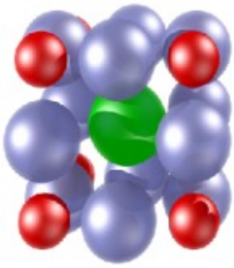
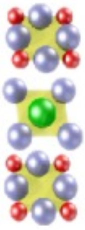
新領域
物質系

Lippmaa研究室

Prof. Mikk Lippmaa

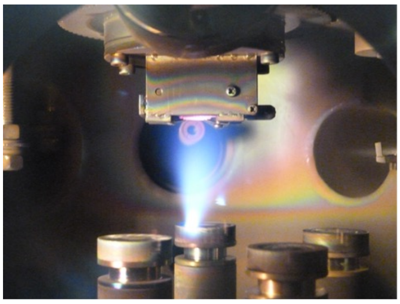
The most common minerals in the Earth's crust are oxides. Oxides can be found everywhere in our everyday life: in concrete, window glass, precious gems, ceramic kitchen knives, and many other places. Oxides are key components in modern electronics as dielectrics in capacitors or insulators in transistors and memories. Lippmaa laboratory works on oxide thin films, nanostructures, and interfaces.



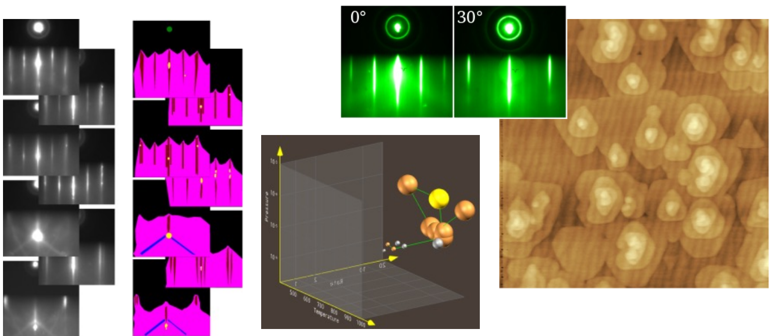


Many common transition metal oxides can be viewed as stacks of atomic layers. This layering and the semi-localized nature of transition metal electrons gives oxides many fascinating properties, such as superconductivity, magnetism, ferroelectricity, and many others.

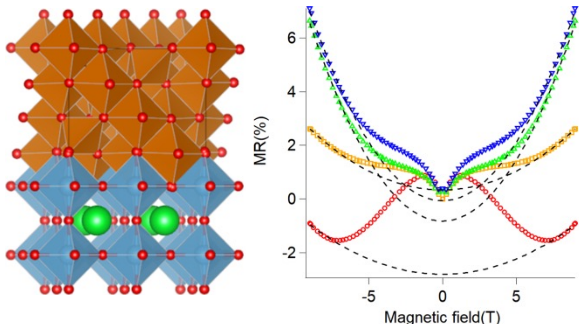
Working on oxide thin films gives you a chance to learn many experimental techniques, from materials synthesis and nanostructure growth to device fabrication and materials property analysis. We offer projects oriented either at synthesis, property analysis, or technique development, **depending on your interests**.



Lippmaa laboratory uses pulsed laser deposition to grow nanoscale films, heterostructures, and various types of nanostructures. Using in-situ electron diffraction for surface analysis, we grow crystals a single atomic layer or block at a time. Our main interest is in the physical properties of nanometer scale surface layers (catalysis), interfaces (2-dimensional systems), and nanostructures (functional properties), superlattices (spin structure), doped or strained layers (altermagnets). Novel physical properties and functions often appear at interfaces; hence we work on techniques for growing high-quality oxide heterostructures and seek interesting new materials functions.

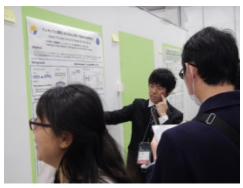


Machine learning analysis of surface diffraction (RHEED) patterns with a U-Net neural network for autonomous synthesis of new materials



Searching for novel magnetic states and weak (anti)localization effects in 2D confined carrier systems at interfaces that contain magnetic impurities or other localized spins.

We welcome students who like experimental science, are interested in developing new materials and are interested in learning to use various experimental techniques for thin film synthesis and materials characterization.



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