



Spring 2021 Mechanical Engineering Distinguished Speaker Series

Professor Ju Li

Dept. of Nuclear Science and Engg. and Dept. of Materials Science and Engg.,
Massachusetts Institute of Technology, Cambridge, MA 02139, USA.

Date and time: March 4 2021 @ 3:30 PM

Venue: Online Zoom requiring VT authentication

<https://virginiatech.zoom.us/j/86093085919?pwd=bWhMOVIHcmNhQ2Jncy92cDBwV1U4dz09>

Meeting ID: 860 9308 5919

Passcode: 681173

ABSTRACT

Radiation-materials interactions at the nanoscale provide powerful avenues to control properties and shape materials. I will demonstrate efforts to computationally model these interactions based on first principles, as well as experimentally using high-precision electron beam to manipulate individual atoms and defects, and using ion beam for forming and stressing of solids. Radiation resistance in both structural and functional materials can be effectively tuned by nano-structuring, leading to scalable engineering solutions for nuclear energy.

[1] "Engineering single-atom dynamics with electron irradiation," *Science Advances* **5** (2019) eaav2252.

"Focused-helium-ion-beam blow forming of nanostructures: radiation damage and nanofabrication," *Nanotechnology* **31** (2020) 045302.

[2] "Nano-beam and nano-target effects in ion radiation," *Nanoscale* **10** (2018) 1598. "Sample spinning to mitigate polarization artifact and interstitial-vacancy imbalance in ion-beam irradiation," *npj Computational Materials* **6** (2020) 189.

[3] "Dispersion of carbon nanotubes in aluminum improves radiation resistance," *Nano Energy* **22** (2016) 319. "Superconducting Cu/Nb nanolaminate by coded accumulative roll bonding and its helium damage characteristics," *Acta Materialia* **197** (2020) 212.

[4] "Radiation-resistant metal-organic framework enables efficient separation of krypton fission gas from spent nuclear fuel," *Nature Communications* **11** (2020) 3103.

Speaker Biography



Prof. 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>) investigates the mechanical, electrochemical, and transport behaviors of materials as well as novel means of energy storage and conversion. Prof. Li 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. He was elected Fellow of the American Physical Society in 2014 and a Fellow of the Materials Research Society in 2017. In 2016 Prof. Li co-founded one of the MIT Energy Initiative (MITEI) Low-Carbon Energy Centers, the Center for Materials in Energy and Extreme Environments (CME). Prof. 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://li.mit.edu/ab/20> <http://li.mit.edu/ab/19>)