Microfabrication and Engineering

Developing innovative technologies in targetry and diagnostics for discovery science in HED physics

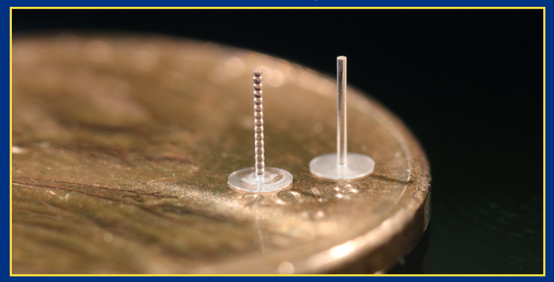
For nearly three decades, General Atomics has been the primary supplier of precision microfabricated targets and components to the U.S. high energy density (HED) physics community, developing a world-leading suite of capabilities in manufacture, metrology, diagnostics, and materials research and development. GA is expanding access to these capabilities to other research communities through an innovative program that will allow efficient collaborations.

GENERAL ATOMICS

CUTTING-EDGE SUITE OF CAPABILITIES USED TO MANUFACTURE INNOVATIVE TARGETS AND COMPONENTS

- Proven techniques to manufacture unique components with precise, sub-micron tolerances
- Automation, robotics, optical scanning and AI-enabled sorting capabilities enable large-batch processing with precise consistency in dimension and composition
- Experience providing products for high repetition-rated HED experiments and target systems
- Innovative characterization and metrology capabilities
- Experience in materials development and manufacturing

Precision Manufacturing and Fabrication

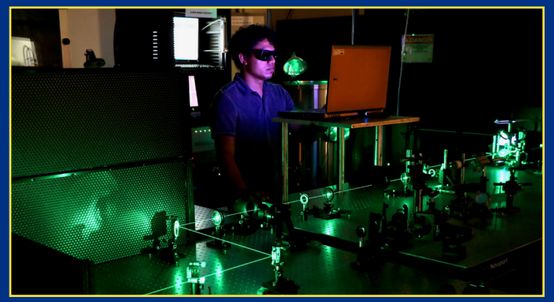


Creating extremely precise components with sub-micron tolerances

Precision Metrology and Characterization

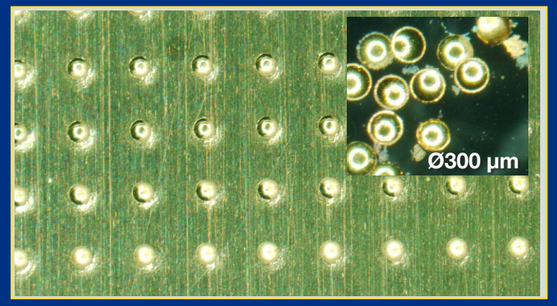
Extensive in-house metrology using the latest technology

Laser Machining



Custom laser cutting, drilling, and machining operations using a variety of wavelengths

High Rep-Rate Target System Experience



Particle acceleration targets gold hemi-shell

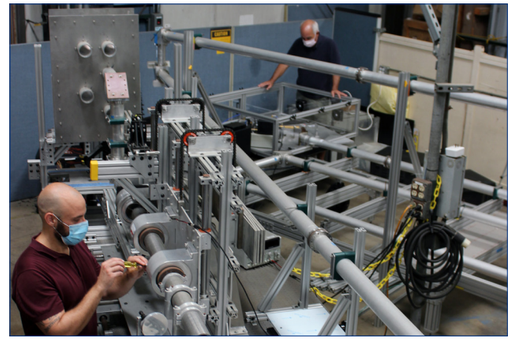
Aerogels and Foams

Sub-millimeter mound of copper aerogel applied with a nanoparticle deposition system next to a bee for scale

Automation of Target Manufacture

Automation expertise enables manufacture and sorting of targets using latest technologies, including artificial intelligence

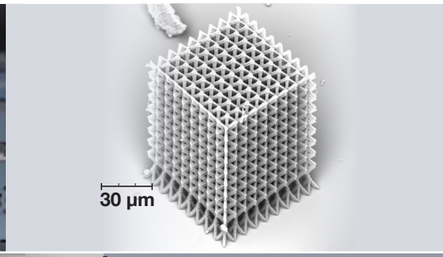
GA created the industry's leading magnetic fusion plasma platform, where dozens of control loops actively regulate plasma conditions using measurements from thousands of diagnostic signals, extensivemodel-based control algorithms, and machine learning. GA is prepared to apply this experience with unique capabilities in diagnostics, controls, and response systems to real-time feedback in rep-rated HED experiments.

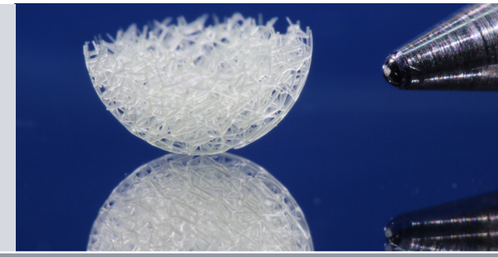


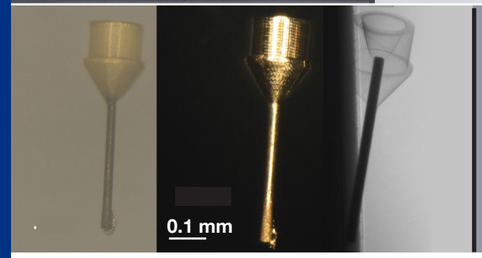
Mockup of low-field-side reflectometer diagnostic for ITER

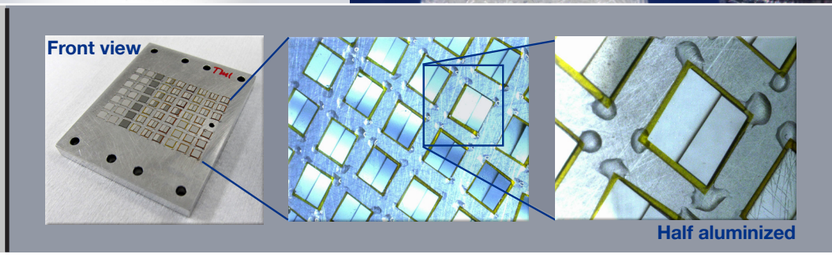
AREAS OF EXPERTISE:

- Micromachining (diamond turning, milling, plating)
- Additive manufacturing using two-photon polymerization (2PP)
- High rep-rate target system design and fabrication
- Product characterization at extremely high throughput
- Metal and plastic coatings
- Foams and dopants
- Graded density foams
- Microassembly
- Polishing of difficult materials
- Gas-filled spherical shells
- Engineering design and automation
- CAD/CAM programming









GA is a trusted partner of the global inertial and magnetic fusion communities, earning a reputation for working with physicists and researchers to develop innovative solutions that enable exploration of new areas of science. GA is expanding its collaborative opportunities with other institutions seeking to utilize GA's unique suite of capabilities in HED target and component fabrication.

If you are seeking a partner for targets and components, please contact us:

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