

Next generation nano antibiotics using C₆₀ fullerenes

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The objective of my research is to design, synthesise and tailor a nanoparticle-antibiotic complex capable of a multi-targeted approach to MDR pathogenic bacterial infections. A C₆₀ fullerene complexed with ampicillin had been designed and characterised via SEM, DLS, PDI, Zeta potential, UV-Vis, Raman and IR. Post-synthesis the complex was tested against several strains of bacteria, pathogenic and non-pathogenic with positive results. The complex could reduce the quantity of ampicillin to inhibit bacterial growth for the non-pathogenic strains. The focus of my research is based on the spectroscopic results obtained via the UV-Vis and Raman analysis, as well as the microbiological data. As a

result of the spectroscopic analysis, I could observe some very key characteristics about the complexes growth and potential point of binding. This was a potential π - π stack formation between the π electrons on the nano C₆₀ system and the aromatic ring on the ampicillin molecule. The deconvoluted Raman spectra from C₆₀ and ampicillin showed a drastic change in the aromatic region. The UV-Vis also showed a change in the nano region, hypochromic. This is mainly C₆₀-C₆₀ interactions which seems to suggest π - π stack. Couple this with the increase in stability via zeta and DLS particle growth would seem to suggest a π system.

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