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Colloidal atoms and molecules[1]

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We describe two new types of colloidal particles that greatly expand the kinds of colloids and nanoparticles that are available for self-assembly. The first type, called colloidal molecules, consists of clusters of microspheres and/or nanospheres that take on well-defined geometries such as dumbbells, triangles, tetrahedra, octahedral, *etc.* With these, we explore new two and three-dimensional phases, including dumbbells at a planar interface, and three-dimensional assemblies of tetrahedra. The second type, called colloidal atoms, consists of nearly spherical particles with a specific number of symmetrically-placed patches on their surface. These patches have symmetries similar to the colloidal molecules described above. The patches can be functionalized with single-stranded DNA that interacts specifically with complementary strands on other particles forming a network or crystal of colloidal particles.

[1]Various aspects of this work involve collaborations with V. N. Manoharan, M. T. Elsesser, D. R. Breed, Xiaochao Xu, P. V. Schwartz, G. R. Yi, Y. S. Cho, and S. M. Yang.