**ABSTRACT**

Three Dimensional button, flower and sphere shaped microstructure of silver nanoparticles dispersed in dextran sulfate matrix were synthesized using silver nitrate, trisodium citrate and dextran sulfate. Three different amount of dextran sulfate (2 drops, 10 drops and 15 drops) were added to each 10 ml of silver nanoparticles to make three different solution mixtures, which was then subjected to different characterization techniques. The XRD study of flower shaped dextran sulfate stabilized silver nanoparticles showed a diffraction pattern corresponding to face centered cubic structure of Ag crystals. The FESEM image shows a well defined three dimensional button shaped microstructure for 2 drops of dextran sulfate, flower shaped microstructure for 10 drops of dextran sulfate and sphere shaped microstructure for 15 drops of dextran sulfate. Based on the morphological structure of the synthesized nanoparticle the absorption property was discussed, the absorption band varied from 429 nm to 434 nm. The nanoparticles prepared using dextran sulfate of high concentration (15 drops) shows a blue shift in absorbance spectra, indicating smaller size of AgNPs with high absorbance property. The results reveal that the surface morphology affects the absorption behavior of the nanoparticles. The results of cytotoxicity assay against human vero cell lines revealed that flower shaped dextran stabilized AgNPs shows ≥ 90% cell viability indicating the biocompatibility of the nanoparticles. The *In-vitro* anticancer activity of the synthesized Ag-DS nanoparticles against human breast cancer cell line MCF-7, was studied. The results of the present study indicated that the Ag-DS nanoparticles can be a potent anticancer agent.