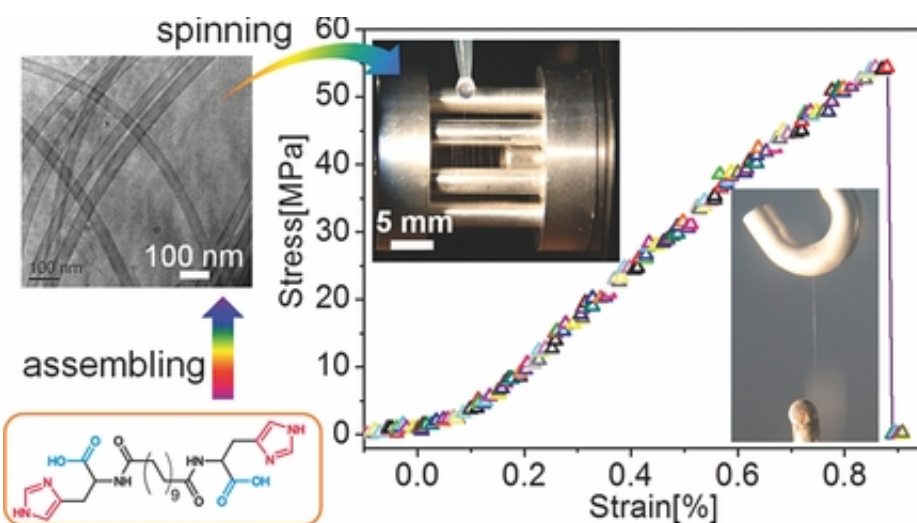


Chemistry team creates spontaneously forming supramolecular nanotube yarn

August 30 2013, by Bob Yirka



(Phys.org) —A team of chemists from the Chinese Academy of Sciences in Beijing has created an alternative to carbon nanotubes. In their paper published in the journal *Advanced Materials*, the researchers describe how they built a supramolecular yarn from monomers that is as strong as polypropylene, a common plastic.

Because of the myriad ways they can be used, scientists have dedicated a lot of effort to creating yarn-like materials that are strong, soft, flexible and can be created in virtually any length. Carbon nanotubes have been the focus of a lot of that research, and for good reason—scientists

believe they may one day form the basis of such exotic structures as a [space elevator](#). But that day hasn't yet arrived, and for that reason, researchers continue to look at other materials that may prove just as useful. In this new effort, the research team in China has discovered a way to make yarn out of carbon and other monomers that form threads that combine to form a type of yarn when pulled or spun.

The threads were made by mixing [monomers](#) (molecules that bind chemically with other molecules) to form threads made of carbon with histidine (an amino acid) serving as the handles on either end. They found the threads formed into flat paper-like materials when submerged in an alkaline solution which then spontaneously rolled themselves up into tubes—each just 40nm in diameter. They also found that if they poked a pin into the solution and then slowly pulled it back out again, the material could be drawn out into a continuous thread which could then be intertwined to form a yarn-like material. When using a spinning spool, the researchers found they could extract yarn segments as long as several meters. After drying, the researchers found the yarn was approximately the same strength as ordinary plastics.

Because the individual threads are so small (and bio friendly) the team envisions micro based research efforts using the threads as platforms for growing cells and possibly even being used to help restore functionality to people with nerve damage. The team plans to further their research to determine if they can build other types of yarns using the same basic technique.

More information: Self-Assembled Supramolecular Nanotube Yarn, *Advanced Materials*, Article first published online: 13 Aug 2013. [DOI: 10.1002/adma.201302345](https://doi.org/10.1002/adma.201302345)

Abstract

Metric length supramolecular nanotube yarns are fabricated through a

spinning process from the diluted aqueous solution of self-assembled nanotubes, with bolaamphiphiles working as molecular building blocks. These non-covalent bonding based nanotube yarns show outstanding mechanical strength compared with some conventional polymers and could be operated under the macro conditions.

© 2013 Phys.org

Citation: Chemistry team creates spontaneously forming supramolecular nanotube yarn (2013, August 30) retrieved 23 April 2024 from <https://phys.org/news/2013-08-chemistry-team-spontaneously-supramolecular-nanotube.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.