



UNIVERSITY OF MINNESOTA
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Department of Chemistry

Special Seminar

4:15 p.m. Friday, September 16 • 331 Smith Hall



Assistant Professor

Xile Hu

Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Catalysts Made of Earth-Abundant Elements for Making C-C and H-H bonds

Research interests:

Main research goal is to develop catalysts that are made of earth-abundant elements for chemical transformations that are related to synthesis, energy, and sustainability. Focus is on base metal catalyzed C-C bond forming reactions, C-H bond functionalization, (electro) catalytic water splitting, activation of small molecules such as CO₂, H₂, O₂ as well as the development of synthetic models for the active site of metalloenzymes.

Website: <http://lsci.epfl.ch>

Abstract

Our lab seeks to develop catalysts made of earth-abundant elements for sustainable chemical synthesis and for applications in energy storage. I will first describe our work in the area of synthetic methodology. We have developed several nickel complexes that prove to be outstanding catalysts for a wide range of challenging reactions, including cross coupling of non-activated alkyl halides and direct C—H alkylation. A central feature of the work is that we design and develop well-defined catalysts. This approach allows us to understand and control the reactivity in a rational manner. It also allows us to thoroughly investigate the mechanism of the catalysis. Another focus of our research is the bio-mimetic and bio-inspired chemistry of hydrogen. In this context, we have synthesized some of the closest small molecule mimics of the active site of [Fe]-hydrogenase, a newly discovered hydrogenase that requires one single metal (Fe) for function. Furthermore, we have discovered an electro-polymerization method to make amorphous metal sulfide films from well-defined coordination complexes. These films catalyze H₂ evolution in water at a wide range of pHs, and with significant current densities at low overpotentials. The catalysts can potentially be incorporated in solar water splitting devices and the synthetic procedures are amendable to large scale manufactures.

Host: Assistant Professor Connie Lu
Refreshments will be served prior to the seminar.