Bioinspired nanoparticles: Syntheses and applications

Dr. Jacob B. Omajali

Department of Biological Sciences, Thompson Rivers University, 805 TRU Way, V2C 0C8, Kamloops, BC,

Abstract

Bacteria are currently useful as renewable sources of bio-inspired nanoparticles (bio-nanocatalysts) by serving as catalyst supports during production. Typical conventional commercial catalysts which are often very expensive, require the use of harmful chemicals as stabilizing and reducing agents, resulting in catalyst that sinter easily with ease for particle growth, deactivation and reduced life span. Bio-nanocatalysts made from biomass of either Gram-positive or Gram-negative bacteria are potential alternatives to commercial production and the biomass can be obtained as waste by-products from another biotechnology process. These bio-nanoparticles can be synthesized by reducing metal salts of palladium, ruthenium, gold, and platinum on bacterial surfaces (or intracellularly as observed recently *via* HAADF-STEM analysis), and are stabilized and prevented from particle growth and agglomeration by the various functional groups found on the bacterial surface. Interestingly, since these precious metals are quite expensive, they can be obtained from waste sources e.g. from road dust, electronic scraps, and catalytic converters and made useful through bio-patterning on bacteria. This presentation will focus on the syntheses of mono and bimetallic bio-nanoparticles (bio-nanocatalysts) by Gram-positive and Gram-negative bacteria, their characterization and applications in environmental and various industrial-type reactions.