に基づくパラマグノン揺らぎ評価コードの開発	中村　和磨	九州工業大学	Ab initio many-body perturbation calculations for paramagnon excitation	Kazuma Nakamura	Kyushu Institute of Technology
73	シリサイド系半導体における熱電輸送物性の不純物添加効果	平山　尚美	東京理科大学	Effects of Impurity Doping on Thermoelectric Transport Properties of Semiconducting Silicides	Naomi Hirayama	Tokyo University of Science
74	光整流効果による THz 波生成の第一原理シミュレーション	篠原　康	東京大学工学系研究科附属光量子科学研究センター	First-principles simulation for THz generation based on optical rectification	Yasushi Shinohara	The University of Tokyo
75	原子膜積層系におけるモアレの第一原理計算その２	内田　和之	京都産業大学　理学部　物理科学科	First-Principles Study of Moire Patterns in Atomic Layers II	Kazuyuki Uchida	yoto Sangyo University
76	燃料電池電極触媒及び酸素吸蔵材料の省貴金化	國貞　雄治	北海道大学大学院工学研究院　附属エネルギー・マテリアル融合領域研究センター	Reduction of Rare Metals in Fuel Cell Catalysts and Oxygen Sorption Materials	Yuji Kunisada	Hokkaido University
77	第一原理計算を用いた超伝導パラメータ評価	中村　和磨	九州工業大学	ab initio calculation for superconducting parameters	Kazuma Nakamura	Kyushu Institute of Technology
78	ペロブスカイト型鉛ハライド混晶の電子構造に関する研究	牧野　哲征	福井大学大学院工学研究科	Study on electronic structures in perovskite-type lead-halide mixed crystals	Takayuki Makino	University of Fukui
79	時間に依存した電子輸送計算に向けた第一原理シミュレーターの開発と応用	江上　喜幸	北海道大学大学院工学研究院	Development and application of first-principles simulator for time-dependent electron-transport calculation	Yoshiyuki Egami	Hokkaido University
80	下部マントル鉱物の格子熱伝導率に対する鉄固溶効果の第一原理計算	出倉　春彦	愛媛大学地球深部ダイナミクス研究センター	First-principles calculations of iron solid solution effects on the lattice thermal conductivity of lower mantle minerals	Haruhiko Dekura	Ehime University
81	水素結合型有機伝導体における H/D 同位体効果の理論的研究	立川　仁典	横浜市立大学大学院生命ナノシステム科学研究科	Theoretical analysis of H/D isotope effect in hydrogen-bonded organic conductor	Masanori Tachikawa	Yokohama City University
82	第一原理計算を用いた希薄窒化物半導体 InSbN のバンド構造に関する研究	藤川　紗千恵	東京理科大学基礎工学部	Study of band structure for InSbN based dilute nitride semiconductor by using first-principle simulation	Sachie Fujikawa	Tokyo University of Science
83	半導体格子欠陥の第一原理計算	山内　淳	慶應義塾大学理工学部	First-principles study on the defects in semiconductors	Jun Yamauchi	Keio University

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84	定電位電極表面における電解質の拡散過程の第一原理シミュレーション	胡　春平	京都大学 学際融合教育研究推進センター（常駐先：産業技術総合研究所）	First-principles simulation of electrolyte diffusion process on constant-potential electrodes	Chunping Hu	Kyoto University
85	時間に依存した電子輸送計算に向けた第一原理シミュレーターの開発と応用	江上　喜幸	北海道大学大学院工学研究院	Development and application of first-principles simulator for time-dependent electron-transport calculation	Yoshiyuki Egami	Hokkaido University
86	表面ナノ構造における重元素効果	合田　義弘	東京工業大学物質理工学院材料系	Effects of heavy elements in surface nanostructures	Yoshihiro Gohda	Tokyo Institute of Technology
87	第一原理バンド計算を用いた強相関電子系の有効模型導出方法の研究	榊原　寛史	鳥取大学大学院工学研究科	A study about the methods for the derivation of effective model in strongly correlated electron system based on the first-principles calculation	Hirofumi Sakakibara	Tottori University
88	二次元半導体の多原子空孔とクラスターの構造・形成・物性の解明	影島　博之	島根大学大学院総合理工学研究科	Study on structure, formation, and physical properties of multiatomic vacancies and clusters of 2D semiconductors	Hiroyuki Kageshima	Shimane University
89	シリコンクラスター超格子の不純物状態に対する第一原理計算	織田　望	産業技術総合研究所	Ab initio calculations of impurity states in the silicon cluster superlattice	Nozomi Orita	National Institute of Advanced Industrial Science and Technology
90	原子膜物質の原子構造と電子物性の解明	藤本　義隆	東京工業大学大学院理工学研究科物性物理学専攻	Atomic structures and electronic properties of atomic-layered materials	Yoshitaka Fujimoto	Tokyo Institute of Technology
91	照射損傷と格子間原子との相互作用の研究	大澤　一人	九州大学応用力学研究所	Study of interaction between radiation damage and interstitial atom	Kazuhito Ohsawa	Kyushu University
92	原子膜物質の原子構造と電子物性の解明	藤本　義隆	東京工業大学大学院理工学研究科物性物理学専攻	Atomic structures and electronic properties of atomic-layered materials	Yoshitaka Fujimoto	Tokyo Institute of Technology
93	MXene 化合物 Ti_2CT_x の電気二重層容量に関する第一原理計算	安藤　康伸	産業技術総合研究所	First-Principles study on the electric-double layer capacitance of MXene compound Ti_2CT_x	Yasunobu Ando	National Institute for Advanced Science and Technology
94	Si 表面上の原子吸着系のモデル計算	服部　賢	奈良先端科学技術大学院大学物質創成科学研究科	Model calculations in Si surfaces with adsorbates	Ken Hattori	Nara Institute of Science and Technology
95	新たなナノスケール界面の電子物性の探索	小林　功佳	お茶の水女子大学理学部物理学科	Search for electronic properties of new nanoscale interfaces	Katsuyoshi Kobayashi	Ochanomizu University
96	電子デバイスのための自己組織化ナノインターフェイスの理論	レービガー　ハンネス	横浜国立大学　大学院工学研究院物理工学コース	Theory of self-organized nano-interfaces for electronic devices	Hannes Raebiger	Yokohama National University
97	酸化物薄膜・界面の第一原理計算	石井　史之	金沢大学理工研究域数物科学系	First-principles calculations of oxide thin-films and heterostructures	Fumiyuki Ishii	Kanazawa University
98	Si 表面上の原子吸着系のモデル計算	服部　賢	奈良先端科学技術大学院大学物質創成科学研究科	Model calculations in Si surfaces with adsorbates	Ken Hattori	Nara Institute of Science and Technology
99	第一原理計算によるエネルギー応用に向けた触媒設計	佐藤　幸生	九州大学大学院工学研究院材料工学部門	Computational Catalyst Design for Energy Applications through ab initio Mechanistic Investigation	Yukio Sato	Kyushu University
100	２次元ハニカムシートのエッジ構造と電子状態	高木　紀明	東京大学新領域創成科学研究科物質系専攻	Geometric and electronic structures at edge of 2-dimensional honeycomb sheets	Noriaki Takagi	The University of Tokyo

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101	同位体超格子や結晶多形超格子を用いたバンド・ギャップの制御	豊田　雅之	東京工業大学理学院物理学系	Band-gap engineering by forming isotope superlattice and polytypic superlattice	Masayuki Toyoda	Tokyo Institute of Technology
102	Ru 担持型アンモニア新触媒設計のための N2 および H2 の解離現象の理論的評価	神原　陽一	慶應義塾大学理工学部物理情報工学科	Theoretical research on dissociation of N2 and H2 for designing new ammonia catalysis supporting Ru	Yoichi Kamihara	Keio University
103	アモルファス酸化鉄二次電池の構造と荷電状態に関する第一原理計算	鶴田　健二	岡山大学大学院自然科学研究科	Ab-initio Analysis on Structures and Charge States of Amorphous Iron Oxide for Secondary Battery	Kenji Tsuruta	Okayama University
104	CuAu-I 型結晶構造を持つ Mn-Pt 合金の磁気構造の理論	内田　尚志	北海道科学大学	Theory of the magnetic structure of Mn-Pt alloys with CuAu-I type crystal structure	Takashi Uchida	Hokkaido University of Science
105	第一原理計算を用いた希薄窒化物半導体 InSbN のバンド構造に関する研究	藤川　紗千恵	東京理科大学基礎工学部	Study of band structure for InSbN based dilute nitride semiconductor by using first-principle simulation	Sachie Fujikawa	Department of Applied electronics
106	軽希土類永久磁石材料の電子状態	赤井　久純	東京大学物性研究所	Electronic structure of light rare earth permanent magnets	Hisazumi Akai	The University of Tokyo
107	第 1 原理運動量依存変分理論の構築と鉄化合物の運動量分布関数・準粒子バンドへの応用	梯　祥郎	琉球大学理学部物理系	First-Principles Momentum Dependent Local Ansatz and Application to Momentum Distribution and Quasiparticle Bands in Fe Compounds	Yoshiro Kakehashi	University of Ryukyus
108	固体表面における磁性分子の吸着状態	高木　紀明	東京大学新領域創成科学研究科物質系専攻	Adsorbed states of magnetic molecules at solid surfaces	Noriaki Takagi	The University of Tokyo
109	超精密ダイヤモンド工具の損耗機構	宇田　豊	大阪電気通信大学工学部機械工学科	Wear mechanism of diamond tool	Yutaka Uda	Osaka Electro-Communication University
110	系希土類永久磁石材料の電子状態	赤井　久純	東京大学物性研究所	Electronic structure of light rare earth permanent magnets	Hisazumi Akai	The University of Tokyo
111	層状人工格子界面の電子状態と近接効果	平井　國友	奈良県立医科大学医学部物理学	Electronic State and Proximity Effects around Interface in Layered Superlattices	Kunitomo Hirai	Nara Medical University
112	$BaZrO_3$ 系プロトン伝導体における局所構造の解明	山口　周	東京大学大学院工学系研究科	Local structure of $BaZrO_3$-based proton-conducting oxides	Shu Yamaguchi	The University of Tokyo
113	第一原理計算による Dirac 半金属超伝導体の電子状態の解析	田仲　由喜夫	名古屋大学大学院工学研究科	Analysis of the electronic properties of superconducting Dirac semimetals with first principle calculations	Yukio Tanaka	Nagoya University
114	触媒設計のための第一原理計算による金属酸化物の電子状態計算	佐々木　岳彦	東京大学大学院新領域創成科学研究科	First principles calculations of electronic states of metal oxides for design of catalysts	Takehiko Sasaki	The University of Tokyo
115	セミクラスレートハイドレートの第一原理計算	平塚　将起	工学院大学機械工学科	First-principle calculation of the semiclathrate hydrates	Masaki Hiratsuka	Kogakuin University
116	超精密ダイヤモンド工具の損耗機構	宇田　豊	大阪電気通信大学工学部機械工学科	Wear mechanism of diamond tool	Yutaka Uda	Osaka Electro-Communication University
117	Mn-Pt 合金の複雑磁気構造の第一原理分子スピン動力学理論	内田　尚志	北海道科学大学	First-principles molecular spin dynamics theory of the complex magnetic structures in Mn-Pt alloys	Takashi Uchida	Hokkaido University of Science

