Green Synthesis and Structural Characterization of Silver Nanoparticles Synthesized Using the Pod Extract of Clitoria Ternatea and Its Application towards Dye Degradation

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Abstract

Silver nanoparticles (SNPs) have multifaceted applications ranging from nanomedicine to nanoremediation. For the first time, silver nanoparticles were synthesized using the aqueous extract of *Clitoria ternatea* pods as reducing agent. The formation of SNPs was first confirmed by visual inspection and then by a characteristic peak at 418nm observed in UV-Vis spectrum. Spherical SNPs with few agglomerations were noticed in SEM image. EDS spectrum showed a strong signal for elemental silver at 3keV. The crystalline nature of the SNPs was confirmed from a sharp peak obtained in XRD at 38.58°. The involvement of biomolecules in the formation and capping processes was ascertained by specific bands such as (cm^{-1}) 3595, 1728, 2924, 1381, 1620 and 1049 in FTIR spectra. The average hydrodynamic size of the SNPs was 62.51 nm. A low PDI value of 0.264 was observed which validated the monodispersity of the SNPs. The stability of the SNPs was corroborated by the zeta potential value of – 24.6 mV. In addition, an important environmental application – degradation of methylene blue dye has been demonstrated in which SNPs acted as nanocatalysts. The first order kinetic constant for the degradation has been calculated as 0.1448 min^{-1}. This outcome may play an excellent role in the environmental remediation applications of the newly synthesized materials.