Researchers report progress in development of carbon nanotube-based continuous fibers

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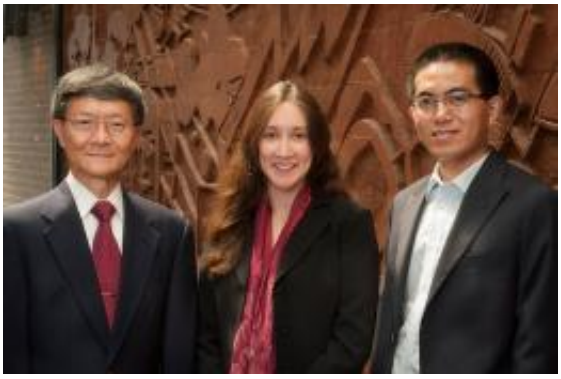

From left, Tsu-Wei Chou, Amanda Wu and Weibang Lu in Spencer Laboratory. Credit: Kathy F. Atkinson

(Phys.org) -- The Chou research group in the University of Delaware's College of Engineering recently reported on advances in carbon nanotube-based continuous fibers with invited articles in *Advanced Materials* and *Materials Today*, two high impact scientific journals.

According to Tsu-Wei Chou, Pierre S. du Pont Chair of Engineering, who co-authored the articles with colleagues Weibang Lu and Amanda Wu, there has been a concerted scientific effort over the last decade to "go big" – to translate the superb physical and mechanical properties of nanoscale carbon nanotubes to the macroscale.

The result, he says, has been the development of continuous fibers

comprised solely of carbon nanotubes held together through local entanglements and van der Waals forces, a type of weak molecular interactions.

“Despite a discontinuous microstructure, these carbon nanotube fibers exhibit strengths comparable to current high performance fibers with significantly lower densities, creating new avenues for ultra-light weight multifunctional composite materials and structures,” explains Chou.

“Furthermore, their flexibility and electrical conductivity have gained attention and given rise to the potential for carbon nanotube fibers to serve as embedded strain and damage sensors.”

The challenge, however, remains how to scale up the material’s size without sacrificing performance and functionality.

Lu's article, published in Advanced Materials, provides an in-depth analysis of the current carbon nanotube fiber processing methodology, including drawbacks and potential avenues for improvement. The article offers a thorough comparison of the current physical, electrical and mechanical properties of carbon nanotube fibers.

Wu's article, published in Materials Today, details the recent experimental characterization of carbon nanotube fibers performed by the Chou group. The review emphasizes the dynamic electromechanical behavior of carbon nanotube fibers and explores opportunities for carbon nanotube fibers in advanced composite applications.

Provided by University of Delaware

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