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Two-Dimensional Crystallization of Microspheres by Drop-Drying[1] LINDSAY SANZENBACHER, TERRY BIGIONI, University of Toledo — When a drop of colloidal solution is dried, nearly all of the particles are deposited at the drop's edge, due to fluid flows inside the evaporating drop. The remaining particles typically form disordered deposits inside the drop's perimeter. My research studies the mechanism involved in the opposite effect, formation of a uniform and highly-ordered monolayer of colloidal spheres, namely, 800 nm polystyrene microspheres. For a monolayer to form, two key conditions must be achieved. First, the particles must be transferred from the bulk of the drop to the liquid-air interface. The interface must in turn be sticky enough to trap the particles, enabling 2D array formation. This interfacial stickiness is due to surface tension. Interfacial interactions are well understood for microspheres, but the evaporation kinetics are not. I have altered the kinetics in various ways to bring the particles in contact with the liquid-air interface, by changing the evaporation rate and drying drops upside down. Some strategies have resulted in interfacial particles, but a highly-ordered monolayer has not yet been achieved. Further study of these methods will be done to determine the best way to promote 2D crystallization and to gain a more complete understanding of the mechanism.

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Lindsay Sanzenbacher
University of Toledo

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