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Cellulose–polymer–Ag nanocomposite fibers for antibacterial fabrics/skin Scaffolds

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Abstract

Natural carbohydrates (polysaccharides): gum acacia (GA) and gaur gum (GG) were employed in dilute solutions: 0.3%, 0.5% and 0.7% (w/v), as effective reductants for the green synthesis of silver nanoparticles (AgNPs) from AgNO3. The formed AgNPs were impregnated into cellulose fibers after confirming their formation by utilizing ultraviolet–visible (UV–vis) spectral studies; Fourier transforms infrared (FTIR) and transmission electron microscopy (TEM). The surface morphology of the developed cellulose–silver nanocomposite fibers (CSNCFs) were examined with scanning electron microscope-energy dispersive spectroscopy (SEM-EDS). The thermal stability and mechanical properties of the CSNCFs were found to be better than cellulose fibers alone. The antibacterial activity of the nanocomposites was studied by inhibition zone method against Escherichia coli, which suggested that the developed CSNCFs can function effectively as anti-microbial agents. Hence, the developed CSNCFs can effectively used for tissue scaffolding.