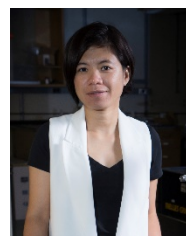




CRC Seminar Series

DATE: 20 May 2021
TIME: 3:00 PM – 5:00 PM
LOC: Online Zoom Meeting



GUEST SPEAKER:

Prof. Libai Huang

Purdue University, West Lafayette, USA

TITLE:

"Ultrafast Dynamic Microscopy of Exciton and Charge Transport"

ABSTRACT:

Long-range propagation of energy and information is highly desirable for solar energy harvesting and quantum information applications. However, there currently lacks experimental tools to investigate transport with high temporal and spatial resolutions to directly elucidate coherent and incoherent regimes. To address this challenge, my research group has developed ultrafast microscopy tools to image energy transport in molecular and nanostructured materials with simultaneously high spatial and temporal resolutions.

In my talk, I will focus on our recent progress on the visualization of exciton and charge transport in the nonequilibrium and coherent regimes. One example is the quasi-ballistic transport of hot carriers in hybrid perovskite materials, which leads to 230 nanometers transport distance in 300 fs. These results suggest potential applications of hot carrier devices based on hybrid perovskites. Another example is the transport of delocalized excitons in molecular aggregates. Our measurements demonstrated that delocalization can greatly enhance exciton diffusion, even when the excitons are only weakly delocalized (< 10 molecules). Finally, I will discuss nonequilibrium transport resulting from many-body exciton interactions. We have shown that the migration of interlayer excitons in WS₂-WSe₂ heterobilayers is controlled by the interplay between the

moiré potentials and strong many-body interactions, leading to exciton-density- and twist-angle-dependent transport length that deviates significantly from normal diffusion.

PROFILE OF PROF LIBAI HUANG:

Libai Huang is currently a Professor of Chemistry at Purdue University. She received her B.S. from Peking University in 2001 and her Ph.D. from University of Rochester in 2006. She joined the Purdue faculty in 2014. Her research program is aimed at directly imaging energy and charge transport with femtosecond time resolution and nanometer spatial resolution to elucidate energy and charge transfer mechanisms.