ICF Target Support Highlights

GA-A22688
September 1999

General Atomics, with our partner Schafer Corporation, serves as the ICF Target Support Contractor, providing target development and fabrication and target system engineering development to support the ICF program at five ICF Labs – LLNL, LANL, NRL, SNL, and UR/LLE. This informal newsletter contains highlights of that support for September 1999.

GA/Schafer onsite staff at LLNL, LANL, and SNL fabricated, machined, assembled and characterized more than 150 targets of various kinds for experiments on Omega, Trident, and Z. We fabricated, characterized, and delivered about 350 targets and target components, including micromachined hohlraums, witness plates, plastic and glass microballoon capsules, foams, and flat foil targets of various materials and configurations to LLNL, LANL, NRL, SNL and UR/LLE for experiments on Nike, Omega and Z.

LLNL recently requested a new form of target – a hemishell of polymer (CH) or doped CH. These targets are used to study the effects of surface finish on shock wave propagation. The hemishells requested had two layers – an inner glow discharge polymer (GDP) layer and an outer layer of 3 atomic % Ge-doped GDP. We developed a process to produce and characterize these target hemishells.

The process begins with poly a-methylstyrene (PAMS) mandrels whose outer diameters are equal to the desired inner diameter of the final hemishells. We overcoated these PAMS shells with the desired thickness of GDP and Ge-GDP. The diameters of the coated shells were measured and sorted into groups of the same diameter (±1 µm) to enable precision and accuracy in the subsequent grinding procedure to convert them into precise hemishells. In the fabrication procedure developed by Annette Greenwood, Don Wall and Dave Steinman, the shells were tacked to the base of a polishing fixture such that they were touching at their equators. They were then embedded in Crystal Bond® potting compound and ground down to the stopping point, determined by the point at which the hemishells touched each other. A three micron diamond polishing compound was used to give a smooth surface to the cross section of the shells. The potting compound was then dissolved in acetone to free the hemishells, and the inner PAMS layer was removed by dissolution in toluene. The resulting hemishells were characterized by interferometry and optical microscopy to determine wall thickness, dome height and diameter.

Hemishells ranging in size from 400 to 900 µm inner diameters and having wall thicknesses of 85 to 145 µm have been produced thus far. The error in bisecting the shells at the equator has been about ± 30 µm, however, with due care, considerable improvement can be achieved, if necessary. This process should be applicable to a wide range of shell sizes.

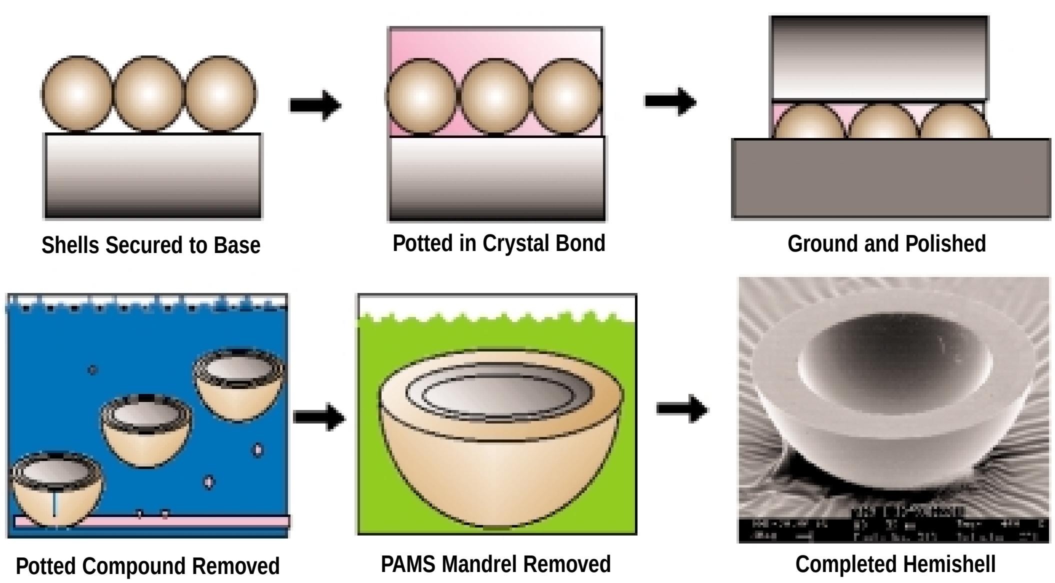

Fig. 1. The process for converting shells into hemishells is relatively quick and simple.

Work supported by the U.S. Department of Energy under Contract No. DE-AC03-95SF20732
For more information, contact Ken Schultz at GA: 858-455-4304; fax: 858-455-2399; e-mail: ken.schultz@gat.com
These reports are available on our web page: http://fusion.gat.com/icf/

Schafer
GENERAL ATOMICS