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Use of Spray Adhesives for the Manufacture of 3-D Capillary Origami Microstructures MITHI DE LOS REYES, NC School of Science and Mathematics — The method of "capillary origami"—using the surface tension of an evaporating water droplet to fold a flexible membrane into a 3-D polyhedron, as investigated by Py et al.—has shown promise as a way to create fully 3-D microstructures. However, the origami re-opens past a critical evaporation point, and previous attempts to prevent this re-opening have proven to be expensive and timeconsuming. We therefore investigated the use of various spray adhesives in keeping these origami microstructures closed. Three characteristics were measured: efficiency, tackiness, and strength of the adhesive. Measurements of these three characteristics point to 3M Super 77 Spray Adhesive as an optimal adhesive for spraying microstructures. Furthermore, we designed a new method to measure adhesive strength by using an analytical balance to measure force applied by a micrometer to a microstructure. We also developed novel procedures to create uniformly-sized microstructures and to accelerate the folding process, all of which improve upon the original capillary origami method. These novel procedures, combined with measurements that indicate 3M Super 77 as an optimum adhesive, suggest a potential method for the mass-production of truly 3-D microstructures. Py, Charlotte, et al. "Capillary origami: Spontaneous wrapping of a droplet with an elastic sheet." Physical Review Letters. 98.156103 (2007)

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