

24th World Nano Conference

May 07-08, 2018 | Rome, Italy

Fabrication and characterization of electrospun silica nanofibers through sol-gel method along with in situ synthesis of silver nanoparticles

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Silica nanofibers are of great interest among the inorganic nanofibers due to the high reactivity and availability of silicon compounds in nature. Sol-gel process is required for electrospinning of silica nanofibers in which a metal alkoxide is hydrolyzed and the viscosity is increased. In this study, silica nanofibers containing silver nanoparticles were synthesized and electrospun from a mixture of silica sol with an easy spinable polymer (PVA) as an additive. The silica sol contains tetraethyl orthosilicate (TEOS), silver nitrate, distilled water, nitric acid and ethanol. Nanofibers were formed through electrospinning set up. The nanofibers were calcinated to remove the solvent and additive polymer. Consequently, pure silica nanofibers was produced. FTIR (Fourier transform infrared spectroscopy) analysis indicated entire removal of polyvinyl alcohol from the structure and formation of silan groups. The presence of silver, silica and oxygen was confirmed by EDX (Energy-dispersive X-ray spectroscopy). Also, XRD (X-ray diffraction) patterns revealed the presence of silver nanoparticles with a mean crystal size of 18 nm. FESEM (Field Emission Scanning Electron Microscope) images showed that adding silver nitrate into the sol-gel, resulted in lower nanofiber diameter from 286 to 136 nm. Furthermore, the electrospun nanofibers were more resistant in acidic media than alkaline media.

Biography

Mahsa Kangazian Kangazi completed her BSc in textile engineering major, technology branch, at Isfahan University of Technology, Iran. She completed her BSc studies as a Distinguished Student, and was accepted at Amirkabir University of Technology (Tehran Polytechnic) by the brilliant talents' scholarship for her MSc in textile engineering-nanofiber structures. In 2016, she defended her MSc thesis and its results were an article and a patent which are being gauged. Then, she got accepted at this university for her PhD in 2017. She is currently pursuing her PhD.

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