

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Magneto-transport properties in All-in-All-out magnetic ordered epitaxial $\text{Sm}_2\text{Ir}_2\text{O}_7$ and $\text{Nd}_2\text{Ir}_2\text{O}_7$ films. W. J. KIM, IBS-CCES, J. H. GRUENEWALD, Univ. of Kentucky, O. B. KORNETA, IBS-CCES, S. S. A. SEO, Univ. of Kentucky, T. W. NOH, IBS-CCES — Pyrochlore iridates $\text{R}_2\text{Ir}_2\text{O}_7$ (R=rare earth element) have been predicted to exhibit a variety of exotic physical phenomena, such as the Weyl semimetallic state and topologically insulating behavior with all-in-all-out (AIAO) magnetic ordering. Here, we have observed a metal-insulator transition accompanied by the AIAO-type magnetic ordering in both $\text{Nd}_2\text{Ir}_2\text{O}_7$ and $\text{Sm}_2\text{Ir}_2\text{O}_7$ films below their respective ordering temperatures. Negative magnetoresistance (MR) is observed below 20 K and this gradually transitions into positive MR upon warming. We speculate that this characteristic negative MR is related to the f - d exchange coupling between the electrons at the Ir sites and localized moments at the R sites, which induces magnetic ordering on the R sub-lattice. Another remarkable feature is unconventional domain wall (DW) conductance. AIAO-type magnetic DW shows metallic behavior in $\text{Nd}_2\text{Ir}_2\text{O}_7$ while $\text{Sm}_2\text{Ir}_2\text{O}_7$ shows insulating behavior. This AIAO-type metallic (insulating) DW conductance is thought to be closely related to the existence of Weyl-semimetallic state (Mott insulating state) which is consistent with a recent theoretical prediction.

W. J. Kim
IBS-CCES

Date submitted: 10 Nov 2016

Electronic form version 1.4