PROGRESS IN HEAVY ION DRIVEN TARGET FABRICATION AND INJECTION

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The target for an Inertial Fusion Energy (IFE) power plant introduces the fusion fuel to the chamber, where it is compressed and heated to fusion conditions by the driver beams. The "Target Fabrication Facility" of an IFE power plant must supply over 500,000 targets per day. The target is then injected into the target chamber at a rate of 5–10 Hz and tracked precisely so the driver beams can be directed to the target. The feasibility of developing successful fabrication and injection methodologies at the low cost required for energy production (about \$0.25/target, about 10^4 less than current costs) is a critical issue for inertial fusion.

The technologies for producing Heavy Ion Fusion (HIF) targets have significant overlaps and synergisms with current day inertial fusion experimental targets and with laser fusion (direct drive) IFE targets. Capsule formation and characterization, permeation filling, and layering of the DT using a cryogenic fluidized bed are common methodologies shared between laser fusion and HIF. Specific to HIF targets are the techniques for fabricating and assembling the hohlraum components. We will report on experimental progress with the Laser-assisted Chemical Vapor Deposition (LCVD) technique to produce "micro-engineered" low density metallic foams for the hohlraum, and calculations of hohlraums materials performance during handling. Fiber growth by LCVD in arrays has been demonstrated for the first time, important to achieve the volume production needed for IFE. We have also evaluated a variety of hohlraum material selections, with consideration of target physics, cost, ES&H, activation, and compatibility with the molten salt coolant. These materials include selections for once-through and for re-cycle scenarios. We have performed a cost analysis for an "nth-of-a-kind" Target Fabrication Facility using our current assumptions about the production processes. Some of these scenarios result in future target manufacturing costs consistent with economical electricity production.

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