Progress Towards Fabrication of Graded Doped Beryllium and CH Capsules for the National Ignition Facility *

A. Nikroo, General Atomics

Current ignition designs require graded doped beryllium or CH capsules. In this paper, we report on the progress towards fabricating both beryllium and CH capsules that meet the current design criteria for achieving ignition on the NIF. NIF scale graded copper doped beryllium capsules have been made by sputter coating, while graded germanium doped CH capsules have been made by plasma polymer deposition. The plasma polymer deposition process has produced dense, void free graded doped CH shells that meet the ignition surface finish requirements. The sputtering process used for fabricating graded beryllium shells can lead to ablators with a high void fraction (>5%) and rough surfaces (~1 μm RMS). Varying the deposition parameters can lead to several different beryllium microstructures, which can potentially be tuned to reduce the void size and fraction to within specifications. In addition, polishing of beryllium-coated shells reduces the outer surface roughness of shells to ignition specifications. Transmission electron microscopy has been used to characterize void fraction and grain structure. Layer thickness and dopant concentrations have been measured by quantitative contact radiography (non-destructive) and electron probe (destructive) techniques. Control over the dopant concentration has been demonstrated to within the desired specifications for each layer by careful control of the coating parameters.

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