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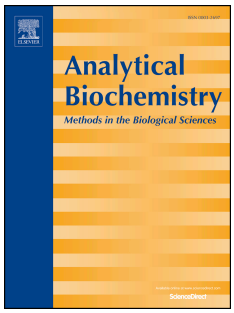

A convenient method of attaching fluorescent dyes on single-walled carbon nanotubes pre-wrapped with DNA molecules

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A convenient method of attaching fluorescent dyes on single-walled carbon nanotubes pre-wrapped with DNA molecules.

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Declaration of interest: none

Abstract

We demonstrated the attachment of different kinds of dyes, Uranine, Rhodamime 800 (R800), and Indocyanine green (ICG), to single-walled carbon nanotubes pre-wrapped with single-stranded DNAs (ssDNA-SWCNTs). A new but simple method was employed, in which a dye solution was added to ssDNA-SWCNTs that had been prepared beforehand in the conventional way. Resulting conjugates of dyes, DNA, and SWCNTs were precisely evaluated by ultraviolet to near-infrared fluorescence/absorbance spectrometry and atomic force microscopy. In particular, simultaneous measurements of fluorescence and absorbance spectroscopy enabled us to find differences in the behaviors of the dyes on SWCNT surfaces. As a result, the fluorescence/absorbance spectra of dyes showed significant changes upon adsorption on SWCNTs. The fluorescence/absorbance peaks of Uranine, R800, and ICG were quenched by 41.3/2.8%, 72.3/48.9%, and 88.3/45.0%, respectively, in the presence of 11.5 μg/mL SWCNTs. We concluded firstly that by pre-wrapping SWCNTs with ssDNA, stable hybrids with these components were obtained even if the dyes used were relatively hydrophobic and secondly that Uranine retained light absorption on the surface of SWCNT while R800 and ICG did not.

Subject category: Nanotechnology

Keywords: Carbon nanotube, DNA, fluorescent dye, Indocyanine green, Rhodamine 800, Uranine

1. Introduction

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