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Experimental Reduction of Laser Imprinting and Rayleigh–Taylor Growth in Spherically Compressed, Medium-Z–Doped Plastic Targets G. FIKSEL, S.X. HU, R. EPSTEIN, V.N. GONCHAROV, D.D. MEYERHOFER, T.C. SANGSTER, B. YAAKOBI, M.J. BONINO, R.K. JUNGQUIST, Laboratory for Laser Energetics, U. of Rochester, V.A. SMALYUK, LLNL — The effect of medium-Z doping of plastic ablators on laser imprinting and Rayleigh–Taylor (RT) instability growth was studied using spherical direct-drive implosions on the OMEGA Laser System. The targets were spherical plastic (CH) shells, with an outer diameter of 860 μm and a thickness of 22 μm, doped with a varied concentration of Si (4.3% and 7.4%) and Ge (3.9%). The targets were imploded with 48 beams with a low-adiabat, triple-picket laser shape pulse with a peak intensity of 4 $\times$ 10^{14} W/cm^2 and a pulse duration of 2.5 ns. The shells were x-ray radiographed through a 400-μm opening in the side of the target. The results show that impurity doping strongly reduces the shell-density modulation and the instability growth rate. The amplitude of the initial imprint is reduced by a factor of 2.5$\pm$0.5 for CH[4.3% Si] targets and a factor of 3$\pm$0.5 for CH[7.4% Si] and CH[3.9% Ge] targets. At the end of the acceleration phase, the reduction factor becomes 3$\pm$0.5 and 5$\pm$0.5, correspondingly. The RT instability growth rate in doped targets is reduced by a factor of 1.5 compared to undoped ones. Simulations using the 2-D radiation–hydrodynamics code *DRACO* show good agreement with the measurements. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

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