

Preparation and characterization of ZnO Nanofibers by Electrospinning

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Recently, one-dimensional nanostructured materials such as nanowires, nanofibers, nanorods, and nanotubes have received a great attention for their potential applications in numerous areas due to their special properties, which are distinct from conventional bulk materials. Among various semiconductor nanostructures, variety of nanostructures of ZnO has been investigated.

Pure ZnO is an n-type semiconductor with a wide bandgap (3.37 eV) and it is one of the most promising materials due to its use in a wide range applications in various fields, including short wavelength light-emitting diode and room temperature ultraviolet (UV) lasing diode, solar cell, UV-absorber, transparent conductor, gas sensor, etc.

The ZnO has been early and widely studied due to its high mobility of conduction electron, good chemical and physical stability, low cost, and so on. Compared to other structural types of ZnO gas sensors, nanostructured ZnO gas sensors are reported to exhibit higher sensitivity.

From this perspective, of ZnO nanofiber based gas sensors are expected to exhibit sensing performance at very low gas concentrations. We have prepared PAN nanofibers from PAN solutions by an electrospinning method. Subsequent calcination of PAN nanofibers under an N₂ atmosphere produced carbon nanofibers(CNF). The carbon nanofibers was coated with zinc oxide sol. Finally, thermal treatment of the zinc oxide sol coated CNF under oxidative conditions resulted in ZnO nanofibers. In this work, we prepared ZnO nanofibers using an electrospinning method.

The morphologies and microstructures of ZnO nanofibers as a function of annealing temperature were analyzed using X-ray diffraction (XRD) and scanning electron microscopy (SEM). Furthermore, the electrical and CO gas sensing properties of ZnO nanofibers were investigated.

References

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Figure. 1 FE-SEM images of ZnO nanofibers

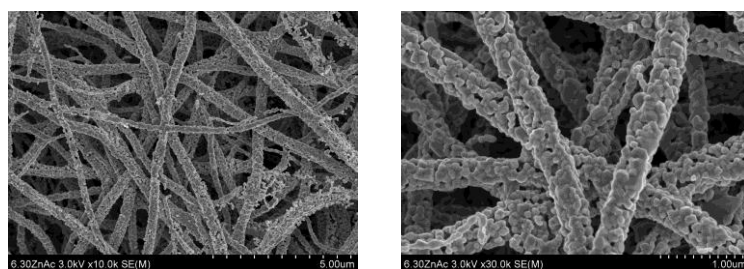


Figure. 2 XRD pattern of ZnO nanofibers

