Deposition of Carbon on Copper Wire: A New Process for the Fabrication of Carbon Microtubes

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Fullerenes, a new class of carbon materials, have unique mechanical and electrical properties that make them efficient alternates to traditional materials. Carbon nanotubes, a type of fullerene, have aroused particular interest due to their great current carrying capacity, high elastic modulus (> 1TPa), and low resistance. They are commonly fabricated in carbon-containing gas environments with metal nanoparticles acting as catalysts; in this chemical vapor deposition method, carbon from the gas deposits onto the surface of the copper, eventually culminating into a carbon nanotube. Due to the small size of the catalysts, however, only small carbon nanotubes have been produced. This project aimed to produce larger carbon nanotubes, dubbed carbon microtubes, by using larger catalysts. Specifically, 80μm copper wire was heated to 850°C in 1100 mbar of methane; subsequently, the copper was etched in a solution of iron (III) nitrate. The result was a carbon microtube with a diameter of 80 μm and a length of several inches. Slight imperfections were shown in the structure of the carbon microtube, but overall the project succeeded in demonstrating this new method as an effective way of producing larger carbon microtubes.

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