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Structure, Wrinkling, and Reversibility of Langmuir Monolayers of Gold Nanoparticles BINHUA LIN, DAVID SCHULTZ, U. of Chicago, XIAO-MING LIN, ANL, DONGXU LI, MATI MERON, JEFF GEBHARDT, P. JAMES VICCARO, U. of Chicago — The assembly of nanoparticles into large, two-dimensional structures provides a route for the exploration of collective phenomena among mesoscopic building blocks. We characterize the structure of Langmuir monolayers of dodecanethiol-ligated gold nanoparticles with *in situ* optical microscopy and X-ray scattering. The interparticle spacing increases with thiol concentration and does not depend on surface pressure. The correlation lengths of the Langmuir monolayer crystalline domains are on the order of five to six particle diameters. Further compression of the monolayers causes wrinkling; however, we find that wrinkled monolayers with excess thiol can relax to an unwrinkled state following a reduction of surface pressure. A theoretical model based on van der Waals attraction and tunable steric repulsion is adopted to explain this reversibility.

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