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Investigation of Antibacterial Properties of Silver Nanoparticle-loaded Poly (acrylamide-co-itaconic acid)-Grafted Cotton Fabric

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Cotton fabric was grafted with a poly (acrylamide-co-itaconic acid) co-polymer via ceric ammonium nitrate (CAN) induced graft co-polymerization in an aqueous medium. The grafted cotton fabric was loaded with Ag nanoparticles by entrapment of Ag⁺ ions into a grafted polymer network, followed by borohydride reduction. The resulting Ag nanoparticle-loaded grafted fabric was characterized by Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and transmission electron microscopy (TEM) analysis. The Ag nanoparticles were almost monodisperse in nature and their average diameter was approximately 12.5 nm. The fabric shows antibacterial activity against *Escherichia coli* depending upon the extent of grafting of the polymer network onto the fabric and the amount of nano Ag loaded into the grafted fabric. Finally, the Ag-loaded grafted fabric is found to suppress the bacterial growth approximately 3 h after the immersion of the fabric into a nutrient broth at 37 °C.

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