Free Form Fibers
The Fiber of Innovation.

High Performance Fibers at Substantially Lower Cost

How does Free Form Fibers make high performance fibers?

Free Form Fibers has assembled the largest concentration of experts in laser-assisted chemical vapor deposition (LCVD) in the industrial world. Free Form applies this world-class expertise in laser processing to the manufacture of a wide range of fibers and coatings. The proprietary technology platform is a first-of-its-kind 'fiber laser printer™,' producing to date silicon carbide, carbon, boron, boron carbide, and tungsten carbide fibers. This manufacturing process is largely material agnostic, and thus can be used to produce custom fibers with user-specified composition and diameters. Note that fibers are laser-printed directly – there is not dissimilar core as with other CVD-based fibers.

Why choose Free Form Fibers?

Free Form Fibers' laser processing approach provides many technical advantages that benefit end-users:

- Precise control of composition correlated to desired material properties, i.e. customer can choose what behaviors (thermal, mechanical, chemical) are of primary importance
- Fiber ribbon spools available
- Fibers are nano-crystalline in nature
- Fiber diameters can be varied from sub-20 microns to 100+ microns
- Fiber material and diameter can be changed on the fly
- Fiber coatings can be applied in-situ with custom material composition and thickness

What does Free Form Fibers' LCVD fabrication approach mean to customers?

- Lower product costs
- High quality, high purity products
- Increased production output
- Quick development cycles for new products
- Wide selection of available materials
- Open possibilities for new products and end-use applications

Where do customers use Free Form Fibers products?

Reinforcements for all composite material systems (polymer matrix composites-PMCs, metal matrix composites-MMCs, ceramic matrix composites-CMCs)

- High performance fibers for applications including aerospace, aeronautics, power generation including nuclear power, and sensors for embedded instrumentation
- Light-weighting for structural reinforcement in aerospace, aeronautic, and consumer goods, leveraging the high strength/density ratio of specific fiber materials
- High strength wear and impact resistant fibers for tooling and armor applications
- Fuel-in-Fiber (patent pending) nuclear fuel rod design

High Performance Materials Uniquely Produced by the Fiber Laser Printing Process:

Silicon carbide (SiC)	Ideal combination of strength:weight and oxidation resistance at high temperature. Stoichiometric form is most valuable as properties are sensitive to oxygen content
Zirconium carbide-SiC Zirconium diboride-SiC Boron-SiC Zirconium-SiC	Customized alloying to enhance oxidation resistance, chemistry, creep resistance, etc.
Amorphous boron	High specific-strength, ideal for light-weighting
Boron carbide (multiple phases)	Harder than diamond at elevated temperature, excellent abrasion resistance
Refractory-grade Zirconium diboride / Hafnium diboride Hafnium carbide / Tantalum carbide	Stable, high strength materials with application temperatures > 2500°C
Pyrolytic and nano-porous carbon Boron nitride Silicon carbide	*In-situ* fiber coatings

We can also customize fibers to customer specifications – which may include chemistry, diameter, grain size, length

info@fffibers.com 518-690-0396 x2701

Free Form Fibers

The Fiber of Innovation.

Free Form Fibers LLC
10 Cady Hill Boulevard • Saratoga Springs, NY 12866
518-690-0396 x2701
info@fffibers.com