Photophysics and (Photo)electrochemistry of Hybrid Materials for Solar Energy Applications

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In this seminar, I would like to introduce my current research projects involving the material design, imaging technique, and ultrafast spectroscopy for energy-conversion (e.g., photocatalysis and photoelectrocatalysis)and energy-saving applications, aiming to explore fundamental properties and interactions of organic and inorganic materials for developing efficient energy-conversion and energy-saving processes. I have keen interests in photoinduced charge transfer processes, interfacial electron transfer, electrochemical hydrogen generation, and photoredox reactions for electricity generation, solar fuel production, electrochemiluminescence (ECL), wastewater treatment as well as food waste management. The investigations between material phenomena rely heavily on concepts of energy and environmental engineering, consisting of photophysics, electrochemistry, photoelectrochemistry by utilizing scanning photoelectrochemical microscopy (SECM) imaging, ultrafast transient absorption (TA), time-resolved photoluminescence spectra (TRPL) and so forth. Current research interests in my group are divided by four areas, comprising 1) Energy engineering (e.g., solar fuels, photovoltaics, electrochemiluminescence (ECL), and optoelectronic devices); 2) Environmental engineering (e.g., wastewater treatment, food waste treatment, and Organic matter degradation); 3) Material design (e.g., alloy, organometallics, biomaterials, nanomaterials, perovskites, and metallopolymers); 4) Dynamic interfacial interaction by utilizing photophysical, photochemical, electrochemical and photoelectrochemical techniques.

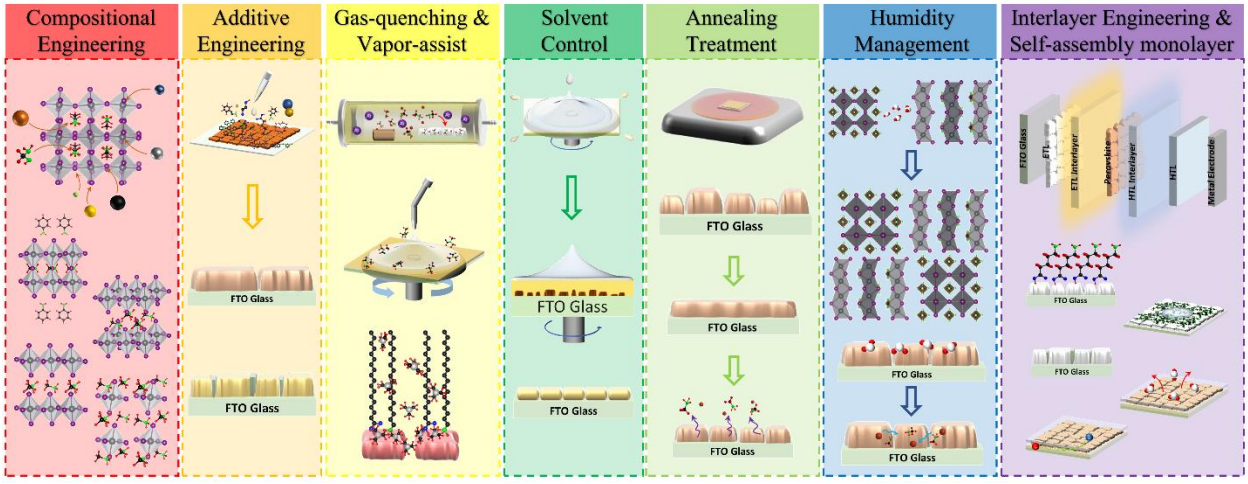


Figure 1. Surface Modification and Interfacial Engineering of hybrid materials.