Environmental NanoChemistry Lab (ENCL)

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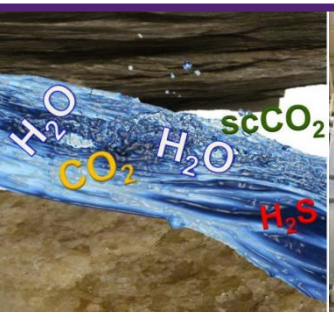
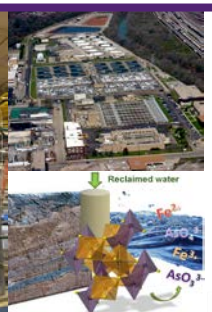
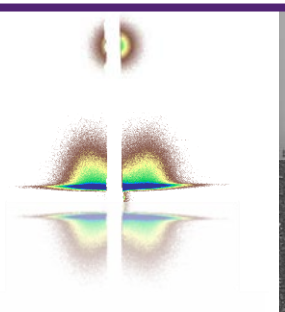
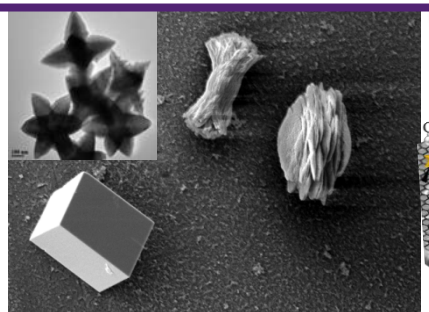
The Jun group investigates **chemical reactions at the water-energy nexus**, including geologic CO_2 sequestration, unconventional oil and gas recovery, resource recovery, water purification, water reuse, and membrane process.

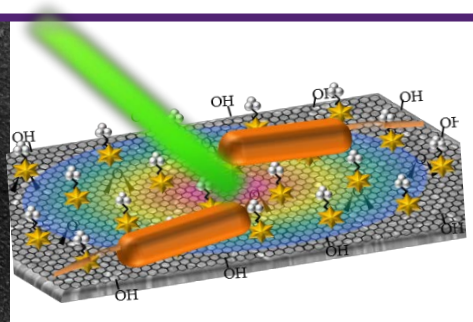
Based on our strong scientific understanding of **nanoscale interfacial chemistry and solid nucleation**, we seek for **technological innovation for clean water** by developing new treatment techniques and green chemistry-enabled catalysts for environmental sustainability.











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We study the following topics:

- ❑ **Nucleation, growth, and aggregation of nanoparticles and their structures and reactivities in aquatic systems.**
- ❑ **Chemical kinetics, thermodynamics, and mechanisms of interfacial reactions at nanoscale.**

- Nanoscale control for CO_2 capture and sequestration and other energy-related subsurface operations
- Photothermal membrane development for water purification
- Water reuse (managed aquifer recharge using reclaimed water) and water quality
- Nutrient (P &N) and resource (Rare Earth Elements & Li) recovery and reuse from water and waste.
- Photochemically-enabled green chemistry for nanostructure synthesis
- Biomineralization, biomaterials, and bio-inspired chemistry for novel materials development
- Nucleation and growth of dendrite and solid electrolyte interphase in Li-battery systems

We use interdisciplinary tools

Synchrotron-Based Techniques at national synchrotron facilities (X-ray scattering, spectroscopy, and diffraction)

We work with national laboratory scientists at national facilities and travel to work with them.

We are experts who use various surface-sensitive techniques and provide in-depth knowledge of **water, surface, and solid state chemistry**. We also simulate your experimental results using **reactive transport models.**

What former students do now?

- **Assistant professors** at the University of Houston, the University of Copenhagen (Denmark), and the University of Washington
- **Postdoctoral scholars** at Georgia Tech, the University of California-Berkeley (with Miller fellowship), the University of Copenhagen, Stanford University, the U.S. Environmental Protection Agency, the National Energy Technology Laboratory, the Los Alamos National Laboratory, and the Oak Ridge National Laboratory