JAMES MADISON UNIVERSITY

SEMINAR
Friday, April 4

Dr. Kory Burns

Department of Materials Science & Engineering
University of Virginia

A New Understanding of Phonons: An Exploration into the Infrared Regime at Atomic Resolution

Abstract. In this presentation, a range of electron energy loss spectroscopy (EELS) techniques are used to collect the chemical and vibrational signal of complex oxides, ordered intermetallic nanoparticles, van der Waals (vdW) solids, and non-vdW two-dimensional materials. By correcting our slit aberrations to near perfection, phonon modes are resolved at atomic resolution. This is accompanied by advanced techniques like off-axis EELS so neutron selection rules dominate our acquisition to produce a localized signal and suppress long-range modes, and momentum-resolved EELS for mapping phononic density of states. Specifically, we address applications to quantum sensors, nanoscale thermoelectric devices, and optoelectronics. Ultimately, this work not only pushes boundaries in electron microscopy, but provides avenues to the entire scientific landscape on decoupling the structure-property relationship in solids for the better and more efficient design of next-generation semiconductors.

About Dr. Burns. Kory Burns is an assistant professor in the Department of Materials Science and Engineering at the University of Virginia. He obtained his PhD in materials science and engineering (Nuclear Engineering program) at the University of Florida in 2022. While in pursuit of his PhD, Kory held multiple positions at external institutions, including the National Energy Technology Laboratory, Oak Ridge National Laboratory, Texas Instruments Inc., and Sandia National Laboratories. His research group focuses on radiation-solid interactions, analytical TEM, *in situ* TEM, and image processing. So far in his first year on the job, Kory has been awarded the NASA VSGC Young Investigator Award, 4-VA Collaborative Research Award, UVa Research Innovation Award, UVa Community Outreach and Engagement Award, and has been a part of teams selected for funding from the Department of Energy, Department of Defense, and the National Science Foundation. Aside from research, he was proudly elected as a member of the board of the distinguished 100 Black Men of Central Virginia, he is the faculty advisor of collegiate 100, a board member of Guide Outreach, and facilitator between the Department of Human Services and the school of engineering and applied sciences (SEAS) at the University of Virginia to create employment opportunities for inner-city young adults.

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Meet the Speaker 2:00 pm, PCB 3144
Seminar 3:30 pm, King 159