Frontiers in AM3X4 and AM6X6 kagome compounds; development of new kagome metals

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Abstract:
Continued efforts into understanding complex electronic and magnetic states in kagome metals has served as a great impetus for the discovery of new kagome metals. This is particularly the case for low-dimensional crystal structures (e.g. our prior discovery of the AV3Sb5 kagome superconductors and recent discoveries in the AM3X4 kagome magnets, both of which are exfoliable). In this chemistry-focused talk, we present our experimental methodology for discovering new kagome metals alongside a discussion of several new families of compounds. Examples include; our ability to tune magnetism in a new series of AM3X4 layered magnets, a new density-wave transition in a nonmagnetic kagome metal, a new kagome prototype built from the AM3X5 structural motif, and new frontiers in the larger AM6X6 kagome family. Our results provide the community with new single-crystal platforms for the exploration of magnetic, structural, and electronic instabilities in kagome metals.

Bio: Brenden recently joined ORNL as a Wigner Distinguished Staff Fellow as part of the Correlated Electron Group. He received his PhD from Colorado School of Mines with Eric Toberer, focusing on development of new thermoelectric materials. Afterwards, he joined Stephen Wilson at UCSB as an Elings Fellow, where he developed the bulk of the research on the AV3Sb5 kagome superconductors. He focuses on the growth and characterization of single crystal, strongly correlated systems -- with a focus on kagome metals.