

High Strength and High Modulus Carbon Fibers (#6716)

A method for producing high strength, high modulus, and high thermal stability carbon fiber using gel-spinning

Georgia Tech researchers have developed a method for creating high strength, high modulus, and high thermal stability carbon fiber from PAN using a gel-spinning technique. The gel-spinning process gives the fiber its high strength characteristics. The fiber is then drawn and stabilized to obtain the high elastic modulus and high thermal stability without ultra-high temperature heat treatment. The resulting elastic modulus is 25-30% higher and the thermal stability is 100 °C greater than that of current state-of-the-art fibers.

Benefits/Advantages

- **Lighter** – Carbon fiber is lighter than metals and exhibits significantly higher strength characteristics
- **Stronger and More Thermally Stable** – Process produces stronger fibers by using new processing techniques
- **Lower Energy Manufacturing** – Process does not require ultra-high temperature for heat treatment of fibers

Potential Commercial Applications

- Automobile and vehicle manufacturing
- Plane manufacturing
- Space craft manufacturing

Background/Context for This Invention

As industry tries to cut down weight of products and environmental impact of using metals, there is a shift to using carbon-based materials due to their lightweight and superb mechanical properties. Carbon fiber has low weight and high strength characteristics, which makes it a desirable material for many applications that require weight savings but high strength. Common carbon fibers are produced using polyacrylonitrile (PAN) dry-jet wet spinning or wet spinning technologies to produce high strength carbon fiber. While PAN fibers with a high modulus of elasticity have been produced, it is at the expense of tensile strength. There

is a market need to increase the tensile strength of these fibers along with their elastic modulus.

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Patent/IP Information

U.S. Patent Issued

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<https://patents.google.com/patent/US9409337B2/en?q=9%2C409%2C337>

Publications

[*High strength and high modulus carbon fibers*](#)

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/high-strength-and-high-modulus-carbon-fibers>