Seminarankündigung

Mittwoch, 9. Mai 2018
16:00 Uhr

WSI, Seminarraum S 101

“Stabilization of semiconductor/liquid interfaces and its characterization using *Operando* techniques”

An artificial photosynthetic device, or called artificial leaf, mimics nature’s photosynthesis, takes sunlight and splits water into H2 and O2. Once abundant and low-cost solar fuels of H2 is produced as a universal energy carrier, H2 can be converted to synthetic fuels and chemicals, upgraded bio-fuel feedstock, and added to combustion cycles. However, achieving such an efficient and flexible artificial leaf is not trivial, particularly due to the instability of efficient semiconductor/liquid interfaces: All technologically important semiconductors so far like Si and GaAs photocorrode. Although transparent conductors are prevalent in solid-state PV research, their uses as a protective coating are essential to the field of photoelectrochemistry.

In this talk, I will first discuss recent breakthroughs in protective coatings as an emerging stabilization strategy for photoelectrochemical water splitting. A road map towards 20% solar-to-fuel conversion artificial leaf will be discussed based on modeling-inspired materials design. We further present the synthesis of thick (Ti,Mn)Ox ternary oxide coatings by using atomic layer deposition (ALD) for robust chemical, electrochemical, and mechanical stability in acid. We further employ operando microscopy and spectroscopy to understand how defects at coatings behave under anodic water oxidation. This experiment for the first time allows correlation of electrochemistry data with product quantification and surface morphology, helping interpret the interplay of water oxidation, photo-corrosion, and local pH.

Prof. Shu Hu
Chemical and Environmental Engineering Department
Yale University
USA