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Confinement-induced restructuring of colloidal particles YINGXI ELAINE ZHU, CINDY LEI, YANGHAI YU, PRASAD SARANGAPANI, Department of Chemical and Biomolecular Engineering, University of Notre Dame — Packing configuration of colloidal particles in the bulk suspension is determined by interparticle interaction and volume fraction. However, many modern technological applications of colloidal suspensions entail applications of surface confinement and significantly modify the packing structure of colloidal particles. The effect of surface confinement on particle packing is yet poorly understood. We have custom designed a compression apparatus that is well equipped with a confocal microscope, allowing us to vary the gap spacing between two flat solid substrates confining colloidal suspension and image the 3-D microstructure of colloidal particles simultaneously. We observe enhanced layering of confined colloidal particles and a well-ordered 2D crystal structure of each layer formed after quasi-static compression. Surprisingly, we have also observed disordered layers of colloidal particles and the jamming of multi-layers against one another after rapid quench. These observations suggest the intriguing confinement-induced restructuring of dense colloidal suspensions, and provide a unifying perspective from which to pack the particles more efficiently than in bulk. In preliminary experiments, we have also studied the effect of surface chemistry and topography on the packing configuration of confined colloidal particles.

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