

MRSEC Seminar Series

“Tuning Magnetism and Superconductivity in Layered Metal Chalcogenides through Intercalation Chemistry.”

We present a new set of layered materials that, unlike transition metal dichalcogenides, are built of square metal lattices leading to new functional properties such as unconventional superconductivity and ferromagnetism. Due to the weak van der Waals interactions that hold the chalcogenide layers together, intercalation chemistry in aqueous solutions can be utilized to prepare new phases with interesting magnetic and electronic properties. We will present our work on the synthesis, characterization, and structural studies via neutron and X-ray scattering of these layered materials. Our group’s strategy has been to incorporate layers such as metal hydroxides to understand superconductivity in the iron chalcogenides such as (AOH)-FeCh materials where A is an alkali metal and Ch = S²⁻ and Se²⁻. We will also present our studies of the cobalt analogues of these layered materials including synthesis of a metastable form of CoCh and its intercalated derivatives such as (AOH)-CoCh. Unlike the case of iron, the cobalt-based materials express weak ferromagnetism instead of superconductivity. We attempt to explain the stark changes in the properties from their electronic structures calculated utilizing density functional theory.



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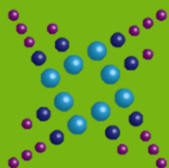
Chemistry and Biochemistry

University of Maryland

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Ryan 4003

4:00 p.m. – 5:00 p.m.



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