NANOTUBES: THE PRESENT AND THE FUTURE

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The term "nanotechnology" has evolved over the years via terminology drift to mean "anything smaller than microtechnology," such as nano powders, and other things that are nanoscale in size, but not referring to mechanisms that have been purposefully built from nanoscale components. Nanotubes, in particular, prove to be useful as molecular components for nanotechnology. Carbon nanotubes (CNT) discovered in 1991 by Sumio Iijima resemble rolled up graphite, although they cannot really be made that way.

The intrinsic mechanical, electrical and transport properties of CNTs make them the ultimate carbon fibers. CNT exhibits extraordinary mechanical properties: the Young's modulus is over 1 TPa. It is stiff as diamond. The estimated tensile strength is 200 GPa. These properties are ideal for reinforced composites, nanoelectromechanical systems.

Apart from remarkable tensile strength, nanotubes exhibit varying electrical properties (depending on the way the graphite structure spirals around the tube, and other factors, such as doping), and can be superconducting, insulating, semiconducting or conducting (metallic).

CNTs are capable of being formed in either single walled structures, also known as Single Walled Carbon Nanotubes and multiple walled structures, also known as Multi-Walled Carbon Nanotubes. Each structure of carbon nanotubes has its own set of properties that make it appropriate for different uses.

Many potential applications have been proposed for CNTs, including conductive and high-strength composites; energy storage and energy conversion devices; sensors; field emission displays and radiation sources; hydrogen storage media; and nanometer-sized semiconductor devices, probes, and interconnects. Some of these applications are now realized in products. Others are demonstrated in early to advanced devices, and one, hydrogen storage, is clouded by controversy.

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