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Stable Drop Formation and Deposition Control in Ink Jet Printing of Polyvinylidene Fluoride Solution NATHANIEL THORNE, XIN YANG, YING SUN, Drexel University, COMPLEX FLUIDS AND MULTIPHASE TRANSPORT LAB–DREXEL UNIVERSITY TEAM — Using inkjet printing as an additive fabrication method is an enabling technology for low-cost, high-throughput production of flexible electronics and photonics. Polymeric materials, such as Polyvinylidene fluoride (PVDF), are widely used as dielectric materials for microelectronics, batteries, among others. However, due to its large molecular weight and incompatibility with moisture in air, the stable drop formation of PVDF solution is quite challenging. In this study, we examine the effects of solute concentration, nozzle back pressure, ejection waveform, and ambient moisture on the formation of PVDF droplets. The deposition dynamics of inkjet-printed PVDF solutions are then examined as a function of the solvent concentration. Bi-solvents of different surface tensions and vapor pressures are used to induce Marangoni flows in order to suppress the coffee-ring effect. The deposition of a single droplet and the interactions between multiple drops are examined for a better control of the deposition uniformity. Printing of lines and patterns with reduced instability is also discussed.

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