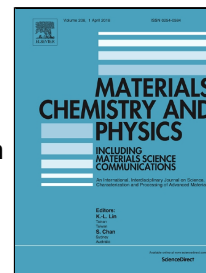


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M.T. Ramesan, V. Santhi, B.K. Bahuleyan, M.A. Al-Maghrabi

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Structural Characterization, Material Properties and Sensor Application Study of *In Situ* Polymerized Polypyrrole/Silver Doped Titanium Dioxide Nanocomposites

M. T. Ramesan^{1*}, V. Santhi¹, B. K. Bahuleyan² and M. A. Al-Maghrabi²

¹Department of Chemistry, University of Calicut, Calicut University P.O., Kerala, India 673 635, Tel: +91 4942401413, Fax: +91 4942400269

²Department of General Studies, Yanbu Industrial College, P. O. Box 30436, Yanbu Industrial City 41912, Kingdom of Saudi Arabia.

Abstract

Polypyrrole (PPy)/ silver doped titanium dioxide (Ag-TiO₂) nanocomposites were prepared using simple and inexpensive *in situ* chemical oxidative polymerisation. The nanocomposites were characterised by Fourier transform infrared (FTIR), UV-Vis spectroscopy, scanning electron microscopy (SEM), X-ray diffraction, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), alternating current (AC) and direct current (DC) conductivity measurements. Furthermore, the ammonia gas sensing properties of PPy and its nanocomposites were explored thoroughly. The FTIR spectrum confirmed the formation of a polymer nanocomposite when the characteristic bands of the PPy shifted to a lower wavenumber region. The UV-Vis spectrum revealed that all the absorption peaks of the composite were shifted to a higher wavelength in comparison with PPy. The shifts in absorption peaks were due to the strong interfacial interaction between the nanoparticles and polymer chain. SEM images showed that the nanoparticles were well shaped spherical particles with the uniform dispersion in the PPy. XRD results revealed that the crystallinity of the nanocomposite increased with an increase in concentration of nanoparticles. TGA analysis showed that the thermal stability of the nanocomposite was enhanced compared to pure PPy. From the DSC analysis, it was clear that the glass transition temperature of the nanocomposite increased when the concentration of metal oxide nanoparticles was

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