Statistical Optimization of Co-stabilized Growth of Ag NPs by Liquid Plasma Interaction Method for Study of Antibacterial Activity

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Abstract

In this study, a plasma jet of argon gas was impinged with a solution of metal salt and stabilizers for production of silver NPs. To optimize the absorbance parameter, a simplex centroid design (SCD) was used to optimize the experiments. The combined and individual effect of stabilizers on the synthesis of Ag NPs was significant when P-value < 0.05. SCD optimization of UV results showed a sharp SPR band at 302 nm. In FTIR analysis, bond absorption at 1633 cm⁻¹ attributed to C=O was shifted to higher wavelength due to saccharides addition. XRD analysis confirmed the FCC structure of Ag NPs having average size of 15 nm. SEM- EDX revealed the formation of spherical shaped Ag NPs with strong absorption at 3 keV confirming the presence of the Ag content. Antibacterial activity of Ag NPs was significant against both bacteria, with slightly stronger activity against Staph. aureus than Escherichia coli.

Full Text

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