**Abstract**

In the generation of nanoparticles for biological applications, the control over synthetic parameters influencing the particles' physicochemical properties are of great interest due to the strong influence of particle size and surface properties on cellular uptake and bio-distribution. Size controlled Dextran sulphate stabilized silver nanoparticles (AgNPs - DS) were synthesized from aqueous solution of silver nitrate (AgNO3) and dextran sulphate sodium salt (DS). The characterization of AgNPs - DS was performed by Ultraviolet–Visible spectroscopy (UV-VIS), Travelling Electron Microscope (TEM), Energy Dispersive X-ray spectroscopy (EDX), X-ray Diffraction (XRD), Fourier Transform Infrared spectroscopy (FTIR) and the antimicrobial activity of the synthesized nanoparticles were also performed. The formation of AgNPs - DS was monitored by colour changes of the reaction mixture from yellowish to brown and by measuring the surface plasmon resonance absorption peak in UV-VIS spectra. The TEM analysis was used to determine the size and shape of AgNPs - DS. The presence of elemental silver and its crystalline structure in AgNPs - DS were confirmed by EDX and XRD analyses. The possible functional groups of DS responsible for the reduction and stabilization of AgNPs were determined by FTIR spectroscopy.