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Optical Measurements of Preheated Polystyrene and Aluminum Layers W. THEOBALD, J.E. MILLER, T.R. BOEHLY, E. VIANELLO, I.V. IGUMENSHCHEV, V.N. GONCHAROV, A.V. MAXIMOV, T.C. SANGSTER, Laboratory for Laser Energetics, U. of Rochester — We present optical measurements of polystyrene and aluminum layers modified by ionizing radiation within a 100-ps time scale. The experiments were performed at the OMEGA Laser Facility using high-energy, 100-ps, 5×10^{14} W/cm^2 laser pulses impinging onto a 40-μm plastic ablator in order to generate the preheat radiation. Two temporal resolving optical diagnostics, a velocity interferometer for any reflector (VISAR), and a temperature-calibrated streaked optical pyrometer (SOP) measure the change of the optical properties and the temperature increase of samples mounted on the target's back side. Preheating prior to the arrival of a shock front is observed for the aluminum and plastic layers. Within the laser interaction time, a strong absorption and a frequency shift of the optical probe laser reflecting from the samples are measured with VISAR. The SOP measurement indicates temperatures of up to $\sim$4 eV at the target's back side prior to the shock front arrival. The experimental results are compared to one-dimensional hydrodynamic simulations with the code *LILAC*. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-92SF19460.

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