FY20 Naval Research Laboratory Report on Omega Laser Facility Experiments

Focused Experiments on High-Z Coating Dynamics on OMEGA EP

Principal Investigators: M. Karasik, J. Weaver, J. Oh, A. J. Schmitt, and S. P. Obenschain (Plasma Physics Division, U.S. Naval Research Laboratory); and D. N. Polsin and D. Mastrosimone (LLE)

During FY20, the Naval Research Laboratory (NRL) in collaboration with LLE executed two shot days on OMEGA EP. The experiments were designed to study the detailed physics of high-Z coatings that are highly effective for imprint mitigation. Soft x-ray spectra of the indirect-direct hybrid drive with high-Z coatings were obtained using the NRL transmission grating spectrometer (NRL TGS) installed on OMEGA EP. Measurement of coating pre-expansion (Fig. 1) needed to maximize the effect of the coating was obtained using the 4ω probe. High-Z coating dynamics were monitored using streaked soft x-ray self-emission. VISAR (velocity interferometer system for any reflector) and SOP (streaked optical pyrometer) images of the shocks generated in the coated and uncoated foils provide data on shock velocity and uniformity.

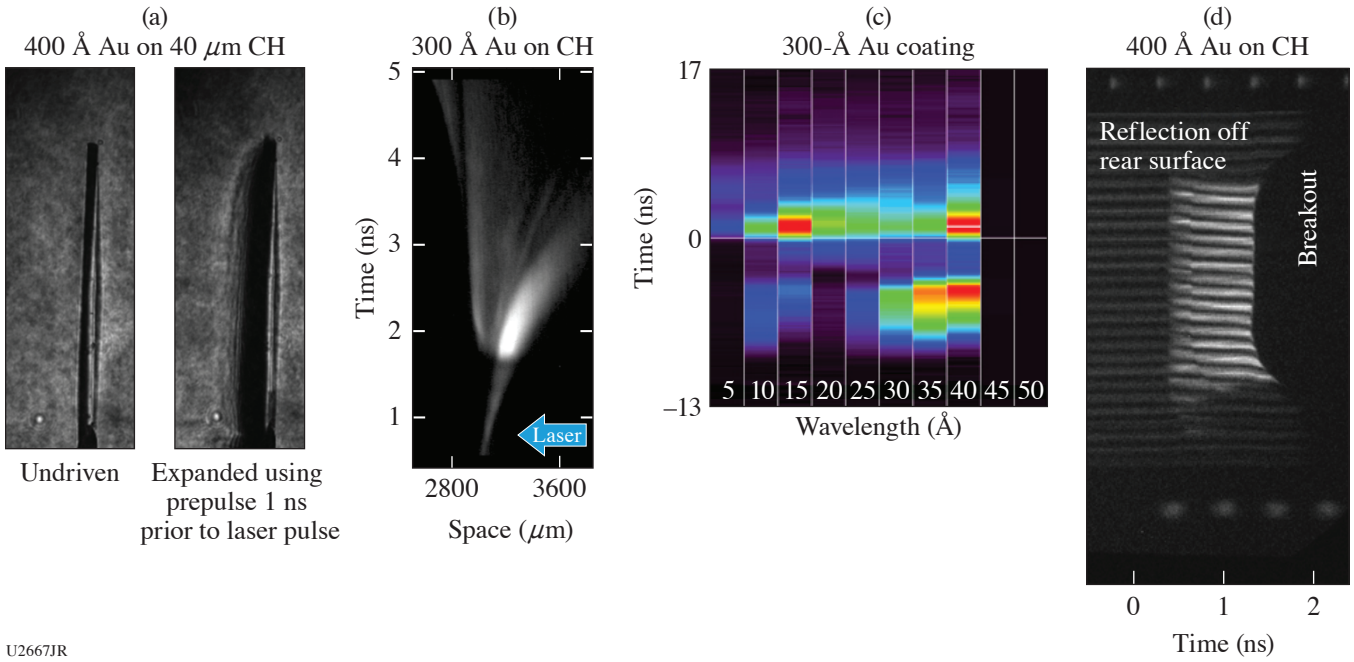

Figure 1
(a) 4ω probe measurement of coating pre-expansion; (b) streaked soft x-ray emission showing coating dynamics; (c) time-resolved soft x-ray spectrum from NRL TGS measurement; and (d) VISAR streak of a high-uniformity shock from a coated target.