

# Electrical and Mechanical Properties of Bismuth Oxide Nanowire/Poly(vinyl acetate)

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**ABSTRACT:** Poly(vinyl acetate) (PVAc) loaded bismuth oxide ( $\text{Bi}_2\text{O}_3$ ) nanowires was successfully prepared at low temperature and ambient pressure. X-ray diffraction and transmission electron microscopy were used to characterize the final product. It was found that  $\text{Bi}_2\text{O}_3$  nanowires were formed and the diameter of the rods was confined to within 8 nm. The diameter and length of formed rods was found increase by increasing the bismuth oxide concentration in the PVAc matrix. The current-voltage (I-V) characteristic curves revealed that the charge transport is mainly nonlinear due to grain boundary contribution. The complex impedance spectroscopy was confirmed that the grain

boundary effect controls the charge transport mechanism through nanocomposites. The deformation behavior after preparing the nanocomposites, irrespective of  $\text{Bi}_2\text{O}_3$  concentration, is similar to that of the unfilled elastomer, implying that the mechanism of large deformation is mainly governed by the matrix. The mechanical measurements confirmed that the bismuth oxide has rod-like shape. © 2010 Wiley Periodicals, Inc. *J Appl Polym Sci* 118: 1598–1605, 2010

**Key words:** mechanical properties; nanocomposites; morphology

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