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Carbon Nanotubes

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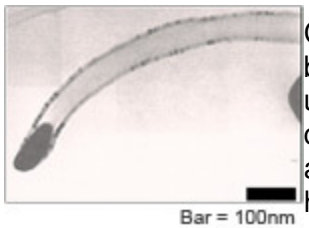

Carbon nanotubes (CNTs) have found numerous exploratory uses in biomaterials to date. For example, researchers are exploring their use as bulk and coated implants, in drug delivery, and as various components of biosensors. They are intriguing materials for these applications since they are light weight and strong, theoretically have high conductivity, and can mimic the dimensions of numerous natural materials in our body (such as collagen). They are an allotrope of carbon. They take the form of cylindricalcarbon molecules and have novel properties that make them potentially useful in a wide variety of applications in nanotechnology,electronics, optics and other fields of materials science. They exhibit extraordinary strength and unique electrical properties, and are efficient conductors of heat. Inorganic nanotubes have also been synthesized.

Nanotubes are members of the fullerene structural family, which also includes buckyballs. Whereas buckyballs are spherical in shape, a nanotube is cylindrical, with at least one end typically capped with a hemisphere of the buckyball structure. Their name is derived from their size, since the diameter of a nanotube is on the order of a few nanometers (approximately 50,000 times smaller than the width of a human hair), while they can be up to several millimeters in length. There are two main types of nanotubes: single-walled nanotubes (SWNTs) andmulti-walled nanotubes (MWNTs).

Manufacturing a nanotube is dependent on applied quantum chemistry, specifically, orbital hybridization. Nanotubes are composed entirely of sp2 bonds, similar to those of graphite. This bonding structure, which is stronger than the sp3 bonds found in diamond, provides the molecules with their unique strength. Nanotubes naturally align themselves into "ropes" held together by Van der Waals forces. Under high pressure, nanotubes can merge together, trading some sp2 bonds for sp3 bonds, giving great possibility for producing strong, unlimited-length wires through high-pressure nanotube linking.

Read more at: http://en.wikipedia.org/wiki/Carbon_Nanotubes