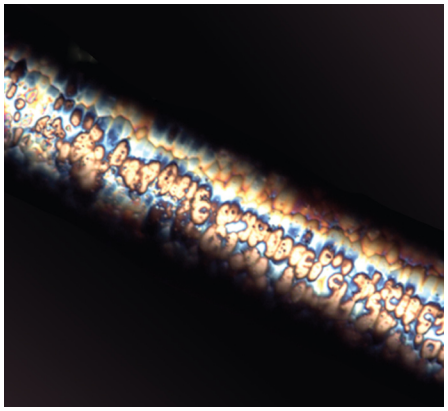
Los Alamos NATIONAL LABORATORY ESTABLISHED 1943

2008 R&D 100 Award Winner

Laser-Weave®: A new approach for synthesizing inorganic fibers and textiles

Features

Laser-Weave® is a new approach to synthesizing inorganic fibers that allows for arbitrarily complex braiding patterns, including patterns that could not be produced mechanically—certainly not in a single mechanical stage. Laser-Weave® provides a simple, low-cost route to the synthesis of fine, refractory-metal fibers and their compounds, as well as improving their underlying fiber strength, elasticity, and toughness. Laser-Weave® uses hyperbaric laser chemical vapor deposition to grow inorganic fibers and intertwine them rather than requiring the fibers to be mechanically assembled or intertwined after they are grown. Laser-Weave® combines all the advantages of a rapid prototyping technology with advanced metallurgy and textile production methods.



Shown is an image of a boron-carbon-silicon alloy fiber grown by high-pressure laser chemical vapor deposition using a very small laser spot. The fiber was grown at 10 cm/s and shows no cracks or fracture planes that can compromise the entire structure.

Applications:

Fibers and fabrics produced by Laser-Weave® can be used in the following:

- Power plant insulation
- High-temperature appliances
- Fire protection clothing
- Aerospace shields
- Commercial appliances

Benefits

- Rapid, one-step production
- Cost-effective implementation
- Synthesis of true glassy and amorphous refractory materials
- Creation of ultimate-strength elastic materials
- Production of high-strength cables and textiles

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Los Alamos 2008 Winners

3D Tracking Microscope

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http://www.lanl.gov/rd100