

Modifying the sorption properties of multi-walled carbon nanotubes via covalent functionalization

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Source: ANALYST **Volume:** 134 **Issue:** 9 **Pages:** 1928-1933 **DOI:** 10.1039/b823316k **Published:** 2009

Abstract: We demonstrate that the functionalization of carbon nanotubes dramatically alters their sorption characteristics. The effect of covalent functionalization of multiwalled carbon nanotubes (MWNTs) on the gas phase adsorption and desorption of polar and nonpolar organics is presented. Carboxylation and nitration led to the generation of polar functional groups on the nanotube surface. The derivatized nanotubes showed strong adsorption of polar analytes such as alcohols and relatively weaker adsorption for nonpolar and aromatic compounds. The breakthrough volume of ethanol increased by 300%, where as that of hexane decreased by 75% after functionalization. The functionalized MWNT also showed rapid desorption of the polar as well as nonpolar compounds.

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