La2O3-type structure magnetic topological candidates

Madalynn Marshall[1], Weiwei Xie[2], Huibo Cao[3], Antonio M. dos Santos[4]

[1]Rutgers University [2]No affiliation given, [3]Oak Ridge National Laboratory, [4]Oak Ridge National Laboratory

mm3092@chem.rutgers.edu

Within the condensed matter science community, interest in topological materials has grown rapidly. An exciting direction is the combination of topological electronic states with additional quantum phases including magnetic topological materials, which have a range of applications including spintronics, thermoelectric and photovoltaics. Previously, our group discovered the trigonal La2O3-type Mg3Bi2 material to be a type-II nodal-line semimetal. The strong spin orbit coupling (SOC) Bi layers in this structure create an ideal environment for the topological electronic states. To drive this material even further magnetic elements can be introduced, potentially leading to a coupling between the magnetism and topological quasiparticles. In this work we explore various La2O3-type structure magnetic topological candidates consisting of either 3d or 4f magnetic elements. Various techniques have been utilized to investigate the intricate tuning of the magnetic and electronic properties in these materials including neutron diffraction, revealing their magnetic structure and dynamics. As a result, this work has provided a further understanding of the ability to control the magnetic and topological properties.