



Physical Sciences Seminar

Nano- and micro-scale phonon-mediated thermal transport in ion irradiated and nanostructured solid-state materials

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Host: Zhanybek Alpichshev

Understanding heat conduction on micro- and nano- meter spatial scales in solid-state materials is very important for thermal management encountered in numerous applications involving, but not limited to, nuclear and fission energy, thermoelectric, electronic and opto-electronic devices. We will review our recent results on phonon-mediated thermal transport in various solid-state systems: (1) swift heavy ion irradiated single crystalline metal oxides and alkali halides, (2) irradiation-assisted phase-transformed single crystalline Ga₂O₃, (3) ion irradiated and nano-crystalline SiC, and (4) nano-porous & nano-granular Si. Conducted studies employed several laser-based thermal metrology techniques ranging from femtosecond laser-based time-domain thermoreflectance to continuum wave laser-based frequency- and spatial-domain thermoreflectance and micro-Raman opto-thermal spectroscopy, as well as molecular dynamics and semi-analytical phonon thermal transport calculations. New results revealed intriguing heat propagation phenomena associated with the presence of point and extended defects, heat conductivity recovery in irradiated nano-crystalline ceramics, thermal anisotropy and nanoscale phonon hydrodynamics.

Thursday, July 4, 2024 10:00am - 11:00am

Office Bldg West / Ground floor / Heinzl Seminar Room (I21.EG.101)



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