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"BEYOND ADSORPTION" PHENOMENA IN ELECTROCATALYTIC HYDROGEN EVOLUTION

September 11th, 2020 ~ 11:30AM
Seminar via Zoom

FALL 2020 CHEMISTRY SEMINAR SERIES

HOST: DR. HUIXIN HE

ALL THOSE INTERESTED ARE WELCOME TO ATTEND

Abstract: In an energy landscape with increased environmental concerns and reduced availability of fossil fuels, electrochemical systems will likely play a major role for automotive and grid-storage applications. Our research strives to diagnose and overcome challenges related to electrochemical energy storage. We focus on mechanistic analysis that integrates both theory and experiment. One example of these challenges relates to the electrocatalytic hydrogen evolution and oxidation reactions (HER and HOR). The pH-dependence of HER and HOR kinetics remains a fundamental conundrum in modern electrochemistry. In this talk, I will discuss our work to elucidate this paradox using single-crystal voltammetry, microkinetic modeling, and kinetic isotope effects. We find that, contrary to some literature reports, the acidic and basic HER/HOR do not follow different pathways, nor do adsorption energies of active intermediates change. Rather, the interfacial water dynamics are fundamentally and qualitatively different in acid and base. Methods for quantifying these phenomena and implications of these findings on electrocatalyst design are discussed.

Biography: Maureen Tang joined the faculty of Chemical and Biological Engineering at Drexel University in 2014. She received her BS in Chemical Engineering from Carnegie Mellon University in 2007 and her PhD from the University of California, Berkeley in 2012. While at Berkeley, she received a NSF Graduate Research Fellowship, an NSF East Asia Pacific Summer Fellowship, and the Daniel Cubiciotti Student Award of the Electrochemical Society. Dr. Tang completed postdoctoral work at Stanford University and research internships at Kyoto University, the University of Dortmund, and DuPont. She is the recipient of a 2018 NSF CAREER award, the 2019 College of Engineering Early Career Research Award, and a 2018 Award for Excellence in Peer Review from the ACS PRF. Her research at Drexel develops materials, architectures and fundamental insight for electrochemical energy storage and conversion.

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