Developing Depleted Uranium and Gold Hohlraums for the National Ignition Facility*

H.L. Wilkens, General Atomics, P.O. Box 85608, San Diego, California 92186-5608

Fusion ignition experiments will begin at the National Ignition Facility (NIF) using the indirect drive configuration. Although the x-ray drive in this configuration is highly symmetric, energy is lost in the conversion process because the x-rays penetrate the hohlraum wall. To mitigate this loss, calculations show that adding depleted uranium to the traditional gold hohlraum increases the efficiency of the laser to x-ray energy conversion by making the wall more opaque to the x-rays [1]. To this end, multi-layered depleted uranium (DU) and gold hohlraums are being fabricated by alternately rotating a hohlraum mold in front of separate DU and Au sputter sources to build up multi-layers to the desired wall thickness. This mold is removed to leave a freestanding hohlraum half. The two halves are used to assemble the complete NIF hohlraum to the design specifications. DU will quickly oxidize in air as well as in the chemicals required for the hohlraum fabrication process, so our greatest experimental challenge is to protect it from damage. Oxidized DU is unacceptable for two reasons: 1) the lattice expands significantly during oxidation, resulting in severe structural damage to the hohlraum, and 2) oxygen increases the ionization heat capacity of the hohlraum wall, effectively canceling the efficiency gains associated with the addition of DU to a gold-only wall. The unique production techniques required to fabricate these hohlraums will be presented, as well as results from Auger electron spectroscopy which show a minimal presence of oxygen within the hohlraum wall.

[1] T.J. Orzechowski, et al., Phys. Rev. Lett. **77**, 3545 (1996).

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