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RESEARCH & COLLABORATION PROFILE

KEY WORDS Inorganic Chemistry, Supramolecular Chemistry, Coordination Chemistry, Magnetism

Research Snapshot. Dr. Mondal's research focuses on the rational design, synthesis, and characterization of functional coordination complexes and supramolecular architectures based on transition metals and lanthanides. By integrating coordination chemistry, supramolecular assembly, and functional molecular design, His aim to understand the relationships between molecular structure, assembly, and physicochemical properties. My research interests encompass host–guest chemistry, stimuli-responsive coordination systems, chiral recognition, and molecular magnetism, with emerging interests in the electrochemical hydrogen evolution reaction (HER) and oxygen evolution reaction (OER).

RESEARCH EXPERTISE

- **Inorganic Coordination Chemistry:** Transition metal complexes of main group element N, O, P containing ligand.
- **Supramolecular Chemistry:** Developing transition metal and lanthanide metal complexes / clusters.
- **Magnetism:** Synthesis of new lanthanide complexes/clusters and study of their magnetism properties.
- **Stimuli-Responsive Coordination Complexes:** Synthesis and studies of stimuli-responsive (especially light-responsive) ligands and studies their complexes properties.

RECENT RESEARCH HIGHLIGHTS

- **Supramolecular chemistry:** Synthesis of transition metal and lanthanide complexes and their host-guest property. We characterized Bis-β-diketonate ligands metal complexes of transition metal and lanthanides and on-going study based on the host-guest.
- **Stimuli-Responsive Coordination Complexes:** Currently we have working on the light-responsive hydrazone ligands photo-responsive behavior as well as the hydrazone metal complexes.
- **Chiral-recognition of Chiral Binapthol-hydrazone based ligand:** We have also worked on the chiral binapthol-hydrazone ligands metal complexes chiral-recognition study.
- **HER / OER of Transition Metal Complexes:** A new study going on developing the HER / OER property of transition metal complexes.

POTENTIAL COLLABORATION RESEARCH

Best-fit collaborator areas:

- **1. Coordination Chemistry.**
- **2. Supramolecular Chemistry.**
- **3. Electrochemistry.**
- **4. Magnetism.**

SELECTED RECENT PUBLICATIONS

- **Inorg. Chem. 2024, 63, 22338-22348** -Self-Assembled Lanthanide Phosphinate Square Grids (Ln = Er, Dy, and Tb): Dy_4 Shows SMM/SMT and Tb_4 SMT Behavior.
- **J. Mol. Struct. 2023, 1273, 134274** -Aza-donor ligands—A key to synthesizing mononuclear to coordination polymers of cadmium phosphinates.
- **ACS omega 2022, 7, 1090-1099** -In situ assembled polynuclear zinc oxo clusters using modified Schiff bases as ligands
- **Inorg. Chem. Commun. 2022, 143, 109784** -Lutetium oxo clusters utilizing mixed ligand System: Isolation of a rare Lu4 oxo cluster in a tetrahedral architecture.

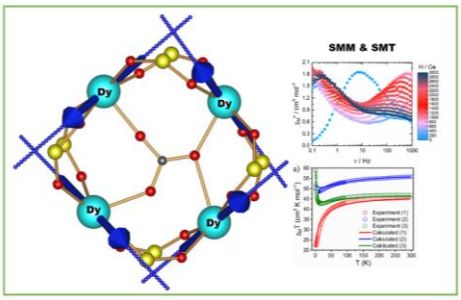
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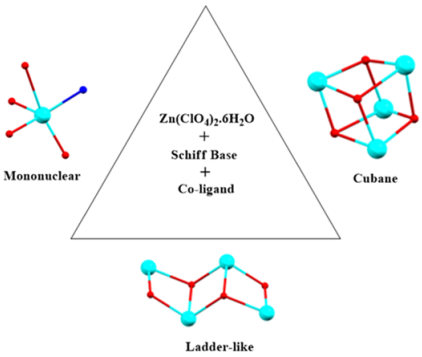
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REPRESENTATIVE RESEARCH FIGURES / SCHEMES

Lanthanide Single Molecular Toroic



Structural Control over Nuclearity of metal



Single Molecular Magnetism

