

## **2-Photon Polymerization for Laser Direct-Write Target Fabrication**

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Two-photon polymerization (2PP) offers an attractive option for direct-writing micron-to-mm sized laser target components that support high-energy-density (HED) plasma physics research. We describe the use of 2PP to deterministically print a number of low density material (LDM) target structures. The structures were printed using commercially available acrylic photo-resins with elemental composition comprised of C, O, H, and N, comparable to the commonly used resorcinol and divinylbenzene foams. A wet development and lift-off process followed by super-critically drying of the structures provides intact LDM structures. Pyrolysis of the 2PP fabricated structures is possible with accompanied compositional and dimensional change. The first foam targets fabricated by 2PP were shot on OMEGA in Nov 2015. A set of 15 low density foam targets were shot on Nike late in FY-17. The pros and cons of 2PP are also discussed including the need to improve the material strength and reduce polymer shrinkage for certain applications.