Title:	Nondestructive Carbon Nanotube Modification for Tailored Functionality
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Description:	High thermal and electrical conductivity, large surface area and excellent chemical stability make carbon nanotubes desirable components in devices for a variety of applications including filtration, pre-concentration, and environmental sensing. Chemical modification can specifically tailor the tubes for desired functionality, but traditional methods of nanotube alteration often detrimentally affect the appealing properties of the tubes. One recently reported option for adding desired functional groups to the surface of nanotubes without disrupting pi-conjugation is to non-covalently adhere polycyclic aromatic hydrocarbons (PACs), such as pyrene, to the surface of the nanotubes and take advantage of the pi-stacking interaction of the aromatic rings of the hydrocarbon with the graphitic carbon surface. This approach immediately opens a broad new field of nanotube research and application in which useful nanotube properties such as thermal conductivity are maintained while problematic nanotube properties such as low solubility are overcome. Work-to-date on the described project has shown that the strategy of anchoring pyrene-like molecules to nanotube surfaces is valid for both multi-wall and single-wall carbon nanotubes, as expected. There is reason to believe that this approach will prove to be a general technique for nondestructively modifying a wide range of graphitic carbon morphologies and formulations from individual single-walled nanotubes to arrays of multi-walled nanotubes grown on a surface. The proposed work will verify early success with this method, publish exciting results obtained so far, and extend the methodology for a number of useful applications including current DOE projects such as reversible carbon dioxide capture for the Carbon Management Program.