

Department of Electrical and Computer Engineering

Materials Engineering Program

Center for Integrated Bio and Nano Systems

10:30 a.m., December 4, 2020

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Electrochemical Behaviors of Two-Dimensional Materials for Energy and Environmental Applications

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Abstract: In this talk, several aspects of the electrochemical behaviors of two-dimensional (2D) materials for energy and environmental applications will be discussed. We developed a local probe electrochemical measurement method and successfully applied it to the electro-catalytic activity measurement of various kinds of transition metal dichalcogenides. The catalytic activity and turnover frequencies of the 2H-MoS₂ basal plane versus edge as well as the 1T'-MoS₂ basal plane are identified by this measurement. At the same time, the basal plane activity and turnover frequencies of transition metal dichalcogenides from different element groups has been systematically studied. We have shown that the general trend of the transition metal dichalcogenides in the form of volcano plot follows the trend of metals. VB-VIA dichalcogenides have been identified as the preferred selection for non noble metal hydrogen evolution reaction (HER) catalysts. Finally, we will demonstrate the application of 2D h-BN as high-performance anti-corrosion coatings for electrothermal membrane distillation of hypersaline waters.



Short Bio: Jun Lou is currently a full professor and the associate chair of the Department of Materials Science and NanoEngineering, and a professor of Chemistry at Rice University. He directs the Nanomaterials, Nanomechanics and Nanodevices Lab (N3L). Lou is an AFOSR Young Investigator and a recipient of Charles Duncan Award for Outstanding Academic Achievement at Rice. He is a highly cited researcher by Clarivate Analytic with over 31,700 citations and a H-index of 82 (according to Google Scholar). He is the Editor-in-Chief of Materials Today, the Elsevier flagship journal covering original research and reviews in the broader materials science community. He currently serves as the site director for the NSF industry university collaborative research center (IUCRC) of Atomically Thin Multifunctional Coatings (ATOMIC) that has 14 member companies, exploring potential applications of 2D materials in different industries with commercial partners.

Please contact Dr. Cunjiang Yu <cyu13@Central.UH.EDU> or Jiming Bao (jbao@uh.edu) if you want to meet with the speaker.