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Surface modification of multiwalled carbon nanotubes (MWCNTs) for biological applications

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Owing to their outstanding physical and chemical properties carbon nanotubes (CNTs) are a promising material with potential applications in drug delivery systems, electronics and aerospace. The major challenge of the practical use of CNTs in medicine is enhancing of their ability to disperse in hydrophilic solvents. Chemical treatment with acids damages the graphite-like structure of CNTs and creates carboxyl groups on their surface. This facilitates further covalent functionalization with various polymers. In this study, detailed picture of the impact of acid treatment on the multiwalled carbon nanotube (MWCNT) surface is obtained by combination of high-resolution transmission electron microscopy (HR-TEM), Raman spectroscopy, Fourier transform infrared spectroscopy (FTIR) and ab initio calculations [1]. The correlations between the oxidation protocol, CNT size, degree of damage to the CNT, and types of functional groups will be discussed. The further functionalization of MWCNTs with polyethylene glycol (PEG) and their potential application in medicine will be also presented.

[1] B. M. Maciejewska M. Jasiurkowska-Delaporte, A. I. Vasylenko, K. K. Koziol S. Jurga, RSC Adv., 2014,4, 28826-28831

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