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Effects of particle number on interaction of particles with contact line in inkjet-printed evaporating colloidal drops YING SUN, VIRAL CHHASATIA, Drexel University — The deposition behavior of inkjet-printed aqueous colloidal drops onto glass substrates with systematically varied wettability has been investigated by using fluorescence microscopy and a high-resolution goniometer. Real-time side-view images show that the contact angle of an evaporating colloidal drop is a function of the number of particles in suspension. The number of particles here is changed either by changing particle volume fraction while keeping particle size as a constant or by changing the particle size (10, 55, and 550 nm in radius) while keeping the particle volume fraction as a constant. During different stages of evaporation, the interplay of surface tension, drag due to evaporative flow, and particle-substrate interactions, rearranges particles inside a colloidal drop near the contact line region. These forces depend upon the size of the particles; however, the net effect of all these forces is independent of particle size. As the number of particles increase inside a drop, the receding contact angle of the evaporating drop decreases due to pinning of particles near the contact line. This reduction in receding contact angle increases the diameter of the particle deposition. The size of the particles affects the deposition diameter as smaller particles can move closer to the contact line compared to the larger particles and have a larger deposition diameter.

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