DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

Department of Materials Science and Engineering

PhD Thesis Proposal Presentation

Date & Time: 16th June 2023, 2:00 pm
Where: Hill Conference Room, 240 LeBow Engineering Building

Probing magnetism in topological heterostructures using synchrotron x-rays and neutron scattering

Name: Prajwal M. Laxmeesha
Advisor: Prof. Steven May

Abstract:
Spin orbit torques from quantum materials such as topological insulators and semimetals are strong candidates to realize next generation integrated non-volatile memory and storage. Thin films of binary kagome compounds *T*m*X*n (T=Mn, Fe, Co; X=Sn, Ge; m:n = 3:1, 3:2, 1:1) have been shown to exhibit a plethora of interesting magnetotransport phenomena such as strong anisotropic anomalous Hall effect and 2D flat bands arising from Berry curvature and the kagome lattice. Furthermore, when coupled with an adjacent ferromagnet, phenomena like spin Hall effects could potentially give rise to novel spin-orbit-torques. In this presentation, I will discuss my recent efforts in growing ferromagnetic buffer-supported epitaxial Weyl and Dirac semimetal FeSn and Fe_3Sn_2 on insulating oxide substrates using molecular beam epitaxy, and through magnetometry, demonstrate strong exchange interaction between them. Proposed activities to use X-ray magnetic circular dichroism (XMCD) and polarized neutron reflectometry (PNR) to probe magnetism in thin films will be described. These methods offer unparalleled capabilities to investigate magnetism not only at interfaces but also throughout these intricate heterostructures, enabling a comprehensive understanding of interfacial magnetic phenomenon in these materials.