



Rensselaer

The HOWARD P. ISERMANN
DEPARTMENT OF CHEMICAL AND
BIOLOGICAL ENGINEERING

CBE Seminar Series – Fall 2020

Dr. Joshua J. Choi

Associate Professor of Chemical Engineering
University of Virginia

Seminar: Wednesday, September 9, 2020

12:00 p.m. (ONLINE)

WebEx link to follow

“Impact of Atomic Structure and Dynamics on Solar Cell Performance of Metal Halide Perovskite Thin Films”

Abstract:

Metal halide perovskites (MHPs) are revolutionizing the solar cell research field - the record power conversion efficiency of MHPs based solar cells has reached 25%, which rivals that of silicon solar cells. What is particularly exciting about MHPs is that they can be manufactured into solar cell devices at low-cost using low temperature solution processing. Based on these attributes, MHPs have been called the “next big thing in photovoltaics” and worldwide research efforts have grown explosively.

Despite the impressive solar cell performance demonstrations, the microscopic mechanisms of the high performance and the thin film growth processes of the MHP thin films are still poorly understood. The lack of understanding in these areas is currently precluding more rational progress toward further increase in efficiency and reliable scaling up of the device area. In this talk, I will present our work that employed temperature dependent elastic and quasi-elastic neutron scattering to characterize the atomic structure and dynamics in MHPs. We find that the organic cations in MHPs play a crucial role in optoelectronic properties relevant for solar cell performance. I will also present our results on synchrotron based *in-situ* grazing incidence X-ray scattering studies on the MHP thin film formation processes. Our results reveal the sub-processes and mechanisms through which highly preferential crystallographic orientation of MHP films can be formed. Impact of thin film crystallographic orientation on solar cell performance will be discussed.

Biography:



Joshua J. Choi received B.E. in Chemical Engineering from Cooper Union (2006) and Ph.D. in Applied Physics from Cornell University (2012). He then performed postdoctoral research at the Department of Chemistry, Columbia University (2012-2014). He joined the faculty of the Department of Chemical Engineering, University of Virginia in August, 2014 and is currently an Associate Professor. He is a recipient of a NASA Early Career Faculty Award (2015).

Due to COVID-19, no refreshments will be available for this seminar

For more information, please contact Lisa Martin (swishl@rpi.edu)