***Mitigation of Laser Imprinting in Spherical Implosions by High-Z Doping:*** Low-adiabat ICF implosions can be degraded by target imperfections and laser-drive nonuniformities. Drive nonuniformities seeded by both long- and short-wavelength laser perturbations can grow during shell acceleration as a result of the Rayleigh–Taylor (RT) instability, affecting the target compression and neutron-yield production. Simulations indicate that radiation preheating from high-*Z* dopants in the ablator can decrease the mass density at the ablation front and increase the standoff distance between the ablation front and laser-deposition region, reducing the imprinting efficiency and the RT growth. To study the effect of high-Z dopants in the ablator material on laser imprint, spherical-RT experiments were performed at the Omega Laser Facility using Si-doped plastic targets in the cone-in-shell configuration. A photograph of a typical target is shown in Fig. 1(a). A plastic spherical shell with an 860-$\mu$m diameter and a 400-$\mu$m opening is attached to a gold cone with a 3.5-mm maximum diameter and a 53° cone angle. For these experiments pure plastic (CH) shells as well as CH doped with 4% Si and 7% Si were used. The target was driven by 49 OMEGA beams with the laser pulse shape shown in Fig. 1(b). Laser imprint is created by either the broadband-intensity modulations of the distributed phase plates (DPP's) or by employing a special DPP that gives a spatial-intensity modulation with a 30-$\mu$m wavelength. The former method creates a broadband spectrum of laser perturbations while the latter forms a single, 30-$\mu$m wavelength mode. The shell was imaged by x rays using a Ta foil backligther irradiated by six OMEGA beams. The x rays, with a peak energy of ~2.5 keV, propagate through the shell and the cone opening and are recorded by an x-ray framing camera (XRFC) with a spatial resolution of ~10 $\mu$m and temporal resolution of ~80 ps. One of the recorded images in these experiments (shot 62753) is shown in Fig. 2(a). The image was taken at 1.7 ns into the laser pulse and single-mode imprinting was used for this shot. The plastic shell was doped with 4% Si. The variation of the x-ray signal intensity is caused by modulation of the shell thickness. The result of the preliminary analysis of the dependence of rms amplitude of the areal-density ($\rho R$) variation at different levels of doping is shown in Fig. 2(b). The modulation is reduced by a factor of 2 to 3 with a doping level of 4% and higher. Analyses of experimental data using two-dimensional *DRACO* simulations for cases with and without high-*Z* dopants are currently underway.

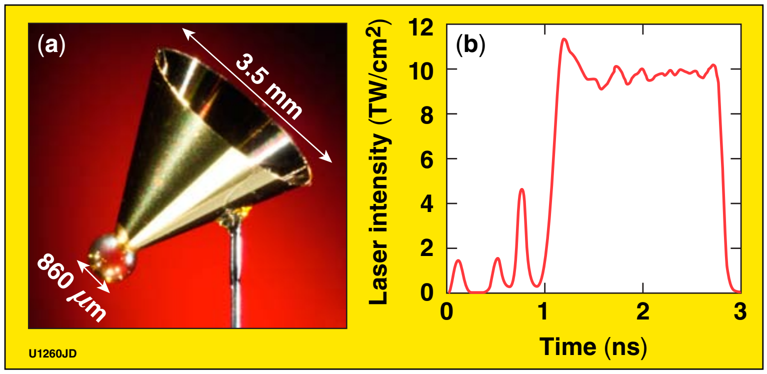


Figure 1. (a) Photograph of cone-in-shell target comprised of a plastic CH shell and a gold cone; the shell is spherically imploded by 49 OMEGA beams. (b) Laser pulse shape used in the experiment.

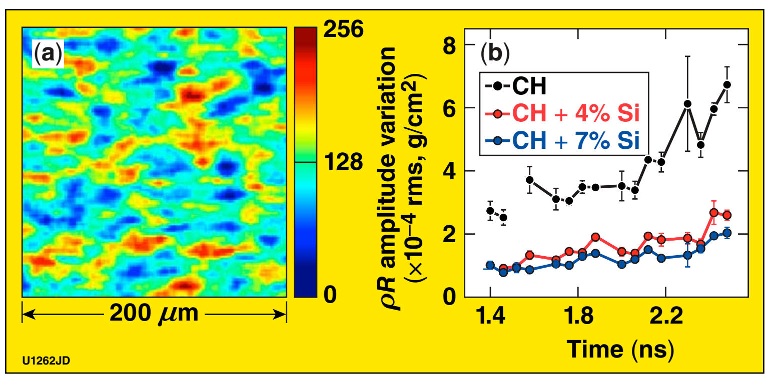


Figure 2. (a) Face-on x-ray image of spherical implosion with 4% Si doping. The seed imprint was created by spatially (30-$\mu$m wavelength) modulated DPP. (b) rms amplitude of the areal-density ($\rho R$) variation versus time at different levels of Si doping.

***Omega Facility Operations Summary:*** The Omega Facility conducted 187 target shots in June—119 on OMEGA and 68 on OMEGA EP. The experimental effectiveness averaged 95.7% for all the facility shots (95.8% for OMEGA and 95.6% for OMEGA EP). A total of 106 target shots were conducted for the National Ignition Campaign (NIC) by experimental teams led by LLE and LLNL scientists. Three experiments accounting for 17 shots were carried out for the HED campaign by scientists from LLNL. Three NLUF experimental teams led by scientists from the University of Michigan, MIT, and General Atomics conducted 21 target shots and three LLNL teams carried out 36 target shots under the LBS program. One CEA experiment accounted for 7 target shots.

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