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Biogenic synthesis of copper and silver nanoparticles using Green Alga Botrycoccus braunii and its antimicrobial activity

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Abstract

Background: Nanotechnology is the branch of science and technology, which deals with the production of substances in size less than100nm scale as nanoparticles. Nanoparticles are studied as building blocks of the next generation of technology with applications in different disciplines. Currently biological species like algae are in great use for the nanoparticles synthesis. Algae are ecological and economically important eukaryotic, photosynthetic organism of the kingdom Protista. As like true plants, algae are not differentiated into root, stem and leaves but similar to lower plants for example Mosses, liverworts, etc.

Aims: In the present study we use the extract of green alga Botryococcus braunii for the synthesis of copper and silver nanoparticles.

Methods: Green alga was collected from Udaisagar Lake Udaipur (Rajasthan, India) and isolated by serial dilution method and grown on Chu-13 nutrient medium. The characterization of alga synthesized copper and silver nanoparticles was carried out by using UV-Vis spectroscopy, Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD) and scanning electron spectroscopy (SEM). Green synthesized nanoparticles were toxic against bacteria and fungus.

Expected findings: FT-IR measurements showed all functional groups having control over reduction and stabilization of the nanoparticles. X-ray diffraction pattern revealed that the particles were crystalline in nature with face-centred cubic (FCC) geometry. SEM micrographs have shown the morphology of biogenically synthesized metal nanoparticles. Further these biosynthesized nanoparticles were found to be highly toxic against two Gram negative bacterial strains Pseudomonas aeruginosa (MTCC 441), and Escherichia coli (MTCC 442), two Gram positive bacterial strains Klebsiella pneumoniae (MTCC 109) and Staphylococcus aureus (MTCC 96) and a fungal strain Fusarium oxysporum (MTCC 2087).

Biography

Dr Tejpal Singh Chundawat is associated with The North Cap University, India since 27th January, 2014. Dr Tejpal has completed his Masters degree (Organic Chemistry) from the M. L. S. University, India in 2007. As a Research Associate he spent two years (2007-2009) in R&D Centre at Jubilant Chemsys Ltd., Noida. Dr Tejpal was awarded Doctoral degree (Organic Synthesis) by the Department of Chemistry, University of Delhi in 2014. He is guiding four PhD students under his supervision and published fifteen research papers in reputed SCI journals. He also awarded a research project from DRDO on development of polyurethane fro blast mitigation. His area of research is synthesis of nanoparticles and their catalytic behavior in organic synthesis and natural product synthesis.

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