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Free-standing monolayer films of ordered colloidal particles[1] ABHISHEK YADAV, MAHESH S. TIRUMKUDULU, Indian Inst of Tech-Bombay — We report a method to fabricate large area, free standing monolayer films of close-packed colloidal particles. Our method creates a wet, free-standing film of colloidal dispersion, which is then dried under controlled environment to achieve a dry, free-standing film of particles. The colloidal dispersion contains mono-dispersed hard particles (such as polystyrene or silica) mixed with relatively smaller and softer polymer particles of low glass transition temperature. During drying, hard particles present in the free standing film arrange in a hexagonal close-packed structure due to capillary interaction and form a monolayer film while the soft particles fill the interstices around hard particles and deform and coalesce to produce a continuous matrix to prevent the cracking of the monolayer film. The monolayer films exhibit strong iridescence indicating potential application in photonic devices. Simulations were performed on the Surface Evolver software to investigate the capillary interactions that lead to particle ordering.

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