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New Approaches to High-Throughput Crystallization Based on Contact Line Pinning. Yevgeniy Kalinin¹, Viatcheslav Berejnov¹, Robert E. Thorne^{1,2}, ¹Physics Dept., Cornell Univ., Ithaca NY USA, ²Mitegen, LLC, Ithaca, NY USA

Macromolecular crystal growth via vapor diffusion relies on solvent evaporation from drops of mother liquor. Drop shape affects the evaporation rate and can have especially large effects on nucleation rates, but is poorly controlled in existing crystallization methods. We have microfabricated micrometer-size patterns that strongly pin drop contact lines, allowing precise control of drop shapes and positions. Uncertainties in evaporation rate are greatly reduced, providing better-defined crystallization conditions and improved reproducibility of results. Drops of protein, surfactant and salt solutions pinned in this manner are highly stable against vibrations and tilts, allowing the substrate to be flipped for hanging drop crystallization. Based on these results, we have designed a new class of crystallization trays that allow *in-situ* X-ray examination and easy crystal retrieval. This work was funded by the National Institutes of Health (R01 GM65981) and by NASA (NAG8-1831).