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## 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*. © 2019, Springer Science+Business Media, LLC, part of Springer Nature.

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Antibacterial activity Biosynthesis Functional surface Silver nanoparticles

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