Al Coatings as a Deuterium Permeation Barrier on Foam Shells and the Dependence on Foam Surface Finish*

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Low-density foam shells are currently being employed as direct drive targets on the Omega laser facility at the U. of Rochester. For cryogenic shots, only a thin layer of glow discharge polymer (GDP) is required on these shells to hold the D_2 (or DT) fill provided the capsules are filled after cooling. Room temperature surrogate experiments, however, require an additional permeation barrier of aluminum (Al) on GDP coated foam shells. This barrier should have a permeation time constant of at least 4 hours for D_2 at room temperature. To study this coating, thin layers of Al were deposited via magnetron sputter coating on the surface of GDP shells and GDP coated foam shells. The foam shells were 180 mg/cc resorcinol formaldehyde (RF) shells with a GDP thickness of 3–5 μm; the GDP shells used had a wall thickness of 25–30 μm. Preliminary data shows that the permeation rate of D_2 for smooth GDP shells is lower than for GDP coated RF shells with similar thicknesses of Al. The main factor in this difference appears to be the surface roughness of the shells. Details of coatings and their characterization will be presented.

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