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2. 強相関 / Strongly Correlated Quantum Systems						
118	銅酸化物高温超伝導体界面における超伝導転移温度向上の起源解明のための数値的研究	今田　正俊	東京大学工学系研究科物理工学専攻	Numerical Studies on Mechanisms for Critical Temperature Control at Interfaces of Superconductors	Masatoshi Imada	The University of Tokyo
119	有限温度変分モンテカルロ法の開発とドープした２次元ハバード模型・銅酸化物第一原理模型の有限温度物性と超伝導機構検証	今田　正俊	東京大学工学系研究科物理工学専攻	Numerical Studies on Finite-Temperature Properties of 2D Hubbard and ab initio Models for Cuprates by Finite-Temperature Variational Monte Carlo Methods	Masatoshi Imada	The University of Tokyo
120	熱的純粋量子状態を用いた量子スピン液体の有限温度の性質の研究	三澤　貴宏	東京大学物性研究所	Thermal pure quantum state study on finite-temperature properties of quantum spin liquids	Takahiro Misawa	The University of Tokyo
121	強相関トポロジカル物質における励起スペクトルの数値的研究	山地　洋平	東京大学大学院工学系研究科物理工学専攻	Numerical Studies on Excitation Spectra of Strongly Correlated Topological Materials	Youhei Yamaji	The University of Tokyo
122	強相関電子系におけるスピン軌道物性の大規模数値シミュレーション	求　幸年	東京大学大学院工学系研究科	Large-scale simulation for spin-orbital physics in strongly-correlated electron systems	Yukitoshi Motome	The University of Tokyo
123	強相関スピン軌道結合系における新規量子現象の理論的研究	求　幸年	東京大学大学院工学系研究科	Theoretical study of novel quantum phenomena in strongly-correlated spin-orbit coupled systems	Yukitoshi Motome	The University of Tokyo
124	遍歴電子磁性体におけるトポロジカル数の異なるスキルミオンの創成と制御	求　幸年	東京大学大学院工学系研究科	Creation and control of skyrmions with different topological numbers in itinerant magnets	Yukitoshi Motome	The University of Tokyo
125	スピン軌道相互作用の強い強相関系におけるスキルミオン相と非平衡現象	川上　則雄	京都大学大学院理学研究科物理学宇宙物理学専攻	Skyrmion phases and nonequilibrium phenomena in strongly correlated electron systems with strong spin-orbit interaction	Norio Kawakami	Kyoto University
126	強相関系のトポロジカル相の解析	吉田　恒也	京都大学理学研究科	Study of topological phases in strongly correlated systems	Tsuneya Yoshida	RIKEN
127	相関する電子およびスピン系のモンテカルロ法を駆使した数値解析	星野　晋太郎	理化学研究所	Monte Carlo approach to correlated electron and spin systems	Shintaro Hoshino	RIKEN
128	トポロジカル相の表面状態における強相関効果	吉田　恒也	京都大学理学研究科	Correlation effects on surface states of topological phases	Tsuneya Yoshida	RIKEN
129	銅酸化物高温超伝導体における電子格子相互作用による超伝導増強機構の数値的検証	大越　孝洋	東京大学大学院工学系研究科物理工学専攻	Numerical study on the mechanism of enhanced superconductivity by phonons in cuprates	Takahiro Ohgoe	The University of Tokyo
130	軌道縮退を有する相関電子系に対する動的平均場理論	古賀　昌久	東京工業大学	Dynamical mean-field theory for correlated electron system with orbital degeneracy	Akihisa Koga	Tokyo Institute of Technology
131	スピン軌道相互作用の強い強相関系におけるトポロジカル相と非平衡現象	川上　則雄	京都大学大学院理学研究科物理学宇宙物理学専攻	Topological phases and nonequilibrium phenomena in strongly correlated electron systems with strong spin-orbit interaction	Norio Kawakami	Kyoto University
132	第一原理計算とモデル多体理論の融合による遷移金属酸化物の電子相関と超伝導に関する研究	黒木　和彦	大阪大学	Study on transition metal oxides by combined first-principles and many-body methods	Kazuhiko Kuroki	Osaka University
133	準周期構造をもつ強相関電子系に対する動的平均場理論	古賀　昌久	東京工業大学	Dynamical mean-field theory for strongly correlated electron systems with quasiperiodicity	Akihisa Koga	Tokyo Institute of Technology

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134	銅酸化物高温超伝導体における電子格子相互作用の役割についての第一原理的研究	大越　孝洋	東京大学大学院工学系研究科物理工学専攻	Ab-initio study on the role of the electron-phonon interactions in high-temperature curate superconductors	Takahiro Ohgoe	The University of Tokyo
135	パイエルス・アンダーソンモデルにおける近藤効果の研究	堀田　貴嗣	首都大学東京理工学研究科物理学専攻	Research on Kondo effect in the Peierls-Anderson model	Takashi Hotta	Tokyo Metropolitan University
136	強相関電子系における超伝導及び磁性状態の研究	山田　篤志	千葉大学理学研究科	Superconductivity and magnetic properties in the strongly correlated electron systems	Atsushi Yamada	Chiba University
137	基板吸着 ^{4}He の量子モンテカルロ計算	本山　裕一	東京大学物性研究所	Monte Carlo simulation of ^{4}He adsorbed on substrates	Yuichi Motoyama	The University of Tokyo
138	5*d* 遷移金属酸化物の強相関第一原理計算	品岡　寛	埼玉大学理学部物理学科	First-principles study on strong electron correlations in 5*d* transition metal oxides	Hiroshi Shinaoka	Saitama University
139	低エネルギー２体散乱過程の幾何学的対称性が発する強相関電子物性	草部　浩一	大阪大学大学院基礎工学研究科	Topological symmetry in two-body scattering in strongly correlated electron systems	Koichi Kusakabe	Osaka University
140	MPS 法の並列化および GPGPU 対応とそのフラストレーション系への応用	五十嵐　亮	東京大学情報基盤センター	Parallelization and GPGPU utilization of MPS program and its application to frustrated systems	Ryo Igarashi	The University of Tokyo
141	横磁場イジング近藤格子模型の数値解析	服部　一匡	首都大学東京	Numerical analysis on a transverse-field Ising-Kondo lattice model	Kazumasa Hattori	Tokyo Metropolitan University
142	空間反転対称性を有するフラストレート磁性体におけるスキルミオンの研究	速水　賢	北海道大学理学部物理学科	Study of skyrmion in frustrated magnets with inversion symmetry	Satoru Hayami	Department of Physics, Hokkaido University
143	量子モンテカルロ法および第一原理計算による強相関電子系の研究	柳沢　孝	産業技術総合研究所	Quantum Monte Carlo and first principles study of strongly correlated electron systems	Takashi Yanagisawa	National Institute of Advanced Industrial Science andTechnology
144	量子モンテカルロ法および第一原理計算による強相関電子系の研究	柳沢　孝	産業技術総合研究所	Quantum Monte Carlo and first principles study of strongly correlated electron systems	Takashi Yanagisawa	National Institute of Advanced Industrial Science andTechnology
145	動的平均場理論による強相関 Ce 化合物の電子構造計算	大槻　純也	東北大学大学院理学研究科	Electronic structure calculations of strongly correlated Ce compounds using the dynamical mean-field theory	Junya Otsuki	Tohoku University
146	多軌道相関金属の内因性スピンホール効果における相互作用効果や多バンド効果の研究	荒川　直也	理化学研究所創発物性科学研究センター	Study of interaction and multiband effects in intrinsic spin-Hall effect of an interacting multiorbital metal	Naoya Arakawa	RIKEN
147	κ 型分子性導体におけるダイマー内電荷自由度と磁性・超伝導	渡部　洋	早稲田大学高等研究所	Intradimer charge degrees of freedom, magnetism, and superconductivity in kappa-type molecular conductor	Hiroshi Watanabe	Waseda Institute for Advanced Study
3. 巨視系の協同現象 / Cooperative Phenomena in Complex, Macroscopic Systems						
148	テンソルネットワーク法によるフラストレート量子スピン系の研究	川島　直輝	東京大学物性研究所	Tensor Network Study on Frustrated Quantum Spin Systems	Naoki Kawashima	The University of Tokyo
149	テンソルネットワーク法によるフラストレート量子スピン系の研究	川島　直輝	東京大学物性研究所	Tensor Network Study on Frustrated Quantum Spin Systems	Naoki Kawashima	The University of Tokyo

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150	高分子溶融体のマルチスケールシミュレーション	村島　隆浩	東北大学大学院理学研究科	Multiscale simulation of polymer melt	Takahiro Murashima	Tohoku University
151	蜂の巣格子 Kitaev-Heisenberg 模型の熱力学的性質と動的性質	鈴木　隆史	兵庫県立大学大学院工学研究科	Thermal properties and dynamical properties of the Kitaev-Heisenberg model on a honeycomb lattice	Takafumi Suzuki	University of Hyogo
152	時間依存多変数変分モンテカルロ法を用いた二次元ハバード模型における非平衡超伝導の数値的研究	今田　正俊	東京大学工学系研究科物理工学専攻	Numerical study of non-equilibrium superconducting states in two-dimensional Hubbard model by the time-dependent multi-variable variational Monte Carlo method	Masatoshi Imada	The University of Tokyo
153	生体膜の構造形成	野口　博司	東京大学物性研究所	Structure formation of biomembranes	Hiroshi Noguchi	The University of Tokyo
154	ゲル充填材系の粗視化 MD 模型による２次元散乱パターン解析	萩田　克美	防衛大学校応用科学群応用物理学科	2D Scattering Pattern Analysis on Coarse Grained MD Model of Filled Hydrogel	Katsumi Hagita	National Defense Academy
155	蛋白質物性に強く関与するソフトモードの効率的サンプリングシミュレーション	北尾　彰朗	東京大学分子細胞生物学研究所	Efficient sampling simulation of the soft modes significantly contribute to protein properties	Akio Kitao	The University of Tokyo
156	生体膜の構造形成	野口　博司	東京大学物性研究所	Structure formation of biomembranes	Hiroshi Noguchi	The University of Tokyo
157	ランダムスピン系の大規模モンテカルロ計算	福島　孝治	東京大学大学院総合文化研究科	Large-scale Monte Carlo calculation of random spin systems	Koji Hukushima	The University of Tokyo
158	量子スピン系の低エネルギー状態に関する数値的研究	中野　博生	兵庫県立大学大学院物質理学研究科	Numerical study on low-energy states of quantum spin systems	Hiroki Nakano	University of Hyogo
159	フラストレート磁性体における新奇秩序の探索	大久保　毅	東京大学大学院理学系研究科物理学専攻	Novel orders in frustrated magnets	Tsuyoshi Okubo	The University of Tokyo
160	マテリアルズ・インフォマティクスによる熱機能材料の探索	塩見　淳一郎	東京大学工学系研究科	Screening for Thermal Functional Materials using Materials Infomatics	Junichiro Shiomi	The University of Tokyo
161	量子応答関数に関するミクロハミルトニアンからの直接計算法の開発	宮下　精二	東京大学理学系研究科物理学専攻	Development of direct method for quantum respose from microscopic Hamiltonian	Seiji Miyashita	The University of Tokyo
162	量子モンテカルロ法の開発とランダムボーズ系の臨界現象	正木　晶子	理化学研究所	Development of Quantum Monte Carlo Methods and Application to Critical Phenomena of Dirty Bosons	Akiko Masaki-Kato	RIKEN
163	動的密度行列繰り込み群法によるフラストレート量子スピン系のスピンダイナミクスの研究	遠山　貴己	東京理科大学理学部応用物理学科	Dynamical DMRG study of spin dynamics in frustrated quantum spin systems	Takami Tohyama	Tokyo University of Science
164	フラストレート磁性体における新奇秩序の探索	大久保　毅	東京大学大学院理学系研究科物理学専攻	Novel orders in frustrated magnets	Tsuyoshi Okubo	The University of Tokyo
165	数値的手法によるバルク・エッジ対応の研究	初貝　安弘	筑波大学大学院数理物質科学研究科物理学専攻	Numerical studies of bulk-edge correspondence	Yasuhiro Hatsugai	University of Tsukuba
166	キラル磁性体の有限温度効果	加藤　雄介	東京大学総合文化研究科広域科学専攻相関基礎科学系	Thermodynamic properties of chiral magnets	Yusuke Kato	The University of Tokyo

