

Preparation of Silicon-Based Oxide Hollow Nanofibers Using Single-Nozzle Electrospinning

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Abstract : In this study, the silicon-base oxide nanofibers with hollow structure were prepared using single-nozzle electrospinning and heat treatment. Firstly, precursor solution was prepared: the Polyvinylpyrrolidone (PVP) and Tetraethyl orthosilicate (TEOS) dissolved in ethanol and to make sure the concentration of solution in appropriate using single-nozzle electrospinning to produce the nanofibers. Secondly, control morphology of the electrostatic spinning nanofibers was conducted, and design the temperature profile to created hollow nanofibers, exploring the morphology and properties of nanofibers. The characterized of nanofibers, following instruments were used: Atomic force microscopy (AFM), Field Emission Scanning Electron Microscope (FE-SEM), Transmission electron microscopy (TEM), Photoluminescence (PL), X-ray Diffraction (XRD). The AFM was used to scan the nanofibers, and 3D Graphics were applied to explore the surface morphology of fibers. FE-SEM and TEM were used to explore the morphology and diameter of nanofibers and hollow nanofiber. The excitation and emission spectra explored by PL. Finally, XRD was used for identified crystallization of ceramic nanofibers. Using electrospinning technique followed by subsequent heat treatment, we have successfully prepared silicon-base oxide nanofibers with hollow structure. Thus, the microstructure and morphology of electrostatic spinning silicon-base oxide hollow nanofibers were explored. Major characteristics of the nanofiber in terms of crystalline, optical properties and crystal structure were identified.

Keywords : electrospinning, single-nozzle, hollow, nanofibers

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