

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Electron Transport between Nanoparticle-Coated Liquid Droplets** SEBNEM SOYLER, CHRISTOPHER KNUTSON, KEVIN MCCARTHY, ROY SHENHAR, HABIB SKAFF, VINCE ROTELLO, TODD EMRICK, THOMAS RUSSELL, MARK TUOMINEN, ANTHONY DINSMORE, University of Massachusetts — We investigate the electronic properties of nanoparticle-coated liquid droplets. We demonstrate single-electron tunnel junctions assembled in solution, using conducting droplets as electrodes and nanoparticles as quantum dots. Here, we are using functionalized gold or CdSe nanoparticles which spontaneously form a monolayer on approx. 30-micron water droplets suspended in insulating oil. A few droplets form junctions between two Platinum or Gold wires; we apply a bias voltage to the wires and measure the current. Due to the small size of the nanoparticles (a few nanometers), the current exhibits single-electron tunneling effects such as the Coulomb blockade. The effect of photoexcitation of the CdSe particles on the current will be discussed. Liquid droplets provide promising systems for controlled and self-repairing tunnel junctions. Improved understanding of the electrical characteristics may allow inexpensive assembly of a large number of devices with controlled size, symmetry and function. This work is partially supported by NASA.

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Date submitted: 01 Dec 2004

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