

Abstract Submitted  
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**Using Capillary Flows to Pattern Lines**<sup>1</sup> SAURABH VYAWAHARE, KATE CRAIG, AXEL SCHERER, California Institute of Technology, Pasadena CA 91125 — One can appreciate how capillary forces cause unexpected patterns and shapes by looking at a soap bubble. Pattern formation by surface tension is seen in ring patterns of coffee stains, fingering patterns in Hele-Shaw cells, ordering of two dimensional micro-sphere crystals, combing of DNA and skeleton formation in marine creatures called radiolarians. Though common, problems involving the understanding and control of the self-assembly mechanism need to be resolved before using capillary forces as a practical lithographic tool. Here, we report capillary flows create line patterns in evaporating liquids between closely spaced parallel plates. The widths of these lines range from a few microns to a few nanometers. Deliberate patterning of such lines requires pinning of the contact line and the presence of foaming surfactants. The position and type of line can be controlled with artificial pinning points and varying solutes respectively, and large-scale photolithography can be used to guide and control the definition of nanostructures. We provide “proof of principle” demonstrations of this method’s application by creating lines of colloidal quantum dots and micro-spheres. This represents the first step in using capillary phenomena to create controlled, self-assembling, one-dimensional wire-like structures

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