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Chemical insights into the synthesis and properties of polycrystalline and single crystal iron scandium sulfide ($FeSc_2S_4$)[1] JENNIFER R. MOREY, KEMP W. PLUMB, SEYED M. KOOHPAYEH, COLLIN L. BROHOLM, TYREL M. MCQUEEN, Institute for Quantum Matter and Johns Hopkins University — Iron scandium sulfide, $FeSc_2S_4$, has recently attracted significant theoretical and experimental interest as a candidate spin-orbital liquid. An AB_2X_4 spinel, $FeSc_2S_4$ (space group Fd-3m, No. 227) features a high degree of frustration associated with the Fe^{2+}, which occupies the A-site diamond sublattice and is tetrahedrally coordinated by sulfur. The Fe^{2+} ion is in a high spin (S=2) state, resulting in orbital degeneracy due to a single hole on the e orbitals. We report the strides we have made to produce material in powder and single crystal form, and the relationship between the chemistry and the structural, magnetic, and thermodynamic properties of $FeSc_2S_4$.

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