USC Viterbi School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Ming Hsieh Institute Seminar Series

Semiconductors and Microelectronics Technology

Visualizing long-range solid state amorphization in ferroic In_2Se_3

Pavan Nukala

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Indian Institute of Science, Bengaluru, India.

Date: Thursday, April 3rd, 2025
Time: 1:30 – 2:30 pm PT
Location: EEB 248

Abstract: I will discuss our recent and exciting results on in-situ transmission electron microscopy studies on T-phase, polar In_2Se_3 nanowires. Through some beautiful atomic resolution images, I'll show that the vdW layers slide with application of current (carrier wind force), eventually leading to a complete solid-state amorphization of these nanowires. I'll show in-situ videos of jerky earth quake-like response of these devices occurring due to the interaction between these defects, which eventually forms a precursor to amorphization. These insights, while on one hand may be considered to be text-book models of solid-state amorphization, have also implications in In_2Se_3 FES-FETs. I will briefly discuss our most recent foray into the transistors and show how the in-situ TEM studies are relevant for these devices.

References:

1 G. Modi*, S. Parathe*, et al., Electrically driven long-range solid state amorphization in ferroic In_2Se_3, Nature, 635, 847, 2024

Biography: Pavan Nukala obtained his Bachelors and Masters in Metallurgical and Materials Engineering from the Indian Institute of Science, Madras, India. He pursued his PhD from University of Pennsylvania, and subsequently was a nanosaclay post-doc at University Paris Saclay and Marie-Curie fellow at the University of Groningen. He started his independent group at the Indian Institute of Science in Bengaluru, India in 2020. His group works on ferroelectric, piezoelectric and phase change materials, oxide and 2D memristors, with an expertise on in-situ electron microscopy.

Hosted by Prof. Jayakanth Ravichandran, Prof. J. Joshua Yang, Prof. Chongwu Zhou, Prof. Stephen Cronin, and Prof. Wei Wu.
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