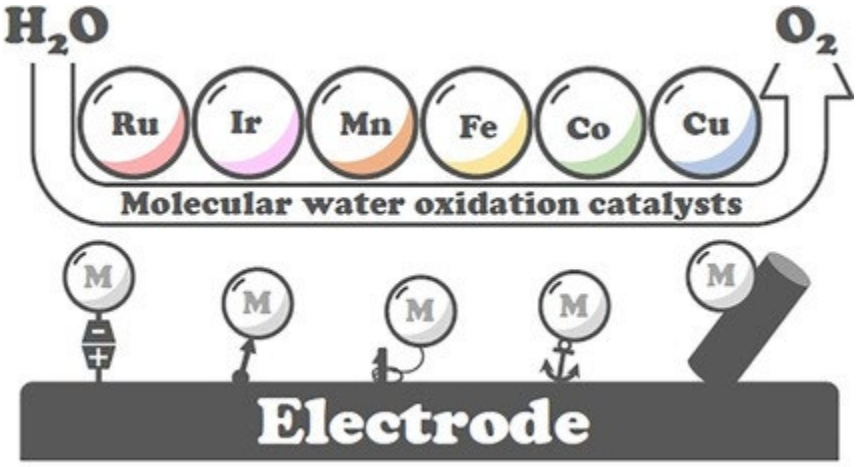
Developing Molecular Catalysts for Water Oxidation: Towards Sustainable Solar Energy Capture and Storage

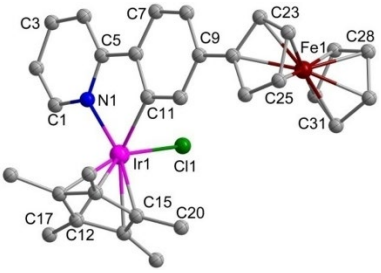
Principal Investigator
Dr. Abir Sarbajna
Assistant Professor
School of Advanced Sciences (SAS)

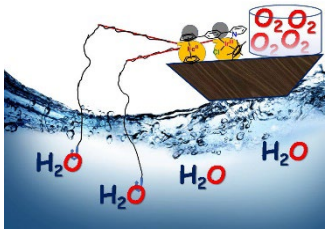


Project Description

The present-day challenge is to develop artificial molecular WOCs based on earth abundant and cheap 3*d*–metals (manganese, iron, cobalt, nickel) instead of rare, precious metals that cost hundreds or thousands of times more per gram, that are highly efficient having turnover frequency (speed of catalytic reaction) comparable to that of Nature's OEC (100–400 times per second). The objectives of this proposal are to **increase the rate of desired catalysis for water oxidation**, using one or more of the following strategies: change metal coordination sphere geometry, use basicity of ligand atoms to speed proton transfer for faster catalysis, use ligands that may lower the overpotential (energy required) needed for water oxidation. Anionic (negatively charged) ligands result in complexes having a more electron-rich metal center and in turn lower oxidation potentials. A second objective which will be pursued in conjunction with the first, is to **slow the rate of undesired catalyst degradation** and use strongly donating N–Heterocyclic Carbene (NHC) ligands which are highly stable under strong oxidizing conditions

Products/ Instruments/ Results/ Outreach Activities





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Name of the Funding Agency
Science and Engineering Research Board (SERB)

Name of the Scheme
Start-up Research Grant (SRG)

Sanctioned Amount (in Rupees)
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Duration of the Project (years)
2