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Pulsed laser deposition and characterizations of pyrochlore iridate thin films MATTHEW STARR, JAIME AVILES-ACOSTA, Indiana University, Bloomington, YUANTAO XIE, Virginia Tech, WENKA ZHU, Indiana University, Bloomington, ZHEN LI, Indiana University, Bloomington; Los Alamos National Laboratory, AIPING CHEN, NAN LI, Los Alamos National Laboratory, CHENGGANG TAO, Virginia Tech, QUANXI JIA, Los Alamos National Laboratory, J. J. HEREMANS, Virginia Tech, S. X. ZHANG, Indiana University, Bloomington — Pyrochlore iridates have attracted growing interest in recent years because of their potential to realize novel topological phases. While most of the previous studies have focused on polycrystalline and single crystalline bulk samples, epitaxial thin films offer a unique platform for controllable tuning of material parameters such as oxygen stoichiometry and elastic strain to achieve new electronic states. In this talk, we will present the growth and characterizations of epitaxial thin films of pyrochlore Y2Ir2O7 and Bi2Ir2O7 that are predicted to host topologically non-trivial states. The iridate thin films were grown by pulsed laser deposition at different conditions, and a narrow window for epitaxial growth was determined. Characterizations of crystalline structures were performed using X-ray diffraction and transmission electron microscopy to establish a growth parameter-structure phase diagram. The compositions of thin films were determined by energy dispersive X-ray spectroscopy, and the surface morphologies were characterized using atomic force microscopy and scanning tunneling microscopy. Magneto-transport studies indicate a strong dependence of transport properties on the oxygen stoichiometry and the film thickness.

Shixiong Zhang
Indiana University, Bloomington

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