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The Parametric Study of Focused Laser-Induced Marangoni Dewetting for Patterning Polymer Thin Films JONATHAN SINGER, TIANXING MA, Rutgers University, STEVEN KOOI, Massachusetts Institute of Technology, EDWIN THOMAS, Rice University — Highly-localized focused laser spike (FLaSk) heating of polymer thin films is a resist- and developer-free alternative to 2D laser direct write for creating patterns on the single micron or, by exploiting overlap effects, submicron scale. The massive temporal and spatial thermal gradients and resulting thermal Marangoni stresses generated by FLaSk are an effective means for the directed dewetting and patterning of such films. Here, the general applicability of this technique to glassy amorphous polymer thin film systems is investigated through systematic investigation of film thickness, glass transition temperature, and polymer mobility. The results reveal that the important parameters are the film thickness (coupled to the optical heating effects through anti-reflection coating effects) and the high-temperature polymer melt mobility, allowing for generation of single features with linewidths of down to 1 μm. Further, the introduction of spatial mobility variations by using polymer brushes, bilayers, and microphase separated block copolymers leads to additional profile manipulation effects (*i.e.*spontaneous 2D pattern generation and flattened top profiles).

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