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167	低次元量子磁性体に対するボンドランダムネスの効果	下川　統久朗	大阪大学大学院 理学研究科 宇宙地球科学専攻	The effect of bond-randomness on the quantum magnetisms in low dimension	Tokuro Shimokawa	Osaka University
168	マニフォールド理論を用いたタンパク質折り畳みのマルコフ状態モデルの構築	吉留　崇	東北大学大学院工学研究科	A construction of the Markov state model of protein folding using the manifold theory	Takashi Yoshidome	Tohoku University
169	ランダム磁性体が示す磁気熱量効果	田村　亮	国立研究開発法人 物質・材料研究機構	Magnetocaloric effect in random magnets	Ryo Tamura	National Institute for Materials Science
170	低次元量子磁性体に対するボンドランダムネスの効果	下川　統久朗	大阪大学大学院 理学研究科 宇宙地球科学専攻	The effect of bond-randomness on the quantum magnetisms in low dimension	Tokuro Shimokawa	Osaka University
171	分子動力学シミュレーションによるアミロイド線維の動的秩序の形成	奥村　久士	分子科学研究所計算科学研究センター	Dynamical ordering of amyloid fibrils by molecular dynamics simulations	Hisashi Okumura	Institute for Molecular Science
172	不純物を含む流体の大規模分子動力学計算	渡辺　宙志	東京大学物性研究所	Large-scale molecular dynamics simulations on liquid containing impurity	Hiroshi Watanabe	The University of Tokyo
173	並列化量子モンテカルロ法の開発と量子格子系における新規量子現象の研究	正木　晶子	理化学研究所	Development of a parallel quantum Monte Carlo Method and Study of novel quantum phenomena in quantum lattice models	Akiko Masaki-Kato	RIKEN
174	スピン液体の量子モンテカルロシミュレーション	紙屋　佳知	理研	Quantum Monte Carlo study of spin liquids	Yoshitomo Kamiya	RIKEN
175	フラストレート磁性体における新奇秩序	川村　光	大阪大学理学研究科	Novel order in frustrated magnets	Hikaru Kawamura	Osaka University
176	数値対角化によるフラストレーション系における量子スピン液体の研究	坂井　徹	兵庫県立大学大学院物質理学研究科	Numerical Diagonalization Study on the Quantum Spin Liquid in Frustrated Systems	Toru Sakai	University of Hyogo
177	確率的最適化による相転移解析と構造探索	藤堂　眞治	東京大学大学院理学系研究科物理学専攻	Stochastic Optimization Approach to Phase Transitions and Structure Search	Synge Todo	The University of Tokyo
178	低次元量子スピン系における新しい磁場誘起相転移	坂井　徹	兵庫県立大学大学院物質理学研究科	Novel Field Induced Transitions in Low-Dimensional Quantum Spin Systems	Toru Sakai	University of Hyogo
179	シェル・モデルを用いた強誘電体の分子動力学シミュレーション II	橋本　保	産業技術総合研究所	Molecular dynamics simulation of ferroelectrics using a shell model II	tamotsu hashimoto	National Institute of Advanced Industrial Science and Technology
180	ヒドロキシ酸による二酸化チタン結晶形態制御機構の分子動力学シミュレーション研究	灘　浩樹	産業技術総合研究所	Molecular Dynamics Simulation Study of Morphology Control Mechanism of TiO_2 Rutile Crystal by Hydroxy Acid	Hiroki Nada	National Institute for Advanced Industrial Science and Technology
181	テンソルネットワーク計算手法の開発	原田　健自	京都大学大学院情報学研究科	Development of tensor network algorithms	Kenji Harada	Kyoto University
182	ランダムスピン系の大規模モンテカルロ計算	福島　孝治	東京大学大学院総合文化研究科	Large-scale Monte Carlo calculation of random spin systems	Koji Hukushima	The University of Tokyo
183	並列化テンソルネットワーク法の開発とその応用	森田　悟史	東京大学物性研究所	Development of Parallelized Tensor-Network Algorithm and its Applications	Satoshi Morita	The University of Tokyo

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184	ランダムな Dirac/Weyl 電子系の数値的研究	大槻　東巳	上智大学理工学部	Numerical study of random Dirac/Weyl electron systems	Tomi Ohtsuki	Sophia University
185	ガラス状物質及び粉体分散系の異常レオロジー現象	古川　亮	東京大学生産技術研究所	Anomalous rheological behaviors of glassy materials and granular suspensions	Akira Furukawa	The University of Tokyo
186	カーネル法による非平衡緩和解析の改良	尾関　之康	電気通信大学情報理工学研究科	Improvement of nonequilibrium relaxation analysis by the use of kernel method	Yukiyasu Ozeki	The University of Electro-Communications
187	フラストレート磁性体における新奇秩序	川村　光	大阪大学理学研究科	Novel order in frustrated magnets	Hikaru Kawamura	Osaka University
188	創発励起を伴う量子スピン系のモンテカルロスペクトル解析	諏訪　秀麿	東京大学大学院理学系研究科物理学専攻	Monte Carlo Spectral Analysis of Quantum Spin Systems with Emergent Excitation	Hidemaro Suwa	The University of Tokyo
189	O(N) モンテカルロ法による 1 次元長距離相互作用イジング模型の動力学の研究	富田　裕介	芝浦工業大学	Numerical study of dynamics in Ising spin models with long-range interactions	Yusuke Tomita	Shibaura Institute of Technology
190	量子フォノンにより誘起される磁化プラトー状態	諏訪　秀磨	東京大学大学院理学系研究科物理学専攻	Magnetization Plateaus Induced by Quantum Phonons	Hidemaro Suwa	The University of Tokyo
191	量子アニーリングの実験的実現のための理論基盤構築	田中　宗	早稲田大学 高等研究所	Theoretical study on quantum annealing machine	Shu Tanaka	Waseda University
192	実在ガラス材料の組織形成と変形に関与する不均一動力学の研究	芝　隼人	東北大学金属材料研究所	Study of heterogeneous dynamics inducing defect structure formation and deformation glassy materials	Hayato Shiba	Tohoku University
193	磁気冷凍におけるスケーリング則の適用外場探索	田村　亮	国立研究開発法人 物質・材料研究機構	Search for applicable external fields of scaling law in magnetic refrigeration	Ryo Tamura	National Institute for Materials Science
194	タンパク質結晶構造解析における n 波法による位相決定の予備的研究	沖津　康平	東京大学 大学院工学系研究科	A preliminary study on phase determination for protein crystals with the n-beam method	Kouhei Okitsu	The University of Tokyo
195	微細横溝加工を施した鉛直平板を流れる凝縮液膜流の熱輸送特性	足立　高弘	秋田大学工学資源学部機械工学科	Heat Transfer Characteristics of Condensate Film Flow along Vertical Plates with Microscopic Grooves	Takahiro Adachi	Akita University
196	格子の自由度と結合した量子スピン系におけるランダムネスの効果	安田　千寿	琉球大学理学部	Randomness Effects on Quantum Spin Systems Coupled to Lattice Degrees of Freedom	Chitoshi Yasuda	University of Ryukyus
197	融解現象とポリアモルフィズム	渕崎　員弘	愛媛大学理工学研究科	Melting phenomena and polyamorphism	Kazuhiro Fuchizaki	Ehime University
198	一般化イジング模型の相転移	田中　宗	早稲田大学 高等研究所	Phase Transitions in Generalized Ising Models	Shu Tanaka	Waseda University
199	空間構造をもつ一次元量子スピン系の数値的研究	利根川　孝	神戸大学大学院理学研究科	Numerical Study of the One-Dimensional Quantum Spin Systems with Spatial Structures	Takashi Tonegawa	Kobe University
200	融解現象とポリアモルフィズム	渕崎　員弘	愛媛大学理工学研究科	Melting phenomena and polyamorphism	Kazuhiro Fuchizaki	Ehime University

