SEMINAR
Co-Hosted: Mechanical Engineering & Materials Science
Institute of Materials Science & Engineering

“Reduced Dimensional Solution-Processed Energy Materials”

Li Na Quan, PhD
Postdoctoral Research Fellow, Chemistry
University of California, Berkeley

Monday, January 27
1:30 – 2:30 PM
Brauer Hall, Room 12

Abstract
Metal halide perovskites are promising solution-processed materials for use in photovoltaics and light emitting diodes (LEDs) in view of their excellent semiconducting properties, the broad spectral range of light absorption, and narrow bandwidth emission. In this talk, I will present how we use the low dimensional perovskite to increase material stability, concentrate charge, improve light emission property, and create optical sources. I will discuss the approaches to improve the stability of the materials, light emitting properties and device performance by tuning the dimensionality and create the mixed-perovskite material with tunable electronic bandgap. At an applied level, I will demonstrate how we achieve the perovskite materials that exhibit near-perfect passivation, with their photoluminescence quantum yields closely approaching unity. They are bright, stable, efficient and easily solution-processible, which renders them useful for light emitting applications. These materials can also be a good platform to design and synthesis of the infra-red (IR) emitting materials and devices. Beyond the material development, I will describe how the electronic excitation of the materials are couple to the lattice vibration and deformation using advanced time-resolved spectroscopy. The unique soft nature of the perovskite lattice gives rise to dynamic fluctuations in the electronic bandgap, which distinguishes hybrid perovskites from traditional inorganic semiconductors.

Biography
Li Na Quan is currently a postdoctoral researcher at the University of California, Berkeley, where she works in the research group of Prof. Peidong Yang on physical chemistry. She earned her Ph.D in Chemistry at Ewha Womans University, South Korea in 2016, co-advised by Prof. Dong Ha Kim and Prof. Ted Sargent at the University of Toronto, Canada. Dr. Quan has authored and coauthored nearly 50 peer-reviewed journal publications and has been recognized with the Materials Research Society Graduate Student Award in 2016, highly cited researcher award in 2019. Her research focuses on the design and synthesis of semiconducting materials for enhanced light-matter interactions, and time-resolved optical studies of excited-state dynamics in complex material systems for energy conversion, optoelectronics and information science.

Faculty, students, and the general public are invited.