

Enhanced Antimicrobial Activity of Amoxicillin Adsorbed on Arginine Functionalized Multi-walled Carbon Nanotubes

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Abstract—*Functionalized carbon nanotubes are attracting increasing attention as new vectors for the delivery of therapeutic molecules. It has been reported that carbon nanotubes (CNTs) cross cell membranes easily and deliver peptides, proteins, and nucleic acids into cells. These innovative carriers present a lower toxicity to humans, a fact that boosts their potential for biomedical applications. In the present work, multi-walled carbon nanotubes were first functionalized with carboxylic acid groups and then with arginine under sonication. The surface functionalization was confirmed by Fourier Transform Infrared (FTIR) Spectroscopy and Scanning Electron Microscopy (SEM). Amoxicillin antibiotic was adsorbed on arginine functionalized carbon nanotubes (CNT-Amoxicillin) and the effect on its activity was studied using Radial diffusion assay which revealed enhanced antibacterial activity against *Bacillus cereus*, *Bacillus subtilis* and *Escherichia coli*. In vitro drug release of CNT-Amoxicillin was performed by dissolving it in phosphate buffer saline (PBS, pH 5.0, 6.8 and 7.4) medium which mimics the pH of biological fluids followed by the dialysis tubing technique.*

Keywords: *multi-walled carbon nanotubes, amoxicillin, antibacterial, dialysis.*