

Abstract Submitted
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Drying Mediated Pattern Formation in a Capillary-Held Polymer Solution¹ ZHIQUN LIN, JUN XU, SUCK WON HONG, JIANFENG XIA, Materials Science and Engineering Department, Iowa State University, Ames, IA 50011 — We demonstrated that concentric ring patterns of high regularity could form spontaneously, simply by allowing a droplet to evaporate in a consecutive “stick-slip” motion in a confined geometry. The process resembled neatly stacked rows of driftwood abandoned by receding tides. The use of solutions with different concentrations and different solvents effectively mediated the evaporative loss of the solvent and the deposition time of the solute, thereby affecting the center-to-center distance between adjacent rings and the height of the ring. A theoretical calculation based on the mass conservation of the solution has, for the first time, been performed to reveal the nature of the formation of gradient ring patterns in a confined geometry. The studies demonstrate that dynamic self-assembly in a confined geometry may offer a new approach to produce gradient features, as well as a simple, versatile, generalizable approach to produce yet more complex patterns. This natural, pattern-forming process could find use in the fields such as nanotechnology and optoelectronics.

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