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201	摩擦の物理	松川　宏	青山学院大学理工学部	Physics of Friction	Hiroshi Matsukawa	Aoyama Gakuin University
202	有機金属構造体におけるトポロジカルな物性と量子スピン液体の実現に関する数値的研究	押川　正毅	東京大学物性研究所	Computational study of topological properties and realization of quantum spin liquids in metal-organic frameworks	Masaki Oshikawa	The University of Tokyo
203	ローレンツ力を含む拡張準古典方程式を用いた超伝導体のホール効果の微視的解析	北　孝文	北海道大学理学部物理学科	Microscopic analysis of the Hall effect in superconductors using the augmented quasiclassical equations with the Lorentz force	Takafumi Kita	Hokkaido University
204	カーネル法による非平衡緩和解析の改良 II	尾関　之康	電気通信大学情報理工学研究科	Improvement of nonequilibrium relaxation analysis by the use of kernel method II	Yukiyasu Ozeki	The University of Electro-Communications
205	アモルファス系の超低周波域のデバイ状態密度とゆらぎの次元依存性	芝　隼人	東北大学金属材料研究所	Debye-law for the density of states and dimensionality dependence of fluctuation at ultra-low-frequencies in amorphous systems	Hayato Shiba	Tohoku University
206	過冷却液体状態のシクロヘキサンにおける局所構造変化と相転移現象	水口　朋子	京都工芸繊維大学	Local structure and phase transition in supercooled cyclohexane	Tomoko Mizuguchi	Kyoto Institute of Technology
207	細胞集団運動における秩序形成の込み合い効果	松下　勝義	大阪大学理学研究科	Crowding effect on order formation in collective cell migration	Katsuyoshi Matsushita	Osaka University
208	コンピュータ支援によるゼオライト合成	大久保　達也	東京大学大学院工学系研究科化学システム工学専攻	Computer-aided synthesis of zeolites	Tatsuya Okubo	The University of Tokyo
209	フラストレート量子スピン鎖の磁気励起とスピン伝導	大西　弘明	日本原子力研究開発機構 先端基礎研究センター	Magnetic excitation and spin transport in frustrated quantum spin chain	Hiroaki Onishi	Japan Atomic Energy Agency
210	相変化熱流体機器の最適設計手法の開発	森本　賢一	東京大学大学院工学系研究科機械工学専攻	Development of optimal design methodology of heat and fluid flow devices involving phase-change heat transfer	Kenichi Morimoto	The University of Tokyo
211	細胞集団運動における細胞込み合いの効果	松下　勝義	大阪大学理学研究科	Cell Crowding Effects in Collective Cell Migration	Katsuyoshi Matsushita	Osaka University
212	メッシュレス解析を用いた伝熱機器形状最適化手法の開発	森本　賢一	東京大学大学院工学系研究科機械工学専攻	Development of meshless analysis-based shape optimization method for heat transfer equipments	Kenichi Morimoto	The University of Tokyo
213	ランダム媒質中の光輸送とその医用イメージングへの応用	町田　学	浜松医科大学フォトニクス医学研究部	Light transport in random media and its application to medical imaging	Manabu Machida	Hamamatsu University School of Medicine
214	N 波高木方程式の球面波 X 線入射条件における数値解法の研究	沖津　康平	東京大学 大学院工学系研究科	Study on numerical method to solve n-beam Takagi equation with spherical-wave X-ray incidence	Kouhei Okitsu	The University of Tokyo
215	長距離相互作用行列の低ランク近似を用いたモンテカルロシミュレーション	五十嵐　亮	東京大学情報基盤センター	Monte Carlo simulation using low-rank approximation to long range interaction matrices	Ryo Igarashi	The University of Tokyo
216	マイコプラズマ滑走タンパク質の構造ダイナミクス解析	新井　宗仁	東京大学大学院総合文化研究科	Structure and dynamics of the gliding protein from Mycoplasma mobile	Munehito Arai	The University of Tokyo
217	異方的超伝導接合の量子現象における数値計算法の研究	田沼　慶忠	秋田大学大学院理工学研究科	Study of numerical methods for quantum phenomena of anisotoropic superconductors	Yasunari Tanuma	Akita University

No.	課題名	氏名	所属	Title	Name	Organization
218	計算機を用いた新規人工タンパク質の合理的設計	新井　宗仁	東京大学大学院総合文化研究科	Computational rational design of novel artificial proteins	Munehito Arai	The University of Tokyo
219	機械ひずみを用いたナノ材料フォノン・電子輸送特性制御	塩見　淳一郎	東京大学工学系研究科	Control of phonon and electron transport properties using mechanical strain	Junichiro Shiomi	The University of Tokyo
220	ソフトマテリアルの秩序構造の光学的性質の計算	福田　順一	産業技術総合研究所	Calculation of optical properties of ordered structures of soft materials	Jun-ichi Fukuda	National Institute of Advanced Industrial Science and Technology
221	タンパク質の分子動力学シミュレーション	新井　宗仁	東京大学大学院総合文化研究科	Molecular dynamics simulations of proteins	Munehito Arai	The University of Tokyo
222	半導体ナノ結晶に関する大規模シミュレーション	寺尾　貴道	岐阜大学工学部	Large-scale simulations of semiconductor nanocrystals	Takamichi Terao	Gifu University
223	高密剛体球系の非平衡相転移と大規模分子動力学シミュレーション	磯部　雅晴	名古屋工業大学	Nonequilibirum phase transition in the large scale dense hard sphere molecular dynamics simulation	Masaharu Isobe	Nagoya Institute of Technology
224	異方性を有する分子系における強誘電性と反強誘電性の競合	高江　恭平	東京大学生産技術研究所	Competition between ferroelectric and antiferroelectric order in anisotropic molecular systems	Kyohei Takae	The University of Tokyo
225	地震の統計モデルの数値シミュレーション	川村　光	大阪大学理学研究科	Numerical simulations on statistical models of earthquakes	Hikaru Kawamura	Osaka University
226	厳密対角化パッケージ Rokko による Heisenberg-Kitaev 模型の研究	坂下　達哉	東京大学物性研究所	Study on Heisenberg-Kitaev model by exact diagonalization package Rokko	Tatsuya Sakashita	The University of Tokyo
227	量子モンテカルロ法を用いた 1 次元相互作用電子系の輸送特性に関する数値研究	加藤　岳生	東京大学物性研究所	Numerical research of one-dimensional interacting electron systems by a quantum Monte Carlo method	Takeo Kato	The University of Tokyo
228	微細横溝加工を施した鉛直平板を流れる凝縮液膜流の熱輸送特性	足立　高弘	秋田大学工学資源学部機械工学科	Heat Transfer Characteristics of Condensate Film Flow along Vertical Plates with Microscopic Grooves	Takahiro Adachi	Akita University
229	半導体ナノ結晶に関する大規模シミュレーション	寺尾　貴道	岐阜大学工学部	Large-scale simulations of semiconductor nanocrystals	Takamichi Terao	Gifu University
230	地震の統計モデルの数値シミュレーション	川村　光	大阪大学理学研究科	Numerical simulations on statistical models of earthquakes	Hikaru Kawamura	Osaka University
231	空間構造をもつ一次元量子スピン系の数値的研究	利根川　孝	神戸大学大学院理学研究科	Numerical Study of the One-Dimensional Quantum Spin Systems with Spatial Structures	Takashi Tonegawa	Kobe University
232	ソフトマテリアルの秩序構造の光学的性質の計算	福田　順一	産業技術総合研究所	Calculation of optical properties of ordered structures of soft materials	Jun-ichi Fukuda	National Institute of Advanced Industrial Science and Technology
233	トポロジカル系における実空間構造の効果の研究	苅宿　俊風	物材機構	Analysis of Topological Systems with Real Space Structures	Toshikaze Kariyado	NIMS
234	パイロクロア反強磁性体における局所格子歪みの効果	青山　和司	大阪大学大学院理学研究科宇宙地球専攻	Lattice distortion effects on classical Heisenberg antiferromagnets on pyrochlore lattices	Kazushi Aoyama	Osaka University

No.	課題名	氏名	所属	Title	Name	Organization
235	生物発光関連分子の電子状態についての研究	樋山　みやび	東京大学物性研究所	Electronic states of bioluminescence related molecules	Miyabi Hiyama	The University of Tokyo
236	現実的なエラーモデルに対する量子誤り訂正符号のエラー耐性評価	杉山　太香典	大阪大学大学院基礎工学研究科	Evaluation of quantum error correction codes' performance against realistic error models	Takanori Sugiyama	Osaka University
237	パイロクロア反強磁性体における局所格子歪みと磁場効果	青山　和司	大阪大学大学院理学研究科宇宙地球専攻	Effects of a magnetic field on spin-lattice-coupled orders in pyrochlore antiferromagnets	Kazushi Aoyama	Osaka University
238	１次元フラストレート量子スピン系の数値的研究	飛田　和男	埼玉大学大学院理工学研究科物質科学部門	Numerical Study of One Dimensional Frustrated Quantum Spin Systems	Kazuo Hida	Saitama University
239	内部反応との相互作用を伴う膜系についての研究	小串　典子	お茶の水女子大学	Simulation study of membrane system coupled with inner reaction	Fumiko Ogushi	Ochanomizu Univ.
240	量子的なノイズに対する量子誤り訂正符号のノイズ耐性評価	杉山　太香典	大阪大学大学院基礎工学研究科	Evaluation of quantum error correction codes' performance against quantum noises	Takanori Sugiyama	Osaka University
241	異方的超伝導接合の量子現象における数値計算法の研究	田沼　慶忠	秋田大学大学院理工学研究科	Study of numerical methods for quantum phenomena of anisotoropic superconductors	Yasunari Tanuma	Akita University
242	ランダム媒質中の光輸送	町田　学	浜松医科大学フォトニクス医学研究部	Light transport in random media	Manabu Machida	Hamamatsu University School of Medicine
243	ペーストの流れの記憶の数値実験	中原　明生	日本大学理工学部一般教育教室（物理）	Numerical simulation for memory of flow in paste	Akio Nakahara	Nihon University
244	電子ー格子ー光子系非断熱ダイナミクスの研究	石田　邦夫	宇都宮大学大学院工学研究科	Study of nonadiabatic dynamics of electron-phonon-photon systems	Kunio Ishida	Utsunomiya University

平成 28 年度スーパーコンピュータ　計算物質科学スパコン共用事業　課題一覧 / Supercomputing Consortium for Computational Materials Science Project List of Supercomputer System 2016

No.	課題名	氏名	所属		Title	Name	Organization
前期 / The first half term							
1	第一原理電子構造計算とデバイス・プロセス・シミュレーション	押山　淳	東京大学	大学院工学系研究科	First-principles electronic-structure calculations and device-process simulations	Atsushi Oshiyama	The University of Tokyo
2	ナノ光応答理論と光・電子機能デバイスの計算科学的設計	信定　克幸	分子科学研究所	理論・計算分子科学研究領域	Nano-optical response theory and computational design of photo-electronic functional devices	Katsuyuki Nobusada	Institute for Molecular Science
3	界面における高温超伝導と非平衡超伝導の研究	今田　正俊	東京大学	大学院工学系研究科	Interfacial high-Tc superconductivity and nonequilibrium superconductivity	Masatoshi Imada	The University of Tokyo
4	f 電子系の第一原理計算手法開発	赤井　久純	東京大学	物性研究所	First-principles calculation on f-electron systems	Hisazumi Akai	The University of Tokyo
5	第一原理フェーズ・フィールド・マッピング	香山　正憲	産業技術総合研究所		First-Principles Phase Field Mapping	Masanori Kohyama	National Institute of Advanced Industrial Science and Technology
6	エネルギーの変換・貯蔵 — 電気エネルギー	杉野　修	東京大学	物性研究所	Energy conversion and storage – electric energy	Osamu Sugino	The University of Tokyo
7	液体材料物性の階層古典モデリングを用いたシミュレーション研究	芝　隼人	東北大学	金属材料研究所	Simulation of liquid materials properties using hybrid classical modeling	Hayato Shiba	Tohoku University
8	2015 年度ソフトウェア開発・高度化プロジェクト課題 (HΦ、OpenMX) を活用した共同研究の推進	吉見　一慶	東京大学	物性研究所	Promotion of joint researches through Project for advancement of software usability in materials science in 2015	Kazuyoshi Yoshimi	The University of Tokyo
9	多変数変分モンテカルロ法を用いた高温超伝導体界面の研究	三澤　貴宏	東京大学	物性研究所	Many-variable variational Monte Carlo study for interfaces of high-Tc superconductors	Takahiro Misawa	The University of Tokyo
後期 / The second half term							
10	第一原理電子構造計算とデバイス・プロセス・シミュレーション	押山　淳	東京大学	大学院工学系研究科	First-principles electronic-structure calculations and device-process simulations	Atsushi Oshiyama	The University of Tokyo
11	非平衡状態における超伝導相関	今田　正俊	東京大学	大学院工学系研究科	Superconducting correlations of nonequilibrium states	Masatoshi Imada	The University of Tokyo
12	第一原理フェーズ・フィールド・マッピング	香山　正憲	産業技術総合研究所		First-principles phase field mapping	Masanori Kohyama	National Institute of Advanced Industrial Science and Technology
13	複合電解質液体の流動、摩擦現象のメソダイナミクスの研究	芝　隼人	東北大学	金属材料研究所	Mesoscale dynamics study of rheology and friction in composite electrolyte solutions	Hayato Shiba	Tohoku University

