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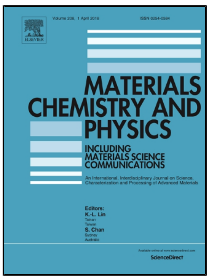

Structural Characterization, Material Properties and Sensor Application Study of In Situ Polymerized Polypyrrole/Silver Doped Titanium Dioxide Nanocomposites

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PII:	S0254-0584(18)30144-5
DOI:	10.1016/j.matchemphys.2018.02.040
Reference:	MAC 20391
To appear in:	*Materials Chemistry and Physics*
Received Date:	12 May 2017
Revised Date:	02 January 2018
Accepted Date:	22 February 2018

Please cite this article as: M.T. Ramesan, V. Santhi, B.K. Bahuleyan, M.A. Al-Maghrabi, Structural Characterization, Material Properties and Sensor Application Study of In Situ Polymerized Polypyrrole/Silver Doped Titanium Dioxide Nanocomposites, *Materials Chemistry and Physics* (2018), doi: 10.1016/j.matchemphys.2018.02.040

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

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Abstract

Polypyrrole (PPy)/ silver doped titanium dioxide (Ag-TiO_2) 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