

## Exploring potential electrical and LPG sensing properties of polyaniline- $\text{Co}_3\text{O}_4$ nanocomposite

Mahadeva<sup>a</sup>, Manjunatha B<sup>b</sup>, Shruti Gogi<sup>a</sup>, Vaishali N Birge<sup>a</sup> & B T Vijaykumar<sup>c</sup>,  
Arunkumar Lagashetty<sup>d</sup> & Sangshetty Kalyane<sup>\*a</sup>

<sup>a</sup> Department of Physics, Bheemanna Khandre Institute of Technology, Bhalki, Bidar 585 413, Karnataka, India

<sup>b</sup> Department of Physics, Government Women First Grade College, Jewargi Colony, Kalaburagi 585 102, Karnataka, India

<sup>c</sup> Department of Physics, Gulbarga University, Kalaburagi 585 106, Karnataka, India

<sup>d</sup> Department of Chemistry, Vijayanagara Sri Krishnadevaraya University, Ballari 583 105, Karnataka, India

E-mail: sangshetty\_2007@rediffmail.com

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Polymer nanocomposites are an important class of materials in which recent researches are reported extensively due to their vast range of applications. Various synthetic methods are available in the literature and much importance is given to scalable processing techniques for sensing applications. The composite of polyaniline (Pn) doped with nanosized cobalt oxide ( $\text{Pn}/\text{Co}_3\text{O}_4$ ) has been synthesized using a chemical oxidative polymerization of aniline in presence of various weight percentage of  $\text{Co}_3\text{O}_4$ . The structural and morphological characterizations of the prepared samples have been examined using X-ray diffraction (XRD) and scanning electron microