DEVELOPMENT OF FOAM TARGETS USED IN INERTIAL FUSION EXPERIMENTS*

R.R. Paguio, C.A. Frederick, J.F. Hund, D.G. Czechowicz, A. Nikroo, M. Takagi,[†] O. Acenas,[‡] and M. Thi[f]

General Atomics, P.O. Box 85608, San Diego, California 92186-5608
paguior@fusiongat.com

[†]Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, California 94551

[‡]Cal State San Marcos, 333 S. Twin Oaks Valley Rd., San Marcos, California 92096

[f]University of California San Diego, 9500 Gilman Drive, La Jolla, California 92093

This paper reviews the processes developed at General Atomics in the past several years to fabricate a variety of foam targets at various densities for the ICF community. The two most common chemical systems used to produce foam targets have been resorcinol-formaldehyde (R/F) aerogel and divinylbenzene (DVB). We have produced batch quantities of foam targets in spherical, cylindrical, and planar geometries. Spherical targets have been made in the form of shells and beads with diameters ranging from approximately 0.5 mm to 4.0 mm, and densities from 100 mg/cc to 250 mg/cc, with typical yield of intact shells or beads of 90%–95%. Permeation barriers have been developed and deposited on both R/F and DVB shells. We have also made R/F foam shells with higher pore size (0.10–0.50 μm) in order to increase the cryo-fill fraction when these shells are cryogenically layered with D_2. Silica aerogel shells and beads have been developed and are being optimized. Novel planar full density CH coated foam targets with sinusoidal perturbations have been made for Rayleigh-Taylor experiments using laser machining. Foams have also been cast directly into CH shock tubes. Other foam target materials currently under development, such as metallic oxide aerogels and metal doped aerogels will also be discussed.

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