No.	課題名	氏名	所属		Title	Name	Organization
14	量子ドット系におけるスピン緩和率に関する解析	吉見　一慶	東京大学	物性研究所	Analysis of spin relaxation phenomena in quantum dots	Kazuyoshi Yoshimi	The University of Tokyo
15	多変数変分モンテカルロ法を用いた負のフント結合を持つ縮退二軌道模型の解析	三澤　貴宏	東京大学	物性研究所	Many-variable variational Monte Carlo study for degenerate two-orbital Hubbard model with inverted Hund coupling	Takahiro Misawa	The University of Tokyo
16	GaN の結晶成長過程の第一原理的解析	重田　育照	筑波大学	計算科学研究センター	First-principles analyses on crystal growth mechanism of GaN	Yasuteru Shigeta	University of Tsukuba
17	ナノ界面高強度パルス光励起ダイナミクス	矢花　一浩	筑波大学	計算科学研究センター	Dynamics in nano-interface excited by high-intensity pulsed light	Kazuhiro Yabana	University of Tsukuba
18	テンソルネットワーク法・量子モンテカルロ法による新しい量子相・量子臨界現象の探求	川島　直輝	東京大学	物性研究所	Search for novel quantum phases and transitions by tensor network methods and quantum Monte Carlo methods	Naoki Kawashima	The University of Tokyo
19	有機 / 無機界面の物性に関する計算	尾形　修司	名古屋工業大学	大学院工学研究科	Simulation of organic-inorganic interfaces	Shuji Ogata	Nagoya Institute of Technology
20	大型実験施設との連携	遠山　貴巳	東京理科大学	理学部第一部	Cooperation research with big experimental Facilities	Takami Tohyama	Tokyo University of Science
21	有機系太陽電池における光電変換の基礎過程の研究と変換効率最適化にむけた大規模数値計算	山下　晃一	東京大学	大学院工学系研究科	Large scale calculations on the fundamental processes of organic and perovskite solar cells and their optimization in conversion efficiency	Koichi Yamashita	The University of Tokyo
22	エネルギーの変換・貯蔵 — 電気エネルギー：全電池シミュレータの基盤技術の開発研究	岡崎　進	名古屋大学	大学院工学研究科	Conversion and storage of energy - Fuel cells and secondary batteries: Research and development of fundamental technologies of battery simulators	Susumu Okazaki	Nagoya University
23	生体膜変形ダイナミクスのマルチスケール・シミュレーション	岡崎　圭一	分子科学研究所	理論・計算物質科学研究部門	Multiscale simulations of bio-membrane shape-changing dynamics	Kei-ichi Okazaki	Institute for Molecular Science
24	グリーン関数法を用いた分子集合体の励起状態計算	藤田　貴敏	分子科学研究所		Excited-state calculations for molecular aggregates based on Green’ s function method	Takatoshi Fujita	Institute for Molecular Science
25	オーダー N 遮蔽 KKR グリーン関数法を用いたスピントロニクス材料の探索	福島　鉄也	大阪大学	ナノサイエンスデザイン教育研究センター	Design of spintronics materials by order-N screened KKR Green function method	Tetsuya Fukushima	Osaka University
26	ナトリウム二次電池に対する物質探索	小口　多美夫	大阪大学	産業科学研究所	Materials exploration for sodium secondary batteries	Tamio Oguchi	Osaka University
27	酸化物基板に担持された汎用元素クラスターの触媒活性	武次　徹也	北海道大学	大学院理学研究院	Catalytic activity of abundant-metal clusters supported by an oxide substrate	Tetsuya Taketsugu	Hokkaido University
28	第一原理計算に基づいたスクリーニングによる新規半導体の探索	大場　史康	東京工業大学	科学技術創成研究院フロンティア材料研究所	Exploration of novel semiconductors by first-principles screening	Fumiyasu Oba	Tokyo Institute of Technology
29	ナトリウムイオン二次電池用電解液の量子分子動力学シミュレーション	中井　浩巳	早稲田大学	理工学術院	Quantum molecular dynamics simulation on electrolyte solution for sodium-ion battery	Hiromi Nakai	Waseda University
30	第一原理計算に基づいた磁性材料の開発	三宅　隆	産業技術総合研究所		First-principles study of magnetic materials	Takashi Miyake	National Institute of Advanced Industrial Science and Technology

No.	課題名	氏名	所属		Title	Name	Organization
31	高電圧ナトリウムイオン電池に向けた正極反応の基礎過程の解析	山田　淳夫	東京大学	大学院工学系研究科	Analysis of elementary cathode reactions towards high-voltage sodium ion batteries	Atsuo Yamada	The University of Tokyo
32	B、C、N を用いた電子デバイス新物質の設計研究	斎藤　晋	東京工業大学	理学院	Materials design using B, C, and N for next-generation device	Susumu Saito	Tokyo Institute of Technology

Publications

Division of Condensed Matter Science

Takigawa group

We have been performing nuclear magnetic resonance experiments on various quantum spin systems and strongly correlated electron systems to explore novel quantum phases with exotic ordering and fluctuation phenomena. The major achievements in the year 2015 include: (1) Discovery of a magnetic field-induced phase transition in PrTi2Al20, a f-electron system with the Gamma-3 non-magnetic doublet crystal field ground state,by means of Al-NMR and magnetization measurements. (2) First observation of a magnetic order in the heavy electron system beta-YbAlB4 under high poressure of 8 GPa.

1. *NMR Observation of Ferro-Quadrupole Order in $PrTi_2Al_{20}$: T. Taniguchi, M. Yoshida, H. Takeda, M. Takigawa, M. Tsujimoto, A. Sakai, Y. Matsumoto and S. Nakatsuji, J. Phys. Soc. Jpn. **85** (2016) 113703(1-4).
2. Pressure-Tuned Exchange Coupling of a Quantum Spin Liquid in the Molecular Triangular Lattice κ-$(ET)_2Ag_2(CN)_3$: Y. Shimizu, T. Hiramatsu, M. Maesato, A. Otsuka, H. Yamochi, A. Ono, M. Itoh, M. Yoshida, M. Takigawa, Y. Yoshida and G. Saito, Phys. Rev. Lett. **117** (2016) 107203(1-6).
3. *Single crystal ^{27}Al-NMR study of the cubic Γ_3 ground doublet system $PrTi_2Al_{20}$: T. Taniguchi, M. Yoshida, H. Takeda, M. Takigawa, M. Tsujimoto, A. Sakai, Y. Matsumoto and S. Nakatsuji, J. Phys.: Conf. Ser. **683** (2016) 012016(1-9).
4. *Site-selective ^{11}B NMR studies on $YbAlB_4$: S. Takano, M. S. Grbic, K. Kimura, M. Yoshida, M. Takigawa, E. C. T. O. Farrell, K. Kuga, S. Nakatsuji and H. Harima, J. Phys.: Conf. Ser. **683** (2016) 012008(1-6).
5. J(1)-J(2) square-lattice Heisenberg antiferromagnets with 4d(1) spins AMoOPO(4)Cl (A=K, Rb): H. Ishikawa, N. Nakamura, M. Yoshida, M. Takigawa, P. Babkevich, N. Qureshi, H. M. Rønnow, T. Yajima and Z. Hiroi, Phys. Rev. B **95** (2017) 064408.

Sakakibara group

We study magnetism and superconductivity of materials having low characteristic temperatures. These include heavy-electron systems, quantum spin systems and frustrated spin systems. The followings are some selected achievements in the fiscal year 2016. (1) An experimental technique of low-temperature magnetization measurements under in-situ tuning of the sample orientation has been developed. A two-axis goniometer is introduced into our capacitively-detected Faraday magnetometer, making it possible to rotate the sample by $|\theta|<7$ deg. and $|\varphi|<3$ deg. The apparatus has been applied to a metamagnetic heavy fermion compound $CeRu_2Si_2$, and found that the magnetization isotherms $M(H)$ of this tetragonal compound can be completely scaled by $H\cos\theta$, where θ is the angle between H and the c axis, confirming the Ising nature of this system. (2) The critical exponent ν of the phase boundary of a field-induced incommensurate ordering state has been examined on the spin-1/2 ferromagnetic-leg ladder 3-Br-4-F-V [=3-(3-bromo-4-fluorophenyl)-1,5-diphenylverdazyl]. Using the temperature-window fitting technique, we obtained the critical exponents which agreed with the 3D Bose-Einstein condensation (BEC) universality class at both sides of the lower critical field and the saturation field. 3-Br-4-F-V thus becomes a new member of the quantum magnets which prove the universality of the 3D BEC exponent. (3) Quasiparticle excitations in the hexagonal heavy-fermion superconductor UPd_2Al_3 have been studied by means of heat capacity (C) measurements under rotating magnetic fields. At low temperatures, the polar angle (θ) dependence of C exhibits a maximum along $H\|[0001]$ with a two-fold symmetric oscillation below 0.5 T, and an unusual shoulder/hump anomaly has been found around 30-60 deg. from the c axis in $C(\theta)$ at intermediate fields ($1<H<2$ T). This feature in $C(\theta)$ entirely comes from nodal quasiparticle excitations, and has been successfully explained by theoretical calculations assuming a gap function with a horizontal line node.

1. Evidence for chiral d-wave superconductivity in URu_2Si_2 from the field-angle variation of its specific heat: S. Kittaka, Y. Shimizu, T. Sakakibara, Y. Haga, E. Yamamoto, Y. Onuki, Y. Tsutsumi, T. Nomoto, H. Ikeda and K. Machida, J. Phys. Soc. Jpn. **85** (2016) 033704 (2016).
2. †*Superconductivity and Non-Fermi-Liquid Behavior in the Heavy-Fermion Compound $CeCo_{1-x}Ni_xIn_5$: R. Otaka, M. Yokoyama, H. Mashiko, T. Hasegawa, Y. Shimizu, Y. Ikeda, K. Tenya, S. Nakamura, D. Ueta, H. Yoshizawa and T. Sakakibara, J. Phys. Soc. Jpn. **85** (2016) 094713.

* Joint research among groups within ISSP.

3. Field-induced phase transitions and magnetoferroelectricity in the perfect triangular lattice antiferromagnet $RbFe(MoO_4)_2$ in a vertical magnetic field: H. Mitamura, R. Watanuki, N. Onozaki, Y. Amou, Y. Kono, S. Kittaka, Y. Shimura, I. Yamamoto, K. Suzuki and T. Sakakibara, J. Magn. Magn. Mater. **400** (2016) 70-72.

