

**Tuesday, January 12th**

**3:30 p.m., Room 1315**

# Special Seminar

**Mircea Dinca**

Massachusetts Institute of Technology

***Making and Storing Hydrogen:***

***I. Heterogeneous Electrocatalysts for Water Oxidation***

***II. Hydrogen Storage in Microporous Metal-Organic Frameworks***

A swift transition to a hydrogen economy is critically dependent on the production of H<sub>2</sub> from clean, renewable sources such as water, and on the effective and safe storage of H<sub>2</sub>, especially for mobile applications.

I. Recent results related to first row transition metal-based water oxidation electrocatalysts will be presented in the context of water electrolysis. In particular, X-ray absorption studies that offer insights on the *molecular* structure of a recently discovered Co-phosphate catalyst will be discussed. In addition, detailed electrochemical studies of a Ni-based system that is mechanistically related to the Co catalyst will be presented.

II. Metal-organic frameworks have emerged as promising H<sub>2</sub> storage media, especially under cryogenic conditions. It will be shown that rational design principles that target coordinatively unsaturated metal centers inside metal-organic frameworks lead to materials with unprecedented H<sub>2</sub> uptake, high adsorption enthalpy, and unusual *metal-H<sub>2</sub> interactions*.

Gas sorption experiments, variable temperature IR spectroscopy, and powder neutron diffraction experiments will be presented in support of these observations.



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