

Tuning colloidal deposits by evaporating sessile droplets

On a fine morning, if you take a tiny droplet of coffee and dry it on a table top, a ring like pattern of dried coffee particles forms. This problem is known as coffee ring problem and the mechanism of the ring formation was first proposed by Deegan et al, 1997. This seems to be an efficient way pattern micro or nanoparticles on solid surfaces. For example, in bioassays and ink-jet printing. In our lab, we have established new ways to self-assemble particles by evaporating sessile droplets. In the figure below, a regime map for predicting the deposit shape as function of the substrate temperature, substrate wettability and particles concentration is proposed. The dashed lines are plotted to demarcate the three regimes. Non-filled and filled symbols represent present and published measurements, respectively. Insets show the deposit image obtained by optical microscopy at particles concentration, $c = 0.05\%$, and scale bars in the insets correspond to 1 mm.

