

Preparation of hydrogel/silver nanohybrids mediated by tunable-size silver nanoparticles for potential antibacterial applications

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In this study, a versatile synthesis of silver nanoparticles of well-defined size by using hydrogels as a template and stabilizer of nanoparticle size is reported. The prepared hydrogels are based on polyvinyl alcohol and maleic acid as crosslinker agents. Three hydrogels with the same nature were synthesized, however, the crosslinking degree was varied. The silver nanoparticles were synthesized into each prepared hydrogel matrix achieving three significant, different-sized nanoparticles that were spherical in shape with a narrow size distribution. It is likely that the polymer network stabilized the nanoparticles. It was determined that the hydrogel network structure can control the size and shape of the nanoparticles. The hydrogel/silver nanohybrids were characterized by swelling degree, Thermal Gravimetric Analysis (TGA), Fourier Transform Infrared (FT-IR), Scanning Electron Microscopy (SEM) and Transmission Electron Microscope (TEM). Antibacterial activity against *Staphylococcus aureus* was evaluated, confirming antimicrobial action of the encapsulated silver nanoparticles into the hydrogels. © 2019 by the authors.

Antibacterial activity

Crosslinking

Hydrogel

Maleic acids

Polyvinyl alcohol

Silver nanoparticles

Template

Bacteria

Crosslinking

Gravimetric analysis

Hydrogels

Metal nanoparticles

Nanostructured materials

Polyvinyl alcohols

Scanning electron microscopy

Synthesis (chemical)

Thermogravimetric analysis

Transmission electron microscopy

Anti-bacterial activity

Antimicrobial action

Fourier transform infrared

Maleic acids

Narrow size distributions

Staphylococcus aureus

Template

Thermal gravimetric analyses (TGA)

Silver nanoparticles