

Abstract Submitted
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Off-normal deposition of PTFE thin films during 157-nm irradiation¹ SHARON R. GEORGE, STEPHEN C. LANGFORD, J. THOMAS DICKINSON, Washington State University — Polytetrafluoroethylene (PTFE) is valued for its chemical stability, low surface energy, and insulating properties. The ablation of PTFE by F₂ excimer lasers (157 nm photons) involves photochemical scission of C-C bonds along the polymer chain. Depending on the fluence, the fragment masses can range from 50 to 2000 amu. Gaussian beam profiles allow for the production of spatially non-uniform distributions of fragment masses, with the lighter fragments concentrated in the center of the laser spot. The resulting trajectories for the light fragments can be strongly forward directed, while the heavy fragments are directed more to the side, well away from the surface normal. We present experimental evidence for these angular distributions, and numerically simulate this behavior with a simple, two-component hydrodynamic model. Under the conditions of our work, most of the ablated mass appears as heavier fragments and can be collected on substrates mounted to the sides or above and below the laser spot. This geometry may have advantages in some applications of pulsed laser deposition.

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