Dynamics and Reactivity of Complex Interfacial Systems

The understanding and control of interfaces has entered a new era due to the advent of refined scattering, visualization, and simulation methods that can elucidate the true atomic- and nano-scale dynamics, reactivity, and self-organizing behavior of such systems. Illustrative research from our group that highlights such advances includes: the discovery of energetic embedding of molecules into ice, the dynamical properties of polymer interfaces spanning single chain motion through nanodomain organization, surface reactions including superconducting radio frequency materials, the dynamical properties of electronic interfaces, and the visualization of spatio/temporal reactivity correlations in order to elaborate mechanistic details of materials oxidation. This talk provides an overview of key ideas and insights derived from these studies.