## Single walled carbon nanotubes-Ciprofloxacin nanoantibiotic: Synthesis, characterization and antibacterial activity

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**Abstract**

Despite the modern medicinal chemistry in designing new therapeutic agents by using different new innovative techniques in molecular modeling and combinatorial chemistry, beside to their expensive cost, infectious diseases continue to be one of the greatest health challenges worldwide. The main disadvantages for conventional antibiotics are the development of multiple drug resistance and adverse side effects. Recent advancement in nanotechnology has expanded our ability to design and construct nanomaterials with targeting, therapeutic, and diagnostic functions. Among nanotechnology-derived materials, carbon nanotubes have stimulated a great interest for biomedical applications because of their unique mechanical, electrical, thermal and spectroscopic properties.Nevertheless, advances in these directions have been hampered by the insolubility of CNTs in most solvents, and most importantly in water where they exist as ropes and large bundles. To overcome these problems we have recently development various approximations for the water solubilzation of SWCNTs.

So, here we aim to develop a new nano-antibiotic based on carbon nanotubes by functionalizing them covalently with Ciprofloxacin antibiotic and proposing that the large surface area of CNT and/or this new nano-prodrug will prevent the bacteria to throw them out once they penetrate the membrane.

In this communication, the full synthesis of the nanoantibiotic will be presented by the covalent functionalization of SWCNTs. A full characterization by TEM, SEM, TGA and Raman spectroscopy have been conducted in order to determine the morphology, size and the quantity of the functionalized SWCNTs. Finally, the antibacterial activity has been determined on three different strains E. coli, S. aureus, P. aeruginosa obtaining a better activity in comparison to the ciprofloxacin antibiotic alone. This study will open the door to develop nanoantibiotic with ease synthesis and low cost with an efficient and effective manner to have a powerful antibacterial activity to the existing antibiotic.