4. First-order superconducting transition of Sr_2RuO_4 investigated by magnetization and magnetic torque: S. Kittaka, A. Kasahara, T. Sakakibara, D. Shibata, S. Yonezawa, Y. Maeno, K. Tenya and K. Machida, J. Magn. Magn. Mater. **400** (2016) 81-83.

5. Heat capacity measurements on UBe_{13} in rotated magnetic fields: anisotropic response in the normal state and the absence of nodal quasiparticles: Y. Shimizu, S. Kittaka, T. Sakakibara, Y. Haga, E. Yamamoto, H. Amitsuka, Y. Tsutsumi and K. Machida, J. Magn. Magn. Mater. **400** (2016) 52-55.

6. [*]Low-energy excitations and ground-state selection in the quantum breathing pyrochlore antiferromagnet $Ba_3Yb_2Zn_5O_{11}$: T. Haku, K. Kimura, Y. Matsumoto, M. Soda, M. Sera, D. Yu, R. A. Mole, T. Takeuchi, S. Nakatsuji, Y. Kono, T. Sakakibara, L. -J. Chang and T. Masuda, Phys. Rev. B **93** (2016) 220407(1-5).

7. Quadrupole-driven non-Fermi-liquid and magnetic-field-induced heavy fermion states in a non-Kramers doublet system: T. Onimaru, K. Izawa, K. T. Matsumoto, T. Yoshida, Y. Machida, T. Ikeura, K. Wakiya, K. Umeo, S. Kittaka, K. Araki, T. Sakakibara and T. Takabatake, Phys. Rev. B **94** (2016) 075134(1-8).

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23. 重い電子系における超伝導研究の新展開 —磁場角度分解比熱測定からみたギャップ対称性—: 橘高俊 一郎 , 榊原 俊郎 , 町田 一成 , 固体物理 **51** (2016) 411-427.

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Mori group

We have successfully developed and unveiled unprecedented functional properties for the molecular materials. The major achievements in 2016 are (1) to disclose the chemical pressure effect by anion substitution on hydrogen-bond-mediated phase transition of β'-H_3(Cat-EDO-TTF)$_2BF_4$, (2) to improve the stability of a metallic state in benzothienobenzothiophene-based molecular conductor, β-[BTBT(OH)$_2$]ClO_4, by an effective increase of dimensionality with hydrogen bonds, and (3) to investigate theoretically the H/D isotope effects on phase transition of hydrogen-bonded organic conductor κ-D_3(Cat-EDT-X)$_2$ (X = TTF and ST).

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Osada group

We have studied the transport properties of the high-mobility thin-film black phosphorus (BP) field effect transistor (FET) device, and have newly found double carrier transport features in positively gated (electron-doped) region. We built a van der Waals stacking structure, hexagonal born nitride (h-BN)/thin-film PB (15-20 nm)/h-BN on SiO_2/n^+-Si substrate, in the grove box environment and then fabricated it into an FET device. By avoiding the degradation of BP by oxygen and water using the h-BN sandwiched structure, the carrier mobility in the FET has reached 6,000 cm^2/Vs for holes and 5,800 cm^2/Vs for electrons, which are the highest mobility ever reported. We have newly observed double period Shubnikov-de Haas oscillations, which indicates two Fermi surfaces (FSs), in the highly electron doped region (positively gated region). The second FS is considered to originate from the second electron subband in the ultra-thin BP films.

1. 原子層におけるトポロジー物理 : 長田 俊人 , 表面科学 **37** (2016) 535-540.

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Yamashita group

We have been studying (1) quantum criticality in heavy-fermion materials by ultra-low temperature cryostat, (2) thermal-Hall conductivity of exotic excitations in frustrated magnets and (3) a new technique for the study of strongly-correlated electron systems. In this year, we have performed (1) Co and In NMR measurements of $CeCoIn_5$ at ultra-low temperatures, (2) thermal Hall measurements in spin liquid materials $Ba_3CuSb_2O_9$ and alpha-$RuCl_3$ and (3) scanning-Hall measurements of Mn_3Sn.

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Division of Condensed Matter Theory

Tsunetsugu group

We have completed the study of optical conductivity near antiferromagnetic transition. The main result is the importance of vertex corrections, and this is different from the case of Mott transition, where the vertex corrections have little effects. We also completed the study of quadrupole antiferro orders in a heavy fermion system, and determined the detailed phase diagram in temperature and magnetic field space. Spin singlet order in breathing pyrochlores has been also investigated in detail, and we have found that the spin size essentially change a ground state order. For S>1/2, tetramer orders are stabilized, which contrasts to dimer orders in the S=1/2 case. For this problem, we have developed a systematic scheme of degenerate perturbation tailored for breathing pyrochlores, and derived an effective Hamiltonian for low-energy dynamics.

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3. Entanglement prethermalization in an interaction quench between two harmonic oscillators: T. N. Ikeda, T. Mori, E. Kaminishi and M. Ueda, Phys. Rev. E **95** (2017) 022129(1-8).

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Kato group

The main research subject of our laboratory is theory of non-equilibrium properties in nanoscale devices. We have studied (1) adiabatic pumping via a quantum dot with Coulomb interaction, (2) current fluctuations in a Kondo-correlated quantum dot, and (3) Andreev bound states in a multi-terminal superconducting device. We have also collaborated with experimentalists in ISSP, and have supported theoretical aspects on (4) pressure dependence of the magnetic ground states in MnP and (5) proximity effect at a single atomic step by STM.

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2. Order, disorder, and tunable gaps in the spectrum of Andreev bound states in a multiterminal superconducting device: T. Yokoyama, J. Reutlinger, W. Belzig and Y. V. Nazarov, Phys. Rev. B **95** (2016) 045411.

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Division of Nanoscale Science

Katsumoto group

We have continued the study of the proximity superconductivity in a ferromagnetic semiconductor (In,Fe)As. The hysteretic behavior of the critical current indicates that the spin-triplet type pairing is realized inside (In,Fe)As. On the other hand, a Heusler ferromagnet Co_2FeSi does not show any proximity superconductivity probably due to the clean ferromagnet-superconductor interface. Microwave response of two-dimensional electrons in quantum Hall state has been studied. By applying gate voltage and controlling the effective sample edge, previously-found absorption peaks are greatly enhanced, which result manifest that the peaks correspond to the edge plasmon absorption.

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4. Spin phase protection in interference of electron spin waves in lightly hydrogenated graphene: T. Kato, J. Kamijo, T. Nakamura, C. Ohata, S. Katsumoto and J. Haruyama, RSC Adv. **6** (2016) 67586.

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Otani group

This year we tried to expand our research activities toward spintronics utilizing more complex materials in collaboration with the groups working on strongly correlated materials. For example, we have demonstrated magneto-chiral nonreciprocity of volume spin wave propagation in chiral-lattice ferromagnets and spin/charge interconversion using the surface state of topological insulator. We also examined systematically conventional spin Hall effects in Pt as a function of conductivity and found that the spin Hall effect of Pt is tunable. Apart from those, we newly found metal/Bi oxide interface provides an effective spin momentum locking behavior which can be applied for detection of spin currents.

1. Optimization of spin injection and spin detection in lateral nanostructures by geometrical means: O. Stejskal, J. Hamrle, J. Pištora and Y. Otani, J. Magn. Magn. Mater. **414** (2016) 132.

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2. Magnetochiral nonreciprocity of volume spin wave propagation in chiral-lattice ferromagnets: S. Seki, Y. Okamura, K. Kondou, K. Shibata, M. Kubota, R. Takagi, F. Kagawa, M. Kawasaki, G. Tatara, Y. Otani and Y. Tokura, Phys. Rev. B **93** (2016) 235131.
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11. Shape- and Interface-Induced Control of Spin Dynamics of Two-Dimensional Bicomponent Magnonic Crystals: S. Choudhury, S. Saha, R. Mandal, S. Barman, Y. Otani and A. Barman, ACS Appl. Mater. Interfaces **8** (2016) 18339.
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Komori group

Growth of hetero-epitaxial fcc Fe thin films is controlled by using a nanoscale strain-relief mechanism due to the substrate step edges. The lattice expansion/compression caused by the steps is directly observed in atomic-scale STM images accompanied with the local change of the surface electronic states. Ammonia synthesis reaction by atomic hydrogen on the N-adsorbed Cu surfaces was studied using STM. Presence of the clean Cu surface largely enhances the reaction probability owing to the hydrogen diffusion on the surface. Spin-direction of photoelectrons from spin-helical surface states is coherently controlled by linearly-polarized excitation laser light for the Bi_2Se_3, Bi(0001) and Bi/Ag(111) surfaces. The direction is three-dimensionally detected by a newly developed SARPES.

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Hasegawa group

Using scanning tunneling microscopy (STM) we investigated transport properties of a monolayer metallic thin film formed on a semiconductor substrate using superconducting pair correlation as a probing signal. The pair correlation was induced onto the two-dimensional (2D) metallic layer by locating superconducting materials on it. Tunneling spectra taken around the proximate area provides information on how the pair correlation spread and decay from the super/normal interface and how step structures on the layer disturbs the spreading. Since these are closely related with electrical conductance, conductivity through the monoatomic layer and a atomic-high step can be estimated through the spatially resolved spectral measurements. We have taken tunneling spectra at 2.1 K around superconducting Pb island structures formed on Pb-induced striped incommensurate phase; a 2D metallic layer formed on Si(111) substrate, and obtained the conductivity through the 2D layer and across a single atomic-height step. It turned out that the steps have a significant contribution to the total resistance even on a nominally flat surface, and that macroscopic monolayer conductance, which includes the step conductance, is quite sensitive to a miscut angle of the substrate. We also demonstrate that a method of compressed sensing is quite effective to improve the quality of obtained results and to save measurement time in the observation of quasi-particle interference (QPI) by STM. Since QPI provides momentum-space information on electronic states of samples, it is a very powerful tool to investigate the electronic states at very low temperature and/or under magnetic field, where photoemission spectroscopy cannot be performed. The QPI measurement is, however, quite time-consuming; it takes a few days to a week for a single dataset. Utilizing the sparseness of the QPI signals in momentum space, we performed a sparsity-inducing algorithm called least absolute shrinkage and selection operator (LASSO), and demonstrated that LASSO recovers a circular QPI pattern of the Ag(111) surface from a dataset whose size is less than that necessary for the conventional Fourier transformation method. Our results demonstrate that the compressed sensing based on the sparse modeling works well in the QPI analysis and that the concept and the procedure should be applied to various subjects in condensed matter physics.

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Lippmaa group

Our recent work is related to the materials analysis and structural design of photoelectrode materials for photoelectrochemical water splitting reactions. We have studied the process of optically excited *d*-state relaxation in oxides and discovered a relaxation path related magnetic order in MnO. This work may open a path to control the relaxation rate of excited *d*-states by external magnetic fields. Another topic is the design of self-organized nanostructures for constructing robust electrodes in oxide thin films to extract photogenerated carriers from a low-mobility oxide semiconductor. Rapid photocarrier recombination limits the maximum achievable efficiency of photoelectrochemical reactions on photoelectrode surfaces because carriers generated

[†] Joint research with outside partners.

deep in the semiconductor cannot be transported to the surface without trapping and recombination. Embedding metallic nanowires in an oxide matrix helps to reduce the necessary diffusion path length for excited carriers and thus improve the efficiency of photo-induced electrochemical reactions. We have demonstrated the growth of Ir metal nanopillars in $SrTiO_3$ and showed that tubular Schottky junctions form around the nanopillars. Photocarriers generated in the Schottky depletion regions are quickly separated and transported to the film surface through the metallic nanopillars.

