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Nanoparticle-coated liquid-metal droplets: interfacial tension and electron transport across the interface KAN DU, B. SAMANTA, L. GLOGOWSKI, V. ROTELLO, M. TUOMINEN, T. EMRICK, T. RUSSELL, A. DINSMORE, University of Massachusetts — We form stable droplets of molten metal, investigate their stability, and demonstrate their potential for forming electronic devices. Droplets of liquid Ga, 0.1-100 microns in diameter, are suspended in water and stabilized by Au or Fe_3O_4 nanoparticles. We measure a large reduction of the surface tension of the Ga droplets when nanoparticles assemble at the interface. To investigate electron transport through the Ga-nanoparticle-Ga junction, we deposit coated droplets on substrates with patterned electrodes. We apply a bias voltage to the electrodes and measure the current after evaporation of the solvent. The nonlinear I-V curve shifts with a gate voltage and indicates a transistor is formed in the junction. Improved understanding of the electrical characteristics may allow inexpensive assembly of a large number of functional devices. We acknowledge support from the Center for UMass/Industry Research on Polymers (CUMIRP) and from NSF NIRT program (CTS-0609107).

Kan Du

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