Preparation, characterization, and antibacterial activity of γ-irradiated silver nanoparticles in aqueous gelatin

ABSTRACT

Colloidal silver nanoparticles (Ag-NPs) were obtained through γ-irradiation of aqueous solutions containing AgNO3 and gelatin as a silver source and stabilizer, respectively. The absorbed dose of γ-irradiation influences the particle diameter of the Ag-NPs, as evidenced from surface plasmon resonance (SPR) and transmission electron microscopy (TEM) images. When the γ-irradiation dose was increased (from 2 to 50 kGy), the mean particle size was decreased continuously as a result of γ-induced Ag-NPs fragmentation. The antibacterial properties of the Ag-NPs were tested against Methicillinresistant Staphylococcus aureus (MRSA) (Gram-positive) and Pseudomonas aeruginosa (P.a) (Gram-negative) bacteria. This approach reveals that the γ-irradiation-mediated method is a promising simple route for synthesizing highly stable Ag-NPs in aqueous solutions with good antibacterial properties for different applications.

Keyword: Bacteria; Gamma rays; Gelatin; Irradiation; Nanoparticles; Silver; Silver nitrate.