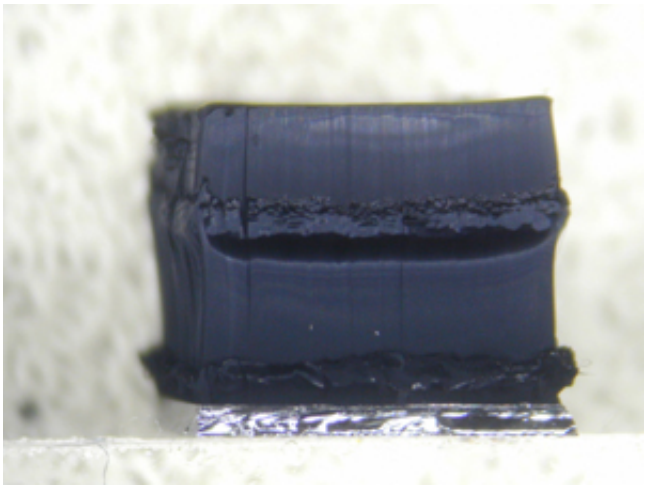
Researchers Grow 7 mm Carbon Nanotube Array

November 29 2006



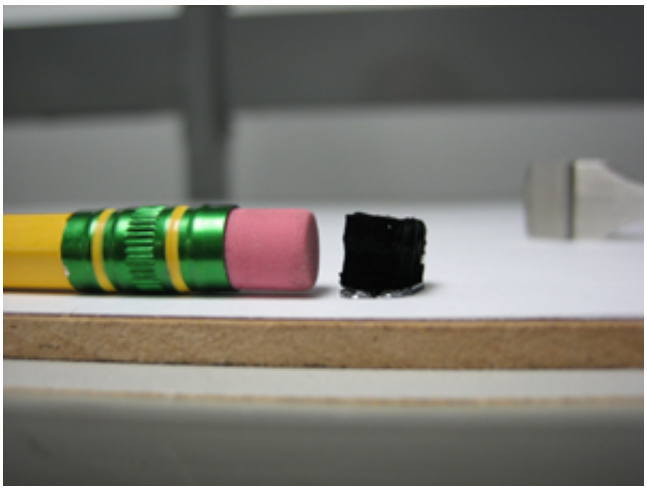
The nanotube array alone on its substrate. Credit: University of Cincinnati

Nanotechnology revolves around the creation of technology — films, materials, devices, applications and systems — on a scale of 1–100 nanometers. But what is a nanometer? A nanometer is one billionth of a meter or 40 billionths of an inch. A human hair is between 50 and 100 microns wide — and a micron is 1,000 nanometers. A DNA molecule is about 2½ nanometers wide. A typical human hair is between 50,000 and 100,000 nanometers wide. So, we could stack at least 1000 nano-devices across the end of a human hair.

It might sound like an oxymoron, but long nanotubes are critical to manufacturers and practitioners in such fields as transportation, defense,

safety and medicine. Because of their increased surface area, large nanotube arrays offer improvements in sensors. Larger nanotubes can be "spun" — or suspended in an epoxy-like substrate — and used to strengthen materials used in airplanes, for example.

Like your great-grandmother's yarn, the longer a continuous thread, the better. In conjunction with First Nano (FN), a division of CVD Equipment Corporation, UC has grown an array on FN's EasyTube Carbon Nanotube system that is longer than 7 mm.



"The harmonious combination of substrate, alloy catalyst and process conditions was found to consistently produce nanotube arrays more than 7 mm long" says Professor Vesselin Shanov, co-director of Smart Materials Nanotechnology Laboratory at the University of Cincinnati (UC).

"First Nano and UC have collaborated in the past and are planning on future collaboration to scale up production of nanotube arrays for

applications that man has only dreamed of, like a super-strong cable for a space elevator and featherweight composite materials for sporting goods, aircraft structures, armor and many more uses."

Leonard Rosenbaum, President and Chief Executive Officer of CVD Equipment Corporation states, "We look forward to continuing our relationship with the University of Cincinnati to bring this technology from the laboratory into full-scale production."

The recent breakthroughs at the University of Cincinnati and CVD Equipment Corporation (of Ronkonkoma, New York), have led to the growth of large carbon nanotube arrays. While individual carbon nanotubes are only 20 billionths of a meter in diameter, the array of carbon nanotubes grow as millimeter-long dense forests on centimeter-wide substrates.

Years of research by UC's Shanov, Schulz and students Andrew Gorton and Yun YeoHeung led to the invention of the method for growing the large nanotube arrays. Researchers and engineers at CVD Equipment Corporation developed and built the equipment used to grow the large carbon nanotube arrays.

Source: University of Cincinnati, by Wendy Beckman

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