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Effect of change in structural properties on gas sensing performance of polyaniline-SrO₂ nanocomposite

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Polyaniline is semi-crystalline polymer but its structure is studied rarely. Extensive study of synthesis, characterization and application of polyaniline and polyaniline-SrO₂ composites has been carried out. Polyaniline having phenolic group as aromatic substituent and its nanocomposite samples with SrO₂ were successfully fabricated by photo-induced polymerization method with various concentrations of SrO₂. Prepared samples were then characterized by XRD, FTIR, SEM, EDAX, UV-Visible absorption spectra and gas sensing performance was checked for various gases. Parameters such as melting point, solubility, stability, morphology, electrical properties and hence gas sensing properties shows great dependence on crystal arrangement of organic component. Hence, crystal structure determination of newly developed component is very important. Analysis of XRD peaks of pure polyaniline and polyaniline-SrO₂ composite exhibits structural change and percentage of crystallinity. Polyaniline-SrO₂ composite exhibit tetragonal structure. The parallel and ordered package of pure polyaniline was studied from XRD peaks. FTIR peaks of polyaniline-SrO₂ nanocomposite samples were taken to evaluate the interaction between polyaniline and SrO₂ particles. As compare to pure polyaniline, UV-visible spectra of polyaniline-SrO₂ nanocomposite shows shift towards lower wavelength. It indicates incorporation of SrO₂ particles polyaniline matrix. Hence, exhibits surface:volume ratio. It reveals in improved electrical conductivity. Thermal conductivity exhibits positive temperature coefficient of resistor of prepared thick film of pure polyaniline and polyaniline-SrO₂ nanocomposite. Gas sensing property of prepared samples was studied with respect to operating temperature, selectivity of CO₂ against other gases response and recovery profile and long term stability of samples. As compare to pure polyaniline, change in structural properties of polyaniline-SrO₂ nanocomposite shows enhanced performance for CO₂ sensing.

Biography

Janhavi Talegaonkar is a Research Scholar and has completed her Master's in Philosophy (2009), from North Maharashtra University, Jalgaon, (M.S.), India. Presently, she is an Assistant Professor in the Department of Physics, at Smt. P. K. Kotecha Mahila Mahavidyala, Bhusawal, (M.S.) India. She is pursuing PhD under the guidance of Prof. D. R. Patil. Her two papers have been published in reputed international journals.

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