SURFACE PLASMON RESONANCE STUDY OF SILVER NANOSTRUCTURES

Final Report of the Minor Research Project

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SUMMARY OF THE FINDINGS OF THE STUDY

"Surface Plasmon Resonance Study of Silver Nanostructures"

Green synthesis provides advancement over chemical and physical method as it is cost effective, environment friendly. In this project silver nanoparticles were synthesized using plant leaf and fruit extract. Analysis of silver nanoparticles prepared from different Plant extracts (Hibiscus, Nutmeg, Pineapple, Coconut water) through green synthesis method was done using UV-Visible absorption spectrum, TEM, FTIR, SEM. A tunnelling electron microscope was employed to analyze the size of the silver nanoparticles.By the analysis of TEM image it is clear that size of silver nanoparticles prepared by (a) Hibiscus (b) Nutmeg (c) Pineapple (d) Coconut water is in the manometer range. A scanning electron microscope was employed to analyze the shape of the silver nanoparticles that were synthesised by green method. SEM analysis shows that the above used ecofriendly products have tremendous capability to synthesize silver nanoparticles which were roughly spherical in shape and were uniformly distributed. Silver nanoparticles exhibit brilliant colours. This is due to optical property-Surface Plasmon Resonance (SPR).UV-Visible absorption band is actually the SPR absorption band. From the UV-Visible absorption band it is clear that SPR peak is in the violet wavelength region of visible light. FTIR gives the information about functional groups present in the synthesised silver nanoparticles for understanding their transformation from simple inorganic AgNO3 to elemental silver by the action of the different photochemical which would act simultaneously as reducing, stabilizing and capping agents. To study the factors that affect optical property, silver nanoparticle were synthesized for different reaction time, temperature, concentration, refractive index. The red shift of SPR peak indicates that the particle size goes on increasing. As the reaction time increases SPR peak suffers red shift. As the reaction temperature increase SPR peak suffers blue shift until the formation of particle attains an optimum condition. The SPR peak suffers red shift as the refractive index of medium increases. Silver nanoparticles are reported to exhibit visible photoluminescence and their fluorescence spectra are analyzed. We analyze several possible mechanisms of the red shift of the SPR, when the size of nanoparticles decreases and/or the temperature of particles increases.The size and temperature effects can appear from the surface damping , spill-out, and electronic environment effects . In addition, the temperature effect arises from the thermal expansion of nanoparticles. Therefore, the observed red shift of the SPR band can be explained by the increase in the temperature of the silica matrix.