

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Electron Dynamics in Nanocrystalline TiO₂ and ZnO Measured by Terahertz Spectroscopy CHARLES SCHMUTTENMAER, Yale University, Department of Chemistry, JASON BAXTER, Dept. of Chemical and Biological Engineering — Understanding the microscopic details of carrier transport in nanocrystalline colloidal thin films is required for complete understanding of a variety of photochemical and photoelectrochemical cells utilizing interpenetrating networks. Measuring the photoconductivity in these materials, however, is a challenging problem because of the inherent difficulty of attaching wires to nanometer-sized objects. Furthermore, picosecond carrier dynamics play an important role in efficient charge separation and transport, but the low temporal resolution of traditional methods used to determine their photoconductivity precludes their use in studying sub-ps to ps dynamics. This talk will present recent advances utilizing THz spectroscopy to investigate and elucidate the microscopic behavior of carrier dynamics within the context of materials for energy applications such as dye-sensitized solar cells and solar-driven cells for catalytic chemistry.

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Date submitted: 17 Nov 2008

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