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Evolution of Magnetism in Single-Crystal $\text{Ca}_2\text{Ru}_{1-x}\text{Ir}_x\text{O}_4$ ($0 \leq x \leq 0.65$)¹ S.J. YUAN, J. TERZIC, J.C. WANG, L. LI, T.F. QI, W.H. SONG, S. ASWARTHAM, G. CAO, Center for Advanced Materials, Department of Physics and Astronomy, University of Kentucky, Lexington, Kentucky 40506, USA — We report structural, magnetic, transport and thermal properties of single-crystal $\text{Ca}_2\text{Ru}_{1-x}\text{Ir}_x\text{O}_4$ ($0 \leq x \leq 0.65$). Ca_2RuO_4 is a structurally-driven Mott insulator with a metal-insulator transition at $T_{\text{MI}} = 357$ K, followed by a well-separated antiferromagnetic order at $T_{\text{N}} = 110$ K. Substituting Ru with Ir enhances the spin-orbit coupling (SOC) and causes further orthorhombic distortions. As a result, a pronounced weak ferromagnetic behavior occurs, which enhances dramatically with increasing Ir concentration. The magnetic ordering temperature T_{N} increases from 110 K at $x = 0$ to 215 K at $x = 0.65$, along with enhanced magnetic anisotropy due to SOC. In addition, with increasing x , the metal-insulator transition T_{MI} increases initially and vanishes eventually.

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