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Adsorption energy of nanoparticles at liquid/liquid interfaces[1]
KAN DU, E. GLOGOWSKI, T. EMRICK, T. RUSSELL, A. DINSMORE, Department of Physics, Department of Polymer Science and Engineering University of Massachusetts Amherst — We investigated the adsorption energy of nanoparticles at liquid/liquid interfaces by measuring the change of interfacial tension during the self-assembly of nanoparticles at interfaces. The sessile-droplet and pendent-droplet methods were used to measure the interfacial tension of liquid-gallium/water and oil/water interfaces. Interfacial tensions were measured under different conditions, including the concentrations and sizes of nanoparticles, ligand composition, solution pH, and ionic strength. The measurements showed that interfacial tension can change by an amount ranging from 0.5 to 150 mN/m. From the change in interfacial tension, we obtain the adsorption energy per nanoparticle, which ranges from less than 10 k_BT to more than 1000 k_BT. The results should contribute to the fabrication of membranes and other nano-composite materials by interfacial assembly.

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