

Fabrication of Gas Filled Tungsten-Coated Glass Shells for HED Experiments*

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Deuterium filled, glass shells, $\sim 850\ \mu\text{m}$ in diameter and $\sim 3\ \mu\text{m}$ in thickness, overcoated with $\sim 3\ \mu\text{m}$ of tungsten are desired for High Energy Density (HED) experiments. In this paper, we report on fabrication of such shells. Tungsten was deposited on glass shells placed in a specially designed holder and agitated using an intermittent tapping technique. Coating thickness was measured by weighing the shells and destructively by interferometry on shards. The uniformity was found to be $<10\%$ as measured destructively by interferometry and electron microscopy, and non-destructively by rolling shells down a smooth incline. The surface finish of tungsten coatings on shells depended on the source to substrate distance which also determined the coating rate. Atomic force microscopy measurements of the surface finish of coated shells are presented. When the glass shells were filled prior to the coating, it was found that most of the gas escaped from the shells during the coating process due to high temperatures experienced. However, we found that, perhaps due to the columnar structure of the coatings, the overcoated shells could be filled with deuterium at elevated temperatures.

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