

JEFFREY I. ZINK INORGANIC CHEMISTRY SEMINAR SERIES



Prof. Selvan Demir

Department of Chemistry, Michigan State University

“Powerful Single-Molecule Magnets Containing Radicals and Bismuth”

Abstract: Single-molecule magnets (SMMs) are molecules that possess an energy barrier to spin inversion, giving rise to slow magnetic relaxation and magnetic hysteresis. To realize their intriguing potential applications, ranging from molecular spintronics, quantum computing, to high-density information storage, spin-reversal barriers (U_{eff}) and magnetic blocking temperatures (TB) must be increased. Lanthanide ions are especially well-suited for the design of SMMs due to their large magnetic moments and magnetic anisotropy that originate from strong spin-orbit coupling of the 4f orbitals. One effective methodology to boost blocking temperatures of multinuclear compounds is to generate strong magnetic exchange between lanthanide centers using radical bridging ligands. In the event of strong magnetic exchange coupling, undesirable relaxation pathways such as quantum tunneling of the magnetization can be suppressed. Here, first, the synthesis and characterization of yttrium complexes containing bisbenzimidazole ($\text{Bbim}3-\bullet$), fluoiflavine ($\text{flv}1-\bullet$ and $\text{flv}3-\bullet$), and tetraazanaphthalene ($\text{tan}1-\bullet$) radical anions will be presented. Second, the successful generation of lanthanide congeners bearing these radical anions which are radical-bridged SMMs with high magnetic blocking temperatures and coercive fields, will be discussed. Another approach to strong coupling employs heavy p-block elements since their diffuse valence orbitals facilitate better penetration of the core electron density of the lanthanide ions relative to diamagnetic ligands comprising lighter p-block elements. Here, the first lanthanide bismuth cluster SMMs containing a $[\text{Ln}_2\text{Bi}_6]$ heterometallocubane core, will be presented. We will also show that the Bi^{2+} radical anion can be tamed with lanthanide ions to give the first SMMs featuring bismuth radicals.

Meet the Speaker

11:45 a.m. | YH 3096

Wednesday, November 18th, 2026

4:00 p.m. | YH4222 - Collaboratory

Dongwon Yoo Seminar & Conference Hall

UCLA College | Physical Sciences
Chemistry & Biochemistry

More information: isaluo196@ucla.edu

This event is made possible by generous donations from our supporters and also through the gifts of the Bhaumik Centennial Collaboratory, Yoo Seminar & Conference Hall, Tsay Study Lab, and Centennial Collaboratory Donor Wall & Space Funds.