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Roughness-controlled depletion interactions for controlling colloidal self-assembly KUN ZHAO, Dept. of Chemistry, University of California-Los Angeles, THOMAS G. MASON, Depts. of Physics and Chemistry, University of California- Los Angeles — The surfaces of colloidal particles resulting from many new fabrication methods are not molecularly smooth, so understanding how the surface roughness affects the depletion attraction is very important. We show that the depletion attraction between custom-shaped microscale platelets can be suppressed when the nanoscale surface asperity heights become larger than the depletion agent. In the opposite limit, the attraction re-appears and columnar stacks of platelets are formed. Exploiting this, we selectively increase the site-specific roughness on only one side of the platelets to direct the mass-production of a single desired assembly: a pure dimer phase. Furthermore, we model the interaction between flat plates coated by hemispheres having controlled sizes and densities relative to those of a spherical depletion agent. Overall, these studies provide significant insight into attractive bonds between particles that retain lubrication, and they provide a basis through which more complex assemblies can be made.

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