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Functional Materials Group

Yoshinobu group

We conducted several research projects in the fiscal year 2016. (1) The activation and hydrogenation of CO_2 on clean and Zn-deposited Cu(111) and Cu(997) surfaces studied by AP-XPS, IRAS, and TPD. (2) The surface chemistry of formic acid on clean and Zn-deposited Cu(111) and Cu(997) surfaces studied by SR-PES, IRAS and TPD . (3) Spectroscopic characterization of H-Cu(111), Zn-Cu(111), Pd-Cu and Pd-Ag surfaces by XPS. (4) Spectroscopic characterization of Pt atoms and clusters on graphene using SR-XPS (5) LT-STM study of CO_2 on Cu(997) (6) Independently driven four-probe conductivity measurement of organic thin films including pentacene etc. (7) Gas-exposure effects on single organic layer FET

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Akiyama group

In 2016, we improved accuracy of absolute electroluminescence-efficiency measurements for multi-junction solar cells by developing an integration-sphere total-flux characterization system. We started time-resolved photo-emission spectroscopy of solar cells. We studied pico- and femto-second short-pulse generation via gain switching in semiconductor lasers via optical pumping and current injection. We studied photo-cleavage and damages of caged luciferins. We made intensive studies on theoretical quantum-chemistry and molecular-dynamics calculations on oxyluciferins and related molecule systems.

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Sugino group

We have done first-principles study of materials. On the basis of the many-body Green's function method for excited states, we have developed a method for classifying excitons in a molecule which is shown particularly important for designing luminescence materials. We have also developed a wave function theory on the basis of a tensor decomposition method and, as a first step, we successfully approached a magnetic single-impurity problem. Using the density functional theory, we have studied topological materials, magnetism under high pressure, and bioluminescence.

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Quantum Materials Group

Oshikawa group

We studied a wide range of problems in quantum condensed matter theory. In particular, we have proposed a new possibility of realizing and designing Kitaev spin liquid in materials, using Metal-Organic Frameworks. Kitaev discovered a remarkable exactly solvable spin model, which has an exotic spin liquid state as the ground state. With its bond-dependent Ising interaction, initially it was regarded as just a theoretical toy model. This perception was changed by Jackeli and Khaliullin, who found that such interactions can naturally arise from spin-orbit interaction in iridates. This led to a flurry of attempts of experimental realization of Kitaev spin liquid in iridates and $RbCl_3$. However, unfortunately, in these materials a sizable Heisenberg antiferromagnetic interaction arises from the direct exchange, resulting in a non-spin liquid ground state. We proposed a novel strategy of using Metal-Organic Frameworks to realize Kitaev spin liquid, and gave supporting theoretical evidences. While it is also based on Jackeli-Khaliullin mechanism, it has advantages in a natural suppression of direct exchanges and in its flexibility and tunability. In particular, it can lead to realization of a variety of three-dimensional Kitaev spin liquids.

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Nakatsuji group

Our group explores novel quantum phases and phase transitions in rare-earth and transition metal based compounds. The

† Joint research with outside partners.

followings are some relevant results obtained in 2016. (1) We discovered second example of an antiferromagnet that exhibits the anomalous Hall effect at room temperature, the chiral antiferromagnet Mn_3Ge. (2) The quantum criticality at ambient pressure in β-$YbAlB_4$ can be transformed into a magnetic state whose transition temperature reaches a record high value exceeding 30 K. (3) Our thermodynamic and muSR studies have revealed highly frustrated magnetism with significant quantum fluctuations in the Heisenberg spinel antiferromagnet $CdYb_2S_4$ (4) Our neutron diffraction experiments in collaboration has revealed that disorder in the pyrochlore lattice plays an important role to enhance quantum fluctuations to stabilize a quantum Coulombic phase formed in a quantum spin ice candidate $Pr_2Zr_2O_7$.

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Materials Design and Characterization Laboratory

Hiroi group

The ferromagnetic and conducting magnetic domain walls in the all-in/all-out order of $Cd_2Os_2O_7$ are studied. The superconductivity and multipolar phase transitions of the pyrochlore oxide $Cd_2Re_2O_7$ are revisited. Many frustrated spin systems are studied. CdK $[CdCu_3(OH)_6(NO_3)_2 \cdot H_2O]$ is a structurally perfect kagome antiferromagnet crystallizing in the kapellasite-type. An

† Joint research with outside partners.

antiferromagnetic order accompanied by a small spontaneous magnetization that surprisingly is confined in the kagome plane sets in at TN ~ 4 K, well below the nearest-neighbor exchange interaction J/kB = 45 K. This suggests that a unique “q = 0” type 120° spin structure with “negative” (downward) vector chirality, which breaks the underlying threefold rotational symmetry of the kagome lattice and thus allows a spin canting within the plane, is exceptionally realized in this compound rather than a common one with “positive” (upward) vector chirality. The origin is discussed in terms of the Dzyaloshinskii-Moriya interaction. The quasi-1D antiferromagnet $NaCuMoO_4(OH)$, which comprises edge-sharing CuO_2 chains, is shown to be a good candidate for the frustrated J1–J2 chain model with J1 = 51 K and J2 = 36 K. We are now looking for evidence of a spin nematic state expected just below the saturation field of 26 T. $AMoOPO_4Cl$ (A = K, Rb) with Mo^{5+} ions in the $4d^1$ electronic configuration are good model compounds for the spin-1/2 J1–J2 square-lattice magnet. Magnetic transitions are observed at around 6 and 8 K in the K and Rb compounds, respectively. In contrast to the normal Néel-type antiferromagnetic order, the NMR and neutron diffraction experiments find a columnar antiferromagnetic order for each compound, which is stabilized by a dominant antiferromagnetic J2. Both compounds realize the unusual case of two interpenetrating J2 square lattices weakly coupled to each other by J1.

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Kawashima group

We have been investigating quantum spin/boson systems and frustrated systems by means of large-scale numerical simulation. We also develop new numerical techniques. Our group's activities of 2016 include: (1) development of the tensor network algorithms and codes suitable for parallel computation, (2) application of the tensor network methods to frustrated spin / fermion systems, and (3) quantum Monte Carlo simulation of bosonic systems targeting the two-dimensional Helium system.

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Uwatoko group

Temperature dependence of resistivity on KFe_2As_2 single crystals down to 20 mK was measured under various hydrostatic pressures up to 17.5 GPa generated in a cubic-anvil cell. With increasing the pressure, the superconducting transition of tetragonal KFe_2As_2 was suppressed gradually and disappears completely at ~ 11 GPa, which was related to the weakening of electronic correlations and/or critical fluctuations under pressure. MnP, a superconductor under pressure, exhibits a ferromagnetic order below T_C ~ 290 K followed by a helical order with the spins lying in the ab plane and the helical rotation propagating along the c axis below T_s ~ 50 K at ambient pressure. Both T_C and T_s are gradually suppressed with increasing pressure and the helical order disappears at ~ 1.2 GPa. At intermediate pressures of 1.8 and 2.0 GPa, the ferromagnetic order first develops and changes to a conical or two-phase (ferromagnetic and helical) structure with the propagation along the b axis below a characteristic temperature. At 3.8 GPa, a helical magnetic order appears below 208 K, which hosts the spins in the ac plane and the propagation along the b axis. The high-pressure magnetotransport measurements in FeSe up to ~ 15 GPa are reported. Above ~ 6 GPa the sudden enhancement of superconductivity ($T_c \le 38.3$ K) accompanies a suppression of magnetic order. The obtained phase diagram highlights unique features of FeSe among iron-based superconductors. And effect of pressure on the several Eu compounds have been investigated as results of joint program.

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Noguchi group

We have studied the membrane shape transformations by proteins. (1) tubulation and rupture by the absorption of banana-shaped proteins. (2) high-genus stomatocyte (nuclear envelope shape) constructed by osmotic pressure and pore-size constraint by nuclear pore complex. We have also proposed new force decomposition methods of multibody potentials to calculate local stress and found that the obtained local stress largely depends on the decompositions even when they satisfy the conservation of translational and angular momentum.

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Materials Synthesis and Characterization group

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Neutron Science Laboratory

Shibayama group

Shibayama group has been exploring the structure and dynamics of soft matter, especially polymer gels, micelles, thermo-responsive polymers, and thermosets, utilizing a combination of small-angle neutron scattering (SANS), small-angle X-ray scattering (SAXS), and dynamic light scattering (DLS). The objectives are to elucidate the relationship between the structure and variety of novel properties/functions of polymer gels/resins. The highlights of 2016 include investigation of (1) solvated structure of thermoresponsive polymers in ionic liquid, (2) structure of amphiphilic conetworks, (3) crosslinking inhomogeneities of phenolic resins, (4) pressure response of thermoresponsive polymer in ionic liquid, and (5) dynamic light scattering microscopy of turbid systems, (6) probe-SAXS of hydrogels under elongation, and so on.

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Yoshizawa group

A systematic study on a family of Ce-based non-centrosymmetric heavy fermion compounds CeTSi3 (T=transition metal ions) were studied, and the M-T phase diagram was established for CePdSi3. It is found that CePdSi3 shows extremely complicated multi-metamagnetic transitions. In order to elucidate such complicated magnetic phase diagram and magnetic properties from a microscopic basis, the crystalline electric field levels were studied for T=Pd, Pt, and Rh compounds with use of inelastic neutron scattering measurements.

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Yamamuro group

Our laboratory is studying chemical physics of complex condensed matters by using neutron scattering, X-ray diffraction, calorimetric, dielectric, and viscoelastic techniques. Our target materials are glasses, liquids, and various disordered systems. This year, we have succeeded to measure synchrotron X-ray diffraction of glassy carbon disulfide (CS_2), propane ($CH_3CH_2CH_3$) and propene (CH_3CHCH_2). These glasses were prepared by vapor-deposition at 3 K by using a cryostat developed for in-situ X-ray diffraction experiments in SPring-8. It was found that the local structures of these simple molecular glasses are similar to those of their crystalline states. Another topic is that we found unusual glass transitions in liquid alkylated tetraphenylporphirins (3,5-C_6C_{10}-TPP and 2,5-C_6C_{10}-TPP); they appeared in a wide temperature range between 150 and 230 K. It is amazing that these large molecules (molecular mass: 2538) exist in liquid states at room temperature. We named these liquids "super-high entropy liquids". Other than above topics, we have obtained neutron diffraction data of nanoparticles of PdPtD and PdRuD alloy hydride systems. The analysis is going on.

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Masuda group

The goal of our research is to discover a new quantum phenomenon and to reveal the mechanism of it. In this fiscal year we studied the following topics; magnetic order in a buckled honeycomb lattice antiferromagnet, spin model of O2-based magnet in a nanoporous metal complex, dielectric and magnetic properties in relaxor magnet, magnetic excitations in a quantum breathing pyrochlore antiferromagnet, and continuous control of local magnetic moment by applied electric field in a multiferroic material.

