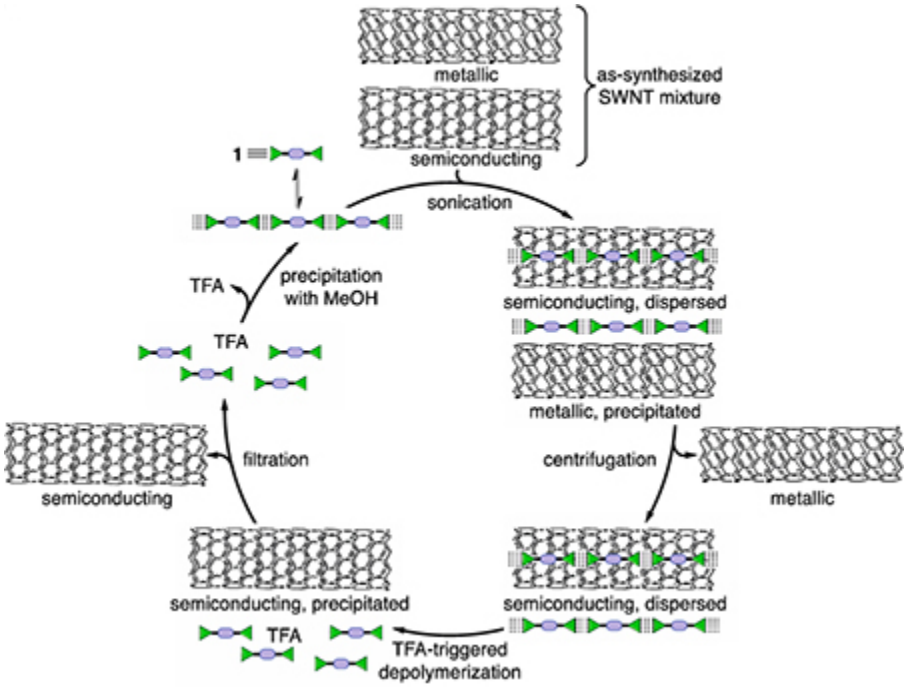
Docket #: S15-023

Sorting of Single-Walled Carbon Nanotubes via Removable Polymer

Stanford researchers successfully purified highly enriched semiconducting single-walled carbon nanotubes (SWNT) free of any dispersing agent via an easy, fast and scalable method. The inventors used a removable supramolecular polymer to selectively disperse semiconducting single-walled carbon nanotubes. The addition of a releasing agent separates the polymer from the semiconducting SWNTs, and allows the polymer to be reused. After filtration, the highly enriched semiconducting SWNTs remain. This scalable method addresses the manufacturing challenges of isolating semiconducting and metallic nanotubes for use in electronic devices such as thin film transistors, solar cells or biological imaging.



Semiconducting/Metallic Single Walled Carbon Nanotube Separation Cycle
(1 = monomer unit, TFA = trifluoroacetic acid)

Related Technologies

Stanford Docket S10-392: **Sorting Semiconducting Carbon Nanotubes for Electronic Devices**

This scalable sorting method uses semi-conducting polymers to selectively wrap around individual semiconducting carbon nanotubes dispersed in a solution, which can be directly deposited as an electronic device after a centrifugation step.

Applications

- **Carbon nanotube purification** with end user applications in:
  - Solar cells, thin-film transistors, photovoltaic devices, organic light-emitting diodes, biosensors, sensor arrays, and electronic devices on flexible substrates
  - Semiconducting inks

Advantages

- **Fast, Simple and Effective** – purity higher than commercially available 99.9%
- **Scalable** for industrial manufacturing

Publications

- Pochorovski, I., Wang, H., Feldblyum, J. I., Zhang, X., Antaris, A. L., & Bao, Z. (2015). H-Bonded Supramolecular Polymer for the Selective Dispersion and Subsequent Release of Large-Diameter Semiconducting Single-Walled Carbon Nanotubes. *Journal of the American Chemical Society*, 137(13), 4328-4331.

Patents

- Published Application: 20160280548
- Published Application: WO2016154468
- Issued: 10,395,804 (USA)

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