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Mesoscale Patterns Formed by Evaporation of a Polymer Solution in the Proximity of a Sphere on a Smooth Substrate: Molecular Weight and Curvature Effects SUCK WON HONG, JIANFENG XIA, MYUNGHWAN BYUN, QINGZE ZOU, ZHIQUN LIN, Iowa State University — A drop of polymer solution was constrained in a sphere-on-flat geometry, resulting in a liquid capillary bridge. As solvent evaporated, intriguing surface patterns of polymer formed, which were strongly dependent on the molecular weight (MW) of polymer. Dotted arrays were formed at low MW; concentric rings were produced at intermediate MW; concentric rings, rings with fingers, and punch-hole-like structures, however, were yielded at high MW. Rings with fingers as well as punch-hole-like structures were manifestations of simultaneous occurrence of the "stick-slip" motion of the contact line and the fingering instabilities of rings. In addition, the curvature of the sphere in the sphere-on-flat geometry was found to affect the pattern formation. A decrease in the curvature of the sphere led to an earlier onset of the formation of punch-hole-like structures when high-MW polymer was employed as the nonvolatile solute.

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