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Forming Cryogenic DT Targets for OMEGA D.R. HARDING, D.H. EDGELL, L.M. ELASKY, Laboratory for Laser Energetics, U. of Rochester — Experiments at LLE have shown that it is possible to fill thin-walled plastic capsules with a mixture of deuterium–tritium (DT) in 3 days and form a 70 to 95-μm ice layer with an inner surface roughness better than 1-μm rms in an additional day. Of the 33 DT targets that have been processed, the average ice roughness is 1.4$\pm$0.9 μm with a median value of 1.4 μm; eight of the targets had a roughness below 1.0-μm rms. The smoothest ice layer possessed a roughness of 0.5-μm rms, a value where the roughness of the plastic capsule's surface and the sensitivity of the shadowgraphy technique begin to affect the accuracy of the analysis. Repeated melting and relayering of the ice layer in the same capsule yielded sub1μm-rms ice roughness each time. The residual roughness is controlled by the crystal growth process, which requires that an initial single crystal be nucleated within the liquid DT and that its growth rate be finely controlled; if the crystal grows too rapidly, facets and dislocations form within the ice. The effect of these crystalline defects is to distort the shadowgraphic analysis. Other notable observations have been (1) that no ^{3}He bubbles were observed in the DT-ice layers after the layer had aged for 19 days, and (2) that transparent DT-ice layers were formed in foam targets (0.16- and 0.116-g/cm^3 foam density). This work was supported by the U.S. DOE under Cooperative Agreement DE-FC52-92SF19460.

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