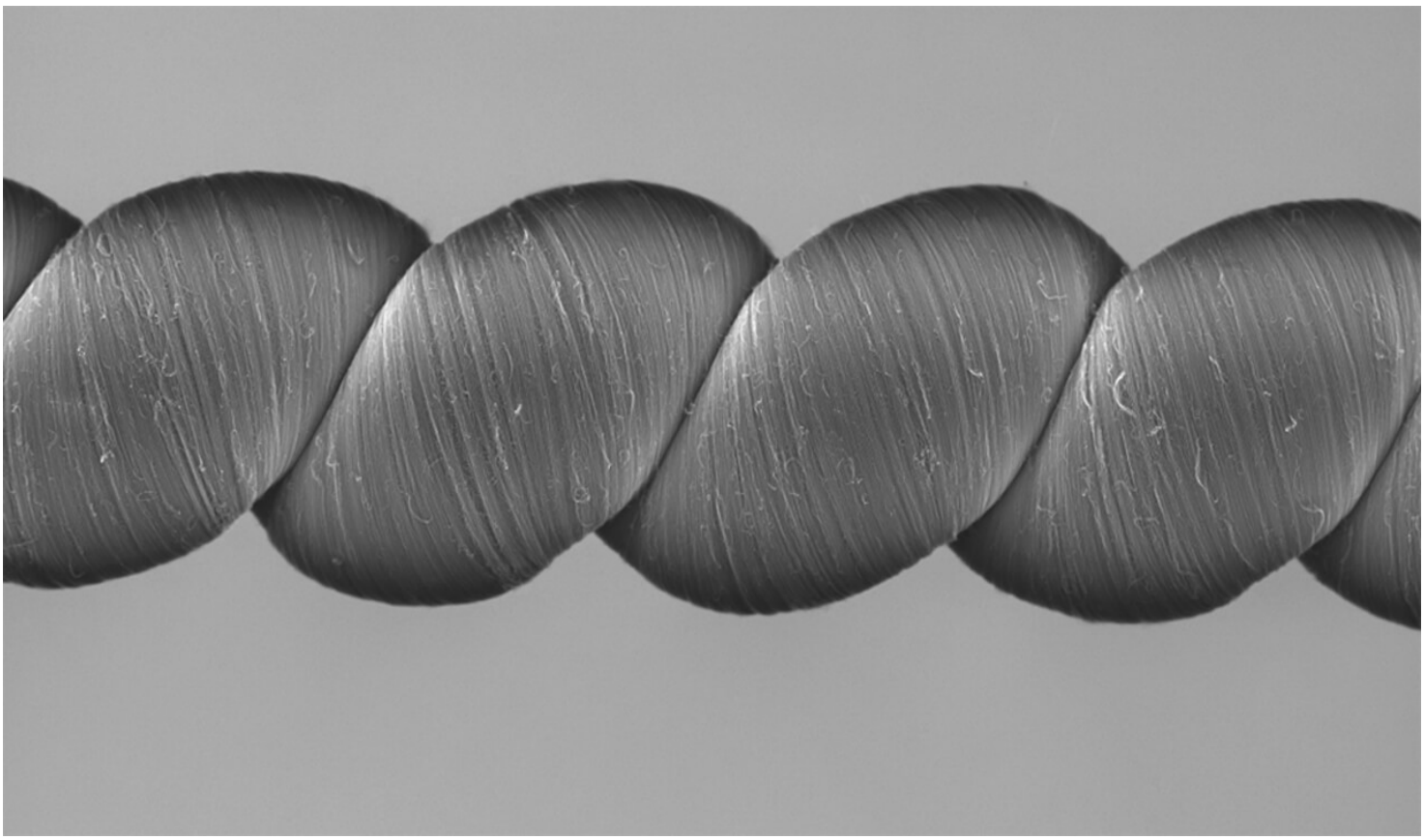

Nano yarn

NANO-YARN GENERATES ELECTRICITY FROM MOTION

TELECOMMUNICATIONS

Researchers have developed a yarn that can generate electricity when stretched or twisted.

Recently, we have seen developments in generating renewable energy from sources as diverse as bubble wrap and by-products from steel production. Now, an international research team led by scientists at the University of Texas (UT) at Dallas and Hanyang University in South Korea has developed a high-tech yarn, dubbed Twistron, that can generate electricity when stretched or twisted.

The yarn is made from carbon nanotubules – hollow cylinders of carbon with a diameter 10,000 times smaller than a human hair. The nanotubules are twist-spun into high-strength, lightweight yarns. In order for the yarn to generate electricity, it must first be submerged in or coated with electrolytic solution, such as salt water. “Fundamentally, these yarns are supercapacitors,” explains Dr. Na Li, a research scientist at the Alan G. MacDiarmid NanoTech Institute at UT Dallas and co-lead author of the study. “In a normal capacitor, you use energy — like from a battery — to add charges to the capacitor. But in our case, when you insert the carbon nanotube yarn into an electrolyte bath, the yarns are charged by the electrolyte itself. No external battery, or voltage, is needed.”

When the yarn is then twisted or stretched, the volume of the carbon nanotubes decreases, which brings the electric charges on the yarn closer together and increases their energy. This in turn increases the voltage associated with the charge stored in the yarn, allowing the harvesting of electricity. By stretching the yarns up to 30 times a second, researchers were able to generate 250 watts of electrical power per kilogram of yarn. In the lab, researchers were able to power a small

LED by stretching an amount of yarn weighing less than a housefly. The researchers have also suggested that the yarn could be woven into clothing and used to harvest electrical energy from human motion to eliminate the need for batteries.

Although at the present, the twistron energy harvesters can be used to effectively power sensors and sensor communications, according to Dr. Ray Baughman, director of the NanoTech Institute and a corresponding author of the study, if the yarn could be manufactured more cheaply, it might also be useful for generate energy from ocean waves. What other uses might there be for a yarn that can generate electricity from motion?

1st September 2017
Email: Ray.Baughman@utdallas.edu
Website: www.nanotech.utdallas.edu
Contact: www.nanotech.utdallas.edu/contact/index.html