

## MWCNT-PEG HYBRIDS AS DUAL-MODALITY CONTRAST AGENT FOR LIGHT AND MRI IMAGING

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### Abstract

Multi walled carbon nanotubes (MWCNTs) are one of the most promising nanomaterials in bioscience. The functionalization of MWCNTs improves their solubility and biocompatibility and enable to apply them into biosensors design, tissue scaffolds or drug delivery systems. In this study, we report the functionalization process of MWCNTs with polyethylene glycol (PEG) of different molecular weight (Mw: 400, 2 000 and 100 000). MWCNTs were synthesized by Chemical Vapor Deposition (CVD) method using ferrocene as the catalyst. A morphology of the MWCNT-PEG complex was characterized by means of Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). Raman spectroscopy and Fourier Transform Infrared Spectroscopy (FTIR) revealed covalent binding of PEGs to previously oxidized MWCNT surface. The water-soluble PEG-MWCNT hybrids were successfully formed. Iron-containing MWCNTs were verified as T2-weighted contrast agents for Magnetic Resonance Imaging (MRI). The PEGylated nanostructures were also labeled with organic dye (DAPI) for further bioimaging purposes. Finally, PEG-MWCNT complexes were internalized inside HeLa cells to prove their minimal cytotoxicity effect. In this contribution we show that the magnetic properties of MWCNTs combined with PEG functionalization with their optical capabilities after organic dye labeling, can lead to obtain a new classes of nanomaterials for both, biology and medicine.

**Keywords:** Multi walled carbon nanotubes, polymer functionalization, MRI

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