

NANO-FS: A NANOSCALE IMAGING AND SPECTROSCOPY LABORATORY FOCUSED ON ENERGY MATERIALS

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The nano-fs lab, at the South Dakota School of Mines and Technology, is focused on developing techniques to probe the optoelectronic properties of materials and nanostructures with high -spatial, -temporal, and -energy resolution. The lab builds on previous aperture-based near-field spectroscopy and microscopy methods developed by the principle investigator while at NREL (focused primarily on solar energy materials CdTe and GaInP), and extends these methods to incorporate tunable femtosecond sources and single molecule methods. Two experiments under development will be presented: the plasmonic control of upconverting nanoparticles, being studied using a spectrally-resolved confocal microscope system, and carrier dynamics in intermediate band solar cells, currently being explored using pump-probe methods. Both these material systems have potential to increase the useful spectral bandwidth of energy conversion devices. Nanoscale knowledge of the optoelectronic properties of these systems can potentially give important insights into the relevant physics of these material systems.