

Abstract Submitted
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Towards Ordering Bare and Polymer-Grafted Nanoparticles in Dip Coating Process¹ CHONGFENG ZHANG, PINAR AKCORA, Stevens Institute of Technology — The unusual phenomenon of anisotropic assembly of microspheres during evaporation of polymer droplets is being investigated in our group. Dynamics of contact-line movement under varying evaporation conditions and the growth of clusters with time on surfaces differing in hydrophilicity will be presented in this talk. We observed that distinctive stripes were formed when the internal shear flows arising from the phase separation of particles from polymer chains were balanced with the Marangoni flows. Contrary to formation of lines of particles with a stick-slip mechanism, our microspheres and nanoparticles assemble parallel to the withdraw direction in dip coating. By varying the polymer concentration and chain length, we were able to show that width and periodicity of lines can be tuned. Further, with the PAA-grafted silica nanoparticles, the effect of strong attraction between free and grafted chains on the assembly process was examined. The mechanism of ordering colloids and nanoparticles with physical bridging of polymers or hydrogen bonding between different polymers has important implications in controlling the organization of functional particles using dip coating process.

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