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High-Areal-Density, Fuel-Assembly Experiments for the Fast-Ignitor Concept W. THEOBALD, C. STOECKL, C. ZHOU, R. BETTI, S. ROBERTS, V.A. SMALYUK, V.YU. GLEBOV, J.A. DELETTREZ, T.C. SANGSTER, D.D. MEYERHOFER, Laboratory for Laser Energetics, U. of Rochester, C.K. LI, R.D. PETRASSO, PSFC, MIT — Fast-ignition targets must be imploded to high-areal densities, $\sim$0.5 g/cm^2, to stop either $\sim$1-MeV electrons or $\sim$18-MeV protons, generated by an intense ultrashort laser pulse. Simulations have shown that high-density and high-areal-density fuel assembly can be achieved by imploding thick cryogenic shells with low velocity on a low adiabat.[1] A scaled noncryogenic version of the proposed design[1] was tested experimentally. Fuel-assembly experiments using 40-μm-thick, 0.9-mm-diam plastic shells filled with various gas pressures were performed on the OMEGA Laser Facility, using an optimized low-speed spherical implosion. High-areal densities with temporally and spatially averaged values of $\sim$130 mg/cm^2 were measured with proton wedged range filters[2] for D_2 and D^3He fills of various pressures in the range from 10 to 33 bar. The areal densities compare favorably to one-dimensional, hydrodynamic-simulation predictions if the measured temporal-neutron-production history is taken into account. 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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[2]F. H. Séguin *et al.*, Rev. Sci. Instrum. **74**, 975 (2003).

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