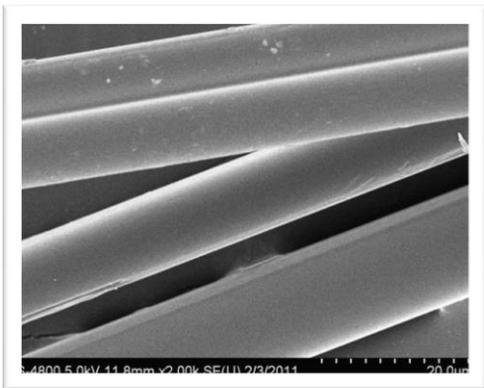


Advanced Structural Fiber (ASF) Program

The Oak Ridge National Laboratory (ORNL) has begun a \$4.24 million project, managed by the Defense Advanced Research Projects Agency (DARPA), focused on developing and producing a structural fiber that has a 50-percent increase in strength and stiffness compared to current fiber technology. The carbon fiber currently used by U.S. weapons systems was developed in the late 1980s with technology that has reached a technical plateau.

ORNL was selected by DARPA to achieve the goals of the ASF program by combining multiple innovative materials processing techniques – polymerization of high molecular weight precursor doped with nano-graphene platelet, drawing the precursor to ultra-small diameter, and conversion in a high magnetic field. ORNL leveraged its world-leading characterization and computational modeling resources to guide processing parameters and develop a strong understanding of the structure-property relationship within the fibers. Developing carbon fiber with increased strength and stiffness will advance current commercial applications and allow the development of new applications requiring these performance goals.

In Phase I of the program, ORNL has been successful in demonstrating the ability to spin kilometers of polymer fiber precursor with molecular weight higher than and diameters smaller than state of art. ORNL converted these novel precursors both conventionally and in the presence of magnetic fields. Preliminary mechanical test data has shown these fibers possess properties that out-perform state of the art commercial carbon fibers. In Phase II of the DARPA ASF Program, ORNL will leverage its \$35M DOE Carbon Fiber Technology Center to demonstrate scale-up to a pilot production rate of 100 lbs/month with the target properties.



**Figure 1 - Hybrid Dry Jet Gel Spun
Fiber Precursor**



**Figure 2 - Kilometer Lengths of
Fiber Precursor Produced**