

Abstract Submitted
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VUV excimer laser-materials interactions with fluorocarbon polymers¹ TOM DICKINSON, SHARON GEORGE, STEVE LANGFORD, Washington State University — Particle emission from transparent wide bandgap materials at laser fluences below the threshold for optical breakdown can provide important insight on interactions at the higher fluences employed for surface modification, machining, and laser ablation deposition. We present recent studies of ion and neutral molecule emission from polytetrafluorethylene [(C₂F₄)_N—PTFE—Teflon®] and polyvinylidene fluoride [(CH₂CF₂)_N—PVDF] during nanosecond pulsed 157-nm excimer laser irradiation. The chemical and electrical properties of these materials play important roles in many technologies. In PTFE, the primary mechanism for material removal involves bond scission along the backbone of the polymer. In PVDF, HF emission is accompanied by carbonization of the irradiated region. High-energy positive and negative ions are observed from both materials under 157-nm irradiation. We describe critical measurements that reveal the physics and chemistry underlying these processes.

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