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A2Ir2O7 rare-earth pyrochlore oxides under extreme conditions

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$A_2B_2O_7$ oxides gathered considerable attention due to many complex and exotic (ground) states observed or theoretically predicted, e.g., spin liquid, spin ice, topological insulator or Weyl semimetal [1,2]. Geometrical frustration of magnetic moments, responsible for these states, is defined very well in $A_2Ir_2O_7$ iridates (with A being the rare earth) since they crystallize in the ordered pyrochlore structure for all rare-earth analogues. With this cubic structure (space group *Fd-3m*), two sublattices of corner-sharing tetrahedra for both A^{3+} and Ir^{4+} magnetic ions are present in A2Ir2O7 iridates, which are moreover surrounded by 8 and 6 oxygen ions, respectively. In this study, we present high-pressure and low-temperature characterization of selected $A_2Ir_2O_7$ analogues, focusing more on the less-investigated heavy-rare-earth side of the periodic table. Polycrystalline samples were grown by the CsCl flux method. Thermal and pressure compressibilities, including detailed insight into oxygen cage deformation of the pyrochlore lattice, are presented and discussed together with other phenomena like metal-insulator transition or the antiferromagnetic all-in-all-out ordering or Ir^{4+} sublattice [3].

[1] E. Lefrançois et al., Nat. Commun. 8, 209 (2017).
[2] W. Witczak-Krempa et al., Annu. Rev. Condens. Matter Phys. 5, 57-82 (2014).
[3] D.Staško et al., J. Phys. Chem. Solids 176, 111268 (2023).

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