

ENGINEERED DEFECT CAPSULE PRODUCTION FOR HYDRODYNAMIC INSTABILITY EXPERIMENTS ON NIF¹

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Spherical capsules with engineered defects of various designs were fabricated for use in inertial confinement fusion experiments. Capsules with pre-imposed surface defects can be used to characterize instability growth and for code validation [1–3]. A range of capsule ablator and feature types have been produced and characterized. Capsules with machined inner and outer surface sine wave ripples have been formed with amplitudes from 0.1 to 7 μm and wavelengths from 50–240 μm . Ripples have been produced in CH plastic, high-density carbon, and beryllium ablator types. Shells have also been manufactured with isolated defects of divots and trenches precisely located on the capsule surface. Targets with uniform inner and outer surface roughness were built to specified RMS roughness. Manufacturing and characterization methods for a variety of engineered defects will be reviewed.

[1] Casey, D.T., et al. “Reduced instability growth with high-adiabat high-foot implosions at the National Ignition Facility,” *Physical Review E* 90.1 (2014).

[2] Smalyuk, V.A., et al. “First measurements of hydrodynamic instability growth in indirectly driven implosions at ignition-relevant conditions on the National Ignition Facility,” *Physical review letters* 112.18 (2014): 185003.

[3] Smalyuk, V.A., et al. “Hydrodynamic instability growth and mix experiments at the National Ignition Facility,” *Physics of Plasmas (1994-present)* 21.5 (2014): 056301.

¹This work performed under the auspices of the U.S. Department of Energy by General Atomics under Contract DE-NA0001808 and by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.