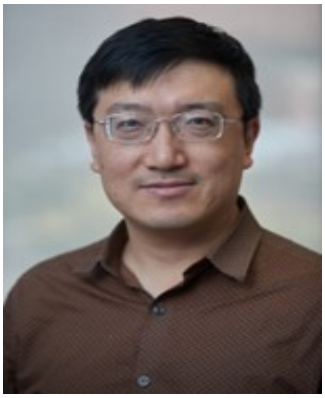
Johns Hopkins University

Department of Chemical & Biomolecular Engineering

Fall 2022 Seminar Series

Professor Bin Wang
University of Oklahoma

Date: Thursday, September 22, 2022
Time: 10:30 a.m.
Mudd Hall 26
Zoom Meeting ID: 919 5918 2879
Passcode: 270887



Title: Interfacial Charge Transfer and Excitation Promote Heterogeneous Catalysis

Abstract: Interfacial charge transfer and excitation play a valuable role in breaking and forming chemical bonds in catalysis. Here I report case studies where electrons directly participate in the reaction and drive the reaction toward desirable products. I will focus on electronic excitation in plasmonic catalysis, which can be applied to metal-, oxide- and acid-catalyzed reactions. Through electronic structure calculations, we find that the non-equilibrium energized electrons may be responsible for the observed rate enhancement and/or selectivity change in several reactions, based on which we propose that the selective population of molecular unoccupied orbitals is critical for the catalytic reactions. We further propose to localize these "hot" charge carriers to promote the reactions by electronically decoupling the reactants from the plasmonic metal. Besides electronic excitation, I will briefly discuss spontaneous charge transfer and electronic delocalization at solid/liquid interfaces to promote aqueous phase reactions.

Biography: Dr. Bin Wang is an Associate Professor in the School of Chemical, Biological, and Materials Engineering at the University of Oklahoma. He received a PhD in Chemistry from the École Normale Supérieure (ENS) de Lyon supported by a Marie Curie Fellowship from the European Commission. Prior joining OU in 2014, he was a postdoctoral research associate in Physics at Vanderbilt University. His research is focused on computational simulations of nanoscale materials and their applications in catalysis, optoelectronics, and batteries. He received a DOE Early Career award, an ACS COMP OpenEye Outstanding Junior Faculty Award, the Young Scientist Prize at the 10th International Conference on Atomically Controlled Surfaces, Interfaces and Nanostructures (ACSIN), and OU Regents' Award for Superior Research and Creative Activity. He has also been included in "Influential Researchers" by ACSI&EC Research.