CHEMICAL AND BIOLOGICAL ENGINEERING

SEMINAR ANNOUNCEMENT

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“Insulator-Metal Transition in Plasma-Synthesized ZnO Nanocrystal Networks”

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Abstract

Fundamental understanding of charge transport in films comprised of semiconductor nanocrystals connected to each other via narrow necks is important for electronic devices based on such films. Such devices include solar cells, light emitting diodes, thin film transistors, sensors, and photodetectors. We use nonthermal plasma synthesis integrated with supersonic inertial-impaction deposition to produce ZnO nanocrystals and films comprising these nanocrystals.\(^1\) We manipulate electron transport properties in these films with a combination of ultraviolet illumination and surface modification via atomic layer deposition in the interstices between the nanocrystals.\(^2\) Specifically, we use these treatments to increase the electron density, \(n\), and the interparticle contact (neck) radius, \(\rho\), independently and thereby induce an insulator-metal transition, the first observed in these types of films.
