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Patterning Thin Polymer Films by Photodirecting the Marangoni Effect CHRISTOPHER ELLISON, CHAE BIN KIM, DUSTIN JANES, JOSHUA KATZENSTEIN, University of Texas at Austin - McKetta Department of Chemical Engineering — New methodologies for patterning micro- and nano- scale features in polymer thin films are desired because of their high technological relevance to a range of applications, including microelectronics fabrication. A new non-contact strategy for high-speed patterning of arbitrary shapes in polymer films that involves photochemically directing the Marangoni effect will be described. The Marangoni effect drives the formation of thin film topography by causing liquid flow in response to surface energy gradients. In this approach, a topographical pattern can be pre-programmed and stored in a smooth glassy film using light activated chemistry to pattern surface energy gradients. The topography can be later revealed by heating the film to the liquid state without use of a wet or dry etch step, unlike traditional photoresist methods. The use of grafting reactions from small molecule photosensitizers to change the surface energy locally in polymers that do not intrinsically undergo photochemical reactions will also be discussed. Judicious selection of the photosensitizing compound in an otherwise transparent polymer expands the use of this method to more readily available light sources. We believe this methodology will be potentially useful as a facile and ubiquitous patterning technique for many polymers.

Christopher Ellison
University of Texas at Austin - McKetta Department of Chemical Engineering

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