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Production of Carbon Nanotubes Having Chalcogen-Containing Functional Groups and Their Uses

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Inventors

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Background

Carbon nanotubes possess many interesting properties which make them suitable for a host of applications including use in batteries, catalysts, fuel cells, chemical sensors, drug delivery and nanoelectronics. However many of these applications require that the nanotbubes be chemically anchored at the surface of an interface, where they can enhance surface dependent processes such as charge transfer and chemical analyte binding. In the past, nanotubes have often been anchored to an interface by literally growing them on a surface; however this is a time and labor intensive process which requires many wet and dry chemistry steps.

Invention Description

Researchers at Arizona State University have developed a method of functionalizing carbon nanotubes with thiol functional groups, thereby allowing them to self-anchor at the surface of gold or any other noble metal. The method uses oxidized nanotubes as a starting material and utilizes a process to replace the oxygen groups with sulfur based groups. The technology can also be used to make functional groups containing other group 6 elements, including selenium and tellurium.

This technology is a robust process which produces functionalized nanotubes which are capable of self anchoring to a multitude of interfaces. It represents significant improvement over existing technologies which immobilize nanotubes at an interface.

Intellectual Property Status:

Patent Pending

Potential Applications

- Chemically anchoring nanotubes to a metal interface.
- Suitable metals include gold, silver, platinum, palladium, copper, nickel, iridium and other noble metals.
- Increases product diversity for applications such as batteries, catalysts, fuel cells, chemical sensors, drug sensors and nanoelectronics.

Benefits and Advantages

- Simple robust process which produces nanotubes that can self-anchor to a metallic surface.
- No chemical steps required for end user of functionalized carbon nanotubes.
- No intermediate groups linking the nanotube and sulfur functional groups.

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