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Emerging Structures for Colloidal Brushes: from Dispersions and Agglomerates to Spherulites, Wires, and beyond ALBERTO STRIOLO, University of Oklahoma — A large variety of nanoparticles holds extraordinary promises for practical applications, e.g., in catalysis and materials science. For these and other applications it is necessary to assemble the nanoparticles to yield supra-molecular aggregates of desired morphology. We are interested in the self-assembly of spherical colloids (i.e., nanoparticles) induced by interactions that become anisotropic because of entropic effects. Thus short polymer brushes are grafted on restricted regions of the spherical nanoparticles considered (e.g., the equatorial plane). Monte Carlo simulations were conducted to assess the properties of the self-assembled nanostructures as a function of the length of the brushes and of the strength of the particle-particle attraction. Depending on the specific solution conditions (particle-particle dispersive attractions, as well as length and density of the grafted polymer brushes) it is possible to obtain uniform dispersions, irregular aggregates, spherulites, one-dimensional wires, and two-dimensional colloidal sheets. We will discuss whether or not the effective colloid-colloid pair interactions at infinite-dilute conditions (i.e., the potential of mean force) can be used to predict the emerging behavior of the colloidal nanoparticles at larger concentrations.

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