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Bidirectional Control of Flow in Thin Polymer Films by Photochemically Manipulating Surface Tension CHAE BIN KIM, DUSTIN JANES, SUNSHINE ZHOU, AUSTIN DULANEY, CHRISTOPHER ELLISON, The University of Texas at Austin — The Marangoni effect causes transport of liquids in response to surface tension gradients. In a thin polymer film, such flow results in formation of topographic features that could be exploited as a practically useful route to manufacture patterned surfaces. An especially versatile material for this application should be able to be spatially programmed to possess regions of higher or lower relative surface tension so that the direction of flow into or out of those regions can be directed with precision. To this end, we describe here a photopolymer whose melt-state surface tension can be selectively raised or lowered in light exposed regions depending on the wavelength and dose of applied light. The direction of Marangoni flow into or out of irradiated regions agrees with expected surface tension changes associated with each photochemical transformation. We believe this patterning methodology will be potentially useful for high throughput fabrication environments such as roll-to-roll processing that can exploit contact-free and solvent-free topography development.

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