

Novel approach to the synthesis of polymer nanocomposites with antimicrobial properties

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Polymer materials with antimicrobial properties are of a wide interest for the food industry, medicine, biotechnology, etc. Of various metallic elements, silver is well known as exhibiting antibacterial properties with low toxicity for humans. Many researchers have reported that Ag nanoparticles (AgNPs) have significant antibacterial activity; however practical methods for AgNPs immobilization into the polymer matrix have been insufficiently advanced.

Simple method for the silver-polymer nanocomposite fabrication is proposed. AgNPs immobilized onto the polymer surface were prepared by using ion-exchangeable poly(acrylic acid) grafted chains as nanoreactors followed by chemical reduction of silver ions. The prepared polymer nanocomposites were characterized by x-ray photoelectron spectroscopy, transmission electron microscopy, ultraviolet-visible absorption spectroscopy, and bactericidal activity measurements.

The results suggest that mono-dispersed Ag nanoparticles with controllable size can be obtained by using poly(acrylic acid) grafted chains for both synthesis and stabilization.