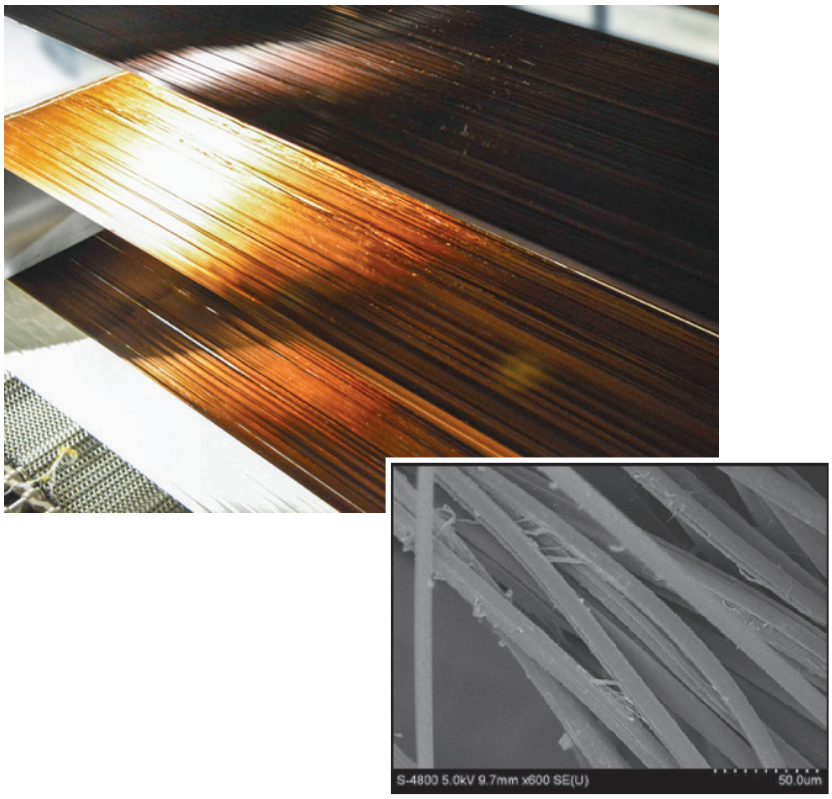
# Improving Carbon Fiber Production: A Better Textile PAN Precursor

Recently, ORNL has developed a new process for converting textile-grade polyacrylonitrile (PAN) precursor to low-cost carbon fibers. This process has the advantage of significantly reducing the cost of carbon fiber production, but to date the performance of the resultant carbon fiber is limited to industrial applications. In addition, the chemistry of the precursor, its original production method, and its stabilization kinetic parameters cause a lack of molecular order. To address these challenges, ORNL has developed a method that can be introduced into traditional PAN precursor production processes with minimal impact and that has the potential to significantly improve the economics and performance of the resulting carbon fiber. While this technology is still in the early development stage, if successful it will enable much broader adoption of carbon fiber formed using precursors produced in textile PAN manufacturing facilities.

This project was accepted into TIP with the goal of providing a minor modification to traditional textile PAN production lines that enhances molecular order in the precursor, thereby improving the performance of the resulting carbonized filaments.

The ability to improve and retain the molecular order in precursor fibers during stabilization favors carbon fiber quality and performance. If successful, this technology could enable the adoption of carbon fiber produced from textile PAN precursors in more demanding applications, possibly including aerospace.

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Dr. Amit Naskar is a senior research staff member and leader of the Carbon and Composites Group in ORNL's Materials Science and Technology Division. He is the lead inventor of ORNL's technology for conversion of polyolefin fibers into carbon fibers, sustainable polymer formulations for composites, and tailored carbon morphology for energy storage. Dr. Naskar earned his PhD in rubber technology from the Indian Institute of Technology (IIT), Kharagpur, India. Prior to joining ORNL, he worked as a post-doctoral researcher at Clemson University in South Carolina. He has published 35 articles in refereed journals and books.

## Technology

*Enhancing Textile Grade PAN Carbon Fiber Precursors*

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## Publications

- E. Morris, M.C. Weisenberger, M.G. Abdallah, F. Vautard, H.A. Grappe, S. Ozcan, F.L. Paulauskas, C. Eberle, D.C. Jackson, S.J. Mecham, A.K. Naskar. "High performance carbon fibers from very high molecular weight polyacrylonitrile precursors". *Carbon, 101(C)* (2016).

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