

Mechanisms and toxicogenomic impact of carbon nanoparticle (C₆₀) on bacteria: molecular interactions and biochemical performance

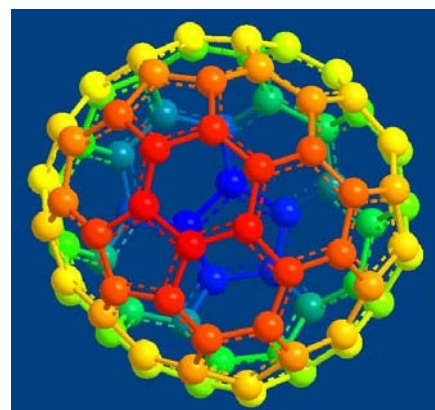
Supervisors: Assoc Prof Bo Jin

Nature of work: Experiment

Area: Chemical Engineering, Bionanotechnology

Funding: *Via* the various University scholarship schemes (see separate information for these).

Project description: Nanoparticles have received enormous R&D attention in recent decades. Among them, carbon nanomaterials (e.g., C₆₀ fullerenes) have been widely used in various industries. The applications of the carbon nanoparticles for pharmacy, drug delivery, and many industrial and commercial practices are expected to be increased considerably in the future. Environmental and public health risks due to the increasing disposal of the nonmaterials into ecosystem have become a significant concern worldwide. Our studies reported that the C₆₀ fullerenes could damage bacterial cells and cause cell death. C₆₀ at certain level can be highly toxic, and particularly result in cancer risk. It is therefore important, in particular for scientists, to better understand how carbon nanoparticles interact with biological systems, including cellular uptake, cell growth, respiratory, enzymatic activities, gene regulations, and metabolic pathways.



This project is to study molecular interactions and genomic activities and potential risks of carbon nanoparticles (C₆₀). The project aims to determine toxicogenomic impact of C₆₀ (both aqueous C₆₀ aggregates and water-soluble C₆₀ derivatives) on fermenting bacteria (*Escherichia coli*) and photosynthetic bacteria (*Cyanotheca sp.*). Research will focus on elucidating the cellular uptake mechanisms, changes in gene expression and mutation, and interactions between fullerenes and lipids, DNA, and proteins.

More details on this project or other related advanced research topics can be referred to the website of www.adelaide.edu.au/bio-nano-tech or visit my office. Our current research interests include water, energy, materials, biotechnology, tissue engineering, and others.