Materials Science and Engineering Department

Spring Seminar Series

Extreme Materials Processing for Green Energy

Prof. Ju li
Department of Nuclear Science and Engineering
and **Materials Science and Engineering**
Massachusetts Institute of Technology

May 18, 2022 | 2-3PM

Zoom Link: https://drexel.zoom.us/j/88592537031

To combat global climate change, the energy transition in the next decades will be a civilization-scale endeavor, requiring tremendous minerals and new materials. It must be "done right". Extremely fast joule heating, plasma exposure or photon / charged-particle radiations can be used to create materials unavailable with conventional synthesis methods. We have developed robotic workflows and active-learning-based automated approaches to search for appropriate processing parameters. This has led to new catalysts for water-splitting and CO2 reduction electrolyzers, as well as new liquid electrolyte and solid coating formulations for battery electrodes. The importance of rapid scaling-up to meet the climate challenges by 2040 is emphasized, taking grid-scale energy storage as the example, where the techniques introduced above can be applied to enhance safety and economy, as well as the recycling of renewable energy wastes (REW). [*Current Opinion in Solid State and Materials Science* 26 (2022) 100975; *Applied Energy* 306 (2022) 118134]

Ju Li has held faculty positions at the Ohio State University, the University of Pennsylvania, and is presently a chaired professor at MIT. His group (http://Li.mit.edu) works on energy materials and systems. Ju is a recipient of the 2005 Presidential Early Career Award for Scientists and Engineers, the 2006 Materials Research Society Outstanding Young Investigator Award, and the TR35 award from Technological Review. Ju was elected Fellow of the American Physical Society in 2014, a Fellow of the Materials Research Society in 2017 and a Fellow of AAAS in 2020. Li is the chief organizer of MIT A+B Applied Energy Symposia that aim to develop solutions to global climate change challenges with "A-Action before 2040" and "B-Beyond 2040 technologies http://applied-energy.org/mitab2022

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Email: kn52@drexel.edu

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