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International MegaGauss Science Laboratory

Takeyama group

1000 T class electro-magnetic flux compression megagauss generators were reconstructed and completed. A peak magnetic field of 450 T is obtained by the magagauss generator with less than 1 MJ energy injection. Magnetization measurement techniques are still in progress in the single-turn coil magagauss generator system, and the measurements using a co-axial type self-compensated pick-up-coil up to 130 T, and using magneto-optical techniques up to 200 T are currently achieved with high reliability, at very low temperature around 5 K. The methods have been applied to investigate spin structures of frustrated magnetic materials, multi-ferro materials, and quantum spin systems, etc.

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Kindo group

The specific heat measurements under long pulsed magnetic field up to 43.5 T has been open for the joint-use research. Repetition of the maximum field generation is limited to three times in a day due to a cooling time for the magnet. We are making new high repetitive magnet to carry out the measurements at higher frequency.

[*] Joint research among groups within ISSP.

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Tokunaga group

Multiferroic materials have been extensively studied partly because of their possible application to the memory devices with low power consumption. Our careful experiments revealed non-volatile magnetoelectric memory effects in a well-known multiferroic material, $BiFeO_3$. We found application of positive (negative) electric fields to a sample causes decrease (increase) in the resistance. This bipolar RRAM effect observed at room temperature will be useful for memory devices.

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Y. Matsuda group

Spin state degree of freedom of cobalt oxides has been attracting much attention of scientists for a long time. The electronic and structural properties as well as the magnetic properties sometimes change dramatically. $LaCoO_3$ is one of the canonical cobalt oxides and has been studied for more than half century owing to its peculiar properties. We have investigated the magnetization process of $LaCoO_3$ in high magnetic fields of up to 133 T at several temperatures. In addition to the previously known magnetization jump at around 65 T at low temperatures, a novel phase has been observed to appear in higher fields when temperature is higher than about 30 K. The phase boundary in field-temperature (B-T) plane indicates this phase has lower entropy than the low field phase. The transition field increases with temperature and becomes higher than 130 T at 105 K. The spatial ordered state of the different spin states, namely high spin (S=2), intermediate spin (S=1) and low spin (S=0) states, is suggested. From theoretical point of view, field-induced transition to an excitonic insulating state possibly explains the observed phenomenon. Another cobalt oxide $(Pr_{1-x}Y_x)_{0.7}Ca_{0.3}CoO_3$ has also been studied in ultrahigh fields of up to 140 T and found that the B-T phase diagram determined by the magnetization and electric resistivity is qualitatively different from that of $LaCoO_3$. We also studied the magnetic field induced phase transition of solid oxygen using irreversible heating effect. In SPring-8, using a pulsed magnet being combined with intense synchrotron x-rays, the valence state of Ce in the heavy fermion compound $CeIrIn_5$ was directly examined in high magnetic fields of up to 40 T at 2 K.

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Center of Computational Materials Science

Akai group

(1) A scheme that combines the nonequilibrium Green's function method with the Korringa–Kohn–Rostoker Green's function method is proposed. The method is applied to Schottky junctions composed of an Al/GaN/Al trilayer. The results show that a Schottky barrier is formed at an undoped GaN and Al interface. The transport property of this system under various finite bias voltages is calculated. It is shown that the asymmetric behavior of electron transport against the direction of bias voltage occurs in this system, confirming the feature of rectification. (2) A classical spin model derived ab initio for rare-earth-based permanent magnet compounds is presented. Our target compound, NdFe12N, is a material that goes beyond today's champion magnet compound Nd2Fe14B in its intrinsic magnetic properties with a simpler crystal structure. Calculated temperature dependence of the magnetization and the anisotropy field agrees with the latest experimental results in the leading order. Having put the realistic observables under our numerical control, we propose that engineering 5d-electron-mediated indirect exchange coupling between 4f-electrons in Nd and 3d-electrons from Fe would most critically help enhance the material's utility over the operation-temperature range. (3) As a collaboration with experimental group, we have developed the method to calculate resonant MOKEZ spectra and apply it to the recent experiments performed at SPring8 by Kubota, et al. The ab-initio calculations explain the experimental results successfully, opening up the possibility to further extend the method so as to cover other systems such as compounds, disordered alloys and also to apply the second-harmonic generation.

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Ozaki group

The X-ray photoelectron spectroscopy (XPS) has become one of the most important and widely used techniques in studying chemical composition and electronic states in the vicinity of surfaces of materials. In spite of the long history of XPS and its importance in materials science, a general method had not been developed so far to calculate the absolute binding energies for both insulators and metals, including multiple splittings due to chemical shift, spin-orbit coupling, and exchange interaction, on equal footing. In this study, we have developed a novel computational method to calculate absolute binding energies of core levels in metals and insulators, based on a penalty functional and an exact Coulomb cutoff method in a framework of the density functional theory. The spurious interaction of core holes between supercells is avoided by the exact Coulomb cutoff method, while the variational penalty functional enables us to treat multiple splittings due to chemical shift, spin-orbit coupling, and exchange interaction on equal footing, both of which are not accessible by previous methods. It is demonstrated that the absolute binding energies of core levels for both metals and insulators are calculated by the proposed method in a mean absolute (relative) error of 0.4 eV (0.16 %) for eight cases compared to experimental values measured with X-ray photoemission spectroscopy within a generalized gradient approximation to the exchange-correlation functional. We have applied the developed method to silicene grown on ZrB2 substrate, which is one of fascinating two-dimensional materials discovered recently. It is found that the obtained binding energies of Si-2p states of the planar structure are in good agreement with the XPS data measured at the photon factory, KEK, resulting in a success of detailed analysis of buckling form of silicene.

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* Joint research among groups within ISSP.

Laser and Synchrotron Research Center

Shin group

We studied high Tc Fe-pnictide superconductors using 7-eV laser. High resolution photoemission study with polarization dependence is very powerful for the study of the superconducting mechanism. Orbital fluctuation mechanism is also important in addition to the spin fluctuation mechanism.

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I. Matsuda group

In 2016, we made large progress in research of the novel materials, especially "borophene". We directly observed its metallicity and, moreover, we discovered the Dirac Fermions. It is of note that the borophene we synthesized is the first metal allotrope of boron in a history of the condensed matter physics. Concerning our developments and experiments of the advanced spectroscopies, we successfully achieved in generating new techniques. One of them is to determine the element-specific complex permittivity using a fast-switching undulator that we have developed at SPring-8 BL07LSU. The other is to measure soft X-ray nonlinear effect with a X-ray free electron laser at SACLA. At the end-station of SPring-8 BL07LSU, we upgraded the time-resolved soft X-ray photoemission system by introducing a high-frequency laser. The time-resolved data for joint-researches were improved significantly that has allowed us not only to measure with high-resolution but also to save beamtime and to accept more proposals for our beamline.

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Kobayashi group

We are developing a high-average-power, femtosecond laser system with Yb-doped fibers. Average power of 100 W is achieved.

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Itatani group

First, we continued the development of intense ultrafast MIR sources based on optical parametric amplification (OPA). One source was BIBO-based OPA followed by difference frequency generation, which covered the spectral range in 5-10 μm. Another source was KTA-based OPA that produced 100-%mu;J, 100-fs pulses at 3.2 μm. Both sources had stable carrier-envelope phases (CEPs), and were used to study high harmonic generation (HHG) in crystalline solids. Polarization-resolved spectroscopy revealed the generation process of solid HHG where carrier transport in band structures played a significant role. Nanotip experiments were also carried out with the MIR sources. We confirmed the plasmonic field enhancement by photoelectron measurement. Second, we continued strong field experiments using a BIBO-based optical parametric chirped pulse amplifier that routinely produced CEP-stable, 1.5-mJ, 10-fs pulses at 1.7μm with a repetition rate of 1 kHz. Attosecond streaking measurement was achieved where diffuse atoms were ionized by an attosecond XUV pulse and a CEP-stable IR field. Generation of isolated 450-attosecond pulses at 100 eV was experimentally confirmed. This is the first attosecond streaking measurement using an OPCPA-based infrared source, showing the capability of IR-OPCPA to extend the attosecond methodology from XUV (<200 eV) to soft-X-ray (>200 eV) regions. Such energy upscale is needed to realize ultrafast soft-X-ray spectroscopy in future. We also started to develop a novel velocity-map-imaging photoelectron spectrometer under the collaboration with Prof. Kling group in Germany. This apparatus is designed to measure the momentum distribution of photoelectrons up to 2 keV, which will be used to explore high-energy attosecond processes induced by long-wavelength optical fields.

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Harada group

Integrating the ambient pressure setup using a differential pumping system realized by FY2015, micro-focusing of the X-ray beam using KB mirrors, and angle resolved mode using the newly developed rotation chamber, we realized the following soft X-ray resonant inelastic X-ray scattering (RIXS) experiments in FY2016. (A)Observation of two-dimensional (excitation energy and momentum) mapping of RIXS By optimizing the focusing optics and using the horizontal rotation of the RIXS spectrometer, angle resolved soft X-ray RIXS spectra of high Tc cuprates were obtained across O 1*s* resonance, which provides unique information about the Cu-O mixing and resultant dispersion from the oxygen side. (B)Combined use of soft X-ray diffraction and RIXS using the angle resolved system High resolution angle resolved RIXS enables us combined use of soft X-ray diffraction from the elastic part and soft X-ray RIXS from the inelastic part. The first demonstration of such experiment was performed for $LaSrFeO_4$ which is well known to exhibit orbital ordering. Spatial modulation of the electron density yields not only soft X-ray diffraction but also intensity modulation of RIXS by the scattering angle, showing possibility of measuring 'inelastic X-ray diffraction'. This year we have accepted 14 collaborative works at BL07LSU HORNET endstation, which include the above two topics and study on water encapsulated in polymers, bio-inspired materials, humidity dependence of functional transition metal complexes and operando analysis of Li ion battery electrodes.

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Wadati group

We succeeded in the observation of photoinduced demagnetization and insulator-to-metal transition in ferromagnetic insulating $BaFeO_3$ thin films by time-resolved x-ray magnetic circular dichroism. We also studied the thickness-dependent physical properties of $La_{1/3}Sr_{2/3}FeO_3$ thin films to obtain critical thickness for charge ordering.

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Kondo group

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Okazaki group

We have investigated superconducting-gap structures of unconventional superconductors such as iron-based superconductors and BiS2-based superconductors by a low-temperature and high-resolution laser ARPES apparatus and transient electronic structures in photo-excited non-equilibrium states by a time-resolved ARPES apparatus using EUV and SX lasers. In the fiscal year 2016, we have revealed unconventional superconductivity in $NdO_{0.71}F_{0.29}BiS_2$ from its quite anisotropic superconducting gap structure, and importance of the spin-orbit coupling for the superconducting gap anisotropy of $Ba(Fe_{0.65}Ru_{0.35})_2As_2$. In addition, we have observed ultrafast melting of the spin density wave order in $BaFe_2As_2$ and a photo-induced excitonic-insulator-to-semimetal transition in Ta_2NiSe_5.

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