

Abstract Submitted  
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**Conductivity of Thin Film Structures Fabricated by E-Beam Lithography from Gold Nanoparticle Resists**<sup>1</sup> STEFAN DICKERT, MYOUNG-HWAN PARK, COLIN JERMAIN, VINCENT M. ROTELLO, MARK T. TUOMINEN, University of Massachusetts Amherst — Drop- and spin-coated solutions of ligand coated nanoparticles act as a novel “direct write” e-beam resist, which can be prepared with metallic, magnetic and semiconducting nanoparticles (Y.Ofir. et. al, Adv. Mater. 20, 2561-2566 (2008)). We prepared thin films from gold nanoparticles in which we varied the ligand length, ligand type and the film thickness. Small angle X-Ray scattering experiments as well as SEM imaging of the samples were performed to determine structural properties of the nanoparticle films at various stages of the fabrication process, after drop coating, ebeam exposure and annealing. We further performed resistance measurements in the 2-350K temperature range and report different conductivity mechanisms based on the ligand type and film thickness, ranging from insulating to Mott hopping conduction to metallic. We observed different results for Thioalkylated trimethyl ammonium (TMA) and thioalkyl tetra (ethylene glycol)ated trimethyl ammonium (TTMA) ligands.

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