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Tuning Frustration in Rare Earth Pyrochlores by Platinum Substitution ALANNAH HALLAS, JONATHAN GAUDET, McMaster University, ARZOO SHARMA, University of Manitoba, MURRAY WILSON, YIPENG CAI, McMaster University, MAKOTO TACHIBANA, National Institute for Materials Science, CHRIS WIEBE, University of Winnipeg, BRUCE GAULIN, GRAEME LUKE, McMaster University — A successful mechanism for exploring the rich physics of rare earth pyrochlores, $R_2B_2O_7$, is to substitute the non-magnetic B-site. Varying the ionic radius of the B-site induces an internal chemical pressure. Some rare earths are robust to substitutions; for example, the holmium-based pyrochlores all exhibit a dipolar spin ice state. In the case of other rare earths such as ytterbium, the ground states are remarkably fragile to chemical pressure. In this talk, I will introduce two materials with a new non-magnetic B-site: platinum. The ionic radius of platinum is comparable to that of titanium, which occupies the B-site in the most well-studied family of pyrochlores. Thus, platinum does not induce a strong chemical pressure on the lattice. Nevertheless, using $Gd_2Pt_2O_7$ and $Er_2Pt_2O_7$ as examples, I will show that platinum does affect a dramatic change on the magnetic properties. We trace this effect to platinum's empty e_g orbitals, which mediate superexchange pathways not available in other rare earth pyrochlores. In $Gd_2Pt_2O_7$, this results in a striking 160% enhancement of T_N as compared to other Gd-based pyrochlores. In $Er_2Pt_2O_7$, the ordering temperature is strongly suppressed and the ground state is altered.

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