ABSTRACT

A strategy for the functionalization of single-walled carbon nanotubes is reported. The synthesis involved the conversion of fluorinated single-walled carbon nanotubes to the thiolated derivative assisted by phosphorous pentasulfide. The thiol group is then quantitatively oxidized to the sulfonic acid group. The extent of oxidation of the thiol precursor is confirmed using X-ray photoelectron spectroscopy, which proved to be immensely useful to discriminate between the –SH and $–SO_3H$ with a chemical shift for the sulfur 2p (approx. 5 eV). The functionalized carbon nanotubes were further characterized by infrared spectroscopy, thermogravimetric analysis, and transmission electron microscopy which revealed a significant change in morphology between the fluoro carbon nanotubes, the thiol and sulfonic acid-modified carbon nanotubes.