Progress in Coating Multi-layered Cocktail Hohlraums*

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Multi-layered depleted uranium (DU) and gold "cocktail" hohlraums are in the beginning stages of production in a sputter-coater designed and assembled at General Atomics. Rather than co-sputtering the material as was done previously, the approach taken in this work is to sputter multiple thin layers of DU and Au (300 Å DU/60 Å Au). The intended outcome of creating a multi-layered structure instead of co-sputtered material is to encapsulate the DU in gold, thus reducing or perhaps preventing oxidation, a problem in the co-sputtered materials. The elements have been chosen to improve the hohlraum wall albedo, targeting the concentration that gives most efficient coupling between beam energy and ignition capsule [1]. The material is coated on either an acrylic or an aluminum mandrel which is machined at one end to make a 1.2 mm diameter, 2.06 mm long cylinder. A thin (1000 Å) Au underlayer is deposited to protect the interior of the hohlraum from oxidation as well as a thick (>5 μm) Au capping layer to not only protect the cocktail material from oxidation, but also to provide structural support. The mandrel on which the cocktail material is grown is leached either with acetone in the case that the mandrel is acrylic, or a NaOH solution for aluminum mandrels, to thus provide a free-standing cylinder. A brief discussion will be given about some interesting physics and engineering issues with which were dealt to reduce the residual stress from the sputtering process such that a free-standing part could be produced. These issues include heating/deformation of the material comprising the mandrel, pressure during sputtering, adherence to the mandrel, as well as structural integrity of the completed cylinder. Characterization of this type of sandwiched material is historically difficult due to the fact that the cocktail region consists of buried interfaces, though promising results from Auger depth profiling will be presented which show that the materials have gratifyingly low oxygen content as well as the current targeted composition of DU80/Au20 at%.

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[1] Orzechowski, T.J., Rosen, M.D., Kornblum, H.N., Suter, L.J., Thiessen, A.R., Wallace, R.J., and Porter, L.J., Phys. Rev. Lett. **77**, 3545 (1996).

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