Abstract Submitted
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Unique magnetism and structural transformation in rare earth dialumindes[1] ARJUN PATHAK, YAROSLAV MUDRYK, DURGA PAUDYAL, VITALIJ PECHARSKY, The Ames Laboratory, U.S. Department of Energy, Iowa State University, Ames, Iowa 50011 — Rare earth metallic alloys play a critical yet often obscure role in numerous technological applications, including but not limited to sensors, actuators, permanent magnets, and rechargeable batteries; therefore, understanding their fundamental properties is of utmost importance. We study structural behavior, specific heat, and magnetism of various binary and pseudobinary rare earth dialumindes by means of temperature-dependent x-ray powder diffraction, heat capacity and magnetization measurements, and first principles calculations. Here, we focus on our recent understanding of low temperature magnetism, and crystal structure of $DyAl_2$, $TbAl_2$, $PrAl_2$, $ErAl_2$, and discuss magnetic and structural instabilities in the pseudobinary $PrAl_2$ – $ErAl_2$ system [1]. Unique among other mixed heavy lanthanide dialumindes, the substitution of Er in $Pr_{1-x}Er_xAl_2$ results in unusual ferrimagnetic behavior, and the ferrimagnetic interactions become strongest around x = 0.25. [1] A. K. Pathak et al, Phys. Rev. Lett. **110**, 186405 (2013), Phys. Rev. B **89**, 224411 (2014).

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Arjun Pathak
Iowa State University

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