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Hyper-branched Structures via Flow Coating YUJIE LIU, DONG YUN LEE, University of Massachusetts-Amherst, CÉCILE MONTEUX, CNRS-ESPCI-Université Pierre et Marie Curie, ESPCI, ALFRED J. CROSBY, University of Massachusetts-Amherst — Evaporative self-assembly has been shown to be a scalable method for organizing non-volatile solutes, e.g. nanoparticles; however, the influence of substrate surface energy in this technique has not been studied extensively. In this work, we utilize an evaporative self-assembly process based upon flexible blade flow coating to fabricate organized structures on substrates that have been modified to systematically vary surface energy. We focus on the patterning of polystyrene. We observe a variety of polystyrene structures including dots, hyper-branched patterns, stripes and lines that can be deposited on substrates with a range of wetting properties. We explain the mechanism for these structural formations based on the competition between Marangoni flow, adsorption, friction and viscosity. The development of this fundamental knowledge is important for controlling hierarchical manufacturing of nanoscale objects with different surface chemistries and compositions.

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