

Lifetime of suspension inkjet drop and its pattern formation

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We investigated the whole lifetime of inkjet drops – generation, spreading and drying. As inks, we used the alcohols (heptanol, octanol and decanol) and suspensions of 2 micrometer polystyrene spherical particles in the alcohols. The particle loading was 5-30 vol%. Bare glass surfaces and aldehyde coated surfaces were used as solid substrates. The result shows that the generation characteristics are not affected by the presence of particles in the liquid. After impact on the substrate, capillary spreading follows and the drop of suspension in octanol shows the same behavior as the drop of pure octanol. The drying characteristics are quite different depending on the presence of particles and/or the wetting characteristics of the solid substrate. On the small contact angle surface, particles are arranged parallel to the contact line and become fully arranged in the crystalline form over the whole surface at the last stage of drying. On the large contact angle surface, particles move toward the rim by the outward flow. We demonstrate that a large area of the monolayer crystalline structure can be obtained by inkjet printing with a judicious control of the drying and wetting conditions based on the present study.