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AgNP/CE electrospun nanofibers for antibacterial applications

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In the present work, we report our research on cellulose nanofibers decorated with silver nanoparticles by novel methods. Cellulose acetate was used as a precursor for cellulose nanofibers. Cellulose acetate nanofibers were fabricated by electrospinning and then treated with 0.01 M NaOH solution for 30 hours to produce cellulose nanofibers. Synthesis of silver nanoparticles was carried out by three simple methods. AgNO₃ was used as precursor for synthesis of silver nanoparticles. Three methods were used for reduction of ionic silver (Ag⁺) into AgNPs were heat treatment, N, N-Dimethylformamide induced heat treatment and 3,4-Dihydroxyphenethylamine coating. The samples were characterized by scanning electron microscopy (SEM), X-ray diffraction spectroscopy (XRD), transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), X-ray photoelectron spectroscopy (XPS) and Field emission scanning electron microscopy (FESEM). Sizes of the AgNPs were calculated using Debye-Scherrer method and from the TEM images. SEM and FESEM images depicted regular morphology of the nanofibers. Structural modifications of cellulose acetate into cellulose were confirmed by FTIR and XRD analysis. Formation of the metallic silver was confirmed from XRD and XPS data. XRD data revealed FCC crystalline structure of the AgNPs. TEM images show cellulose nanofibers covered with well dispersed AgNPs.

Biography

Jatoi Abdul Wahab is a PhD student in Bioscience and Textile Technology Department at Shinshu University, Ueda, Japan. He has completed his ME at Mehran-UET, Pakistan and MSc in Textile Engineering (Chemical Engineering Class) at Politecnico di Torino, Italy. He has been engaged in research, teaching and academic activities for over ten years. He has so far published 17 research articles in reputed research journals. He is the author of four workbooks and has presented (both oral and poster presentations) his research in several international conferences as well.

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