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Interaction of bi-dispersed particles with contact line in inkjet-printed evaporating colloidal drops VIRAL CHHASATIA, YING SUN, Drexel University — The deposition behavior of inkjet-printed aqueous colloidal mixture of micro and nanoparticles onto a glass substrate with systematically varied wettability has been investigated using fluorescence microscopy. Real-time bottom-view images show that particles inside an evaporating drop rearrange themselves near the drop contact line according to their sizes, where smaller particles tend to deposit closer to the contact line compared to the larger ones. By increasing substrate wettability, particles in the bi-dispersed mixture can be further separated compared to those on substrates of poor wettability. This is primarily because during different stages of evaporation, the interplay of surface tension, drag due to evaporative flow, and particle-substrate interactions, rearrange particles inside a colloidal drop near the contact line region. Forces acting on particles determine the extent to which particles enhance contact line pinning, which ultimately determines the final deposition morphology of particles from a bi-dispersed colloidal mixture. The effects of particle size contrast, particle volume fraction, and substrate surface energy on particle separation are examined in detail.

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