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Journal of Cluster Science

Volume 30, Issue 6, 1 November 2019, Pages 1403-1414

Green Synthesis of Silver Nanoparticles and Their Effective Utilization in Fabricating Functional Surface for Antibacterial Activity Against Multi-Drug Resistant Proteus mirabilis(Article)

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Abstract

A simple and rapid synthesis of silver nanoparticles was achieved using the aqueous extract of Ficus benghalensis leaf as both reducing and stabilizing agents. Reaction kinetics of the bioreduction process was investigated to understand the effects of various parameters such as silver ion concentrations, volume of leaf extract, pH of the reaction mixture and reaction duration. The biosynthesized silver nanoparticles were characterized by employing various techniques such as Ultraviolet visible spectroscopy, Fourier transform infrared spectroscopy, X-ray diffraction, dynamic light scattering, scanning electron microscopy and transmission electron microscopy. The obtained silver nanoparticles showed face-centered cubic phase and found to have the spherical shape with an average size of 28.69 nm as respectively observed from XRD and TEM analysis. The biogenic silver nanoparticles showed excellent antimicrobial activity against the multi-drug resistant pathogens such as Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Proteus mirabilis and Staphylococcus aureus, which is comparable with the standard broad spectrum antibiotic streptomycin. Further, the biosynthesized silver nanoparticles were explored for the functionalization of glass slide without using any binding agents, which showed the strong resistance against the growth of biofilm forming Proteus mirabilis.

Author keywords

Antibacterial activity | Biosynthesis | Functional surface | Silver nanoparticles

Funding details

Funding sponsor	Funding number	Acronym
Department of Science and Technology, Ministry of Science and Technology, India See opportunities by डीएसटी		डीएसटी
University Grants Commission	39-409/2010,Lr.No.F.42-485/2013	UGC

Funding text

The authors would like to acknowledge: a) University Grants Commission, Govt. of India, New Delhi for financial assistance under Major Research projects (F. No. 39-409/2010 (SR) & Lr.No.F.42-485/2013 (SR)), b) STIC Kochi for analysis SEM - EDAX and HRTEM - SAED images, c) Gandhigram Rural Institute - Deemed University, Dindigul for analysis SEM – EDAX, d) Alagappa University, Karaikudi for XRD analysis. We also acknowledge the Department of Science and Technology for their support through FIST program to the college.

ISSN: 10407278
Source Type: Journal
Original language: English
DOI: 10.1007/s10876-019-01582-z
Document Type: Article
Publisher: Springer New York LLC

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