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Liquid crystals as on-demand, variable thickness targets for intense laser applications[1] PATRICK L. POOLE, C. DAVID ANDERECK, DOUGLASS W. SCHUMACHER, The Ohio State University — Laser-based ion acceleration is currently studied for its applications to advanced imaging and cancer therapy, among others. Targets for these and other high-intensity laser experiments are often small metallic foils with few to sub-micron thicknesses, where the thickness determines the physics of the dominant acceleration mechanism. We have developed liquid crystal films that preserve the planar target geometry advantageous to ion acceleration schemes while providing on-demand thickness variation between 50 and 5000 nm. This thickness control is obtained in part by varying the temperature at which films are formed, which governs the phase (and hence molecular ordering) of the liquid crystal material. Liquid crystals typically have vapor pressures well below the 10^{-6} Torr operating pressures of intense laser target chambers, and films formed in air maintain their thickness during chamber evacuation. Additionally, the minute volume that comprises each film makes the cost of each target well below one cent, in stark contrast to many standard solid targets. We will discuss the details of liquid crystal film control and formation, as well as characterization experiments performed at the Scarlet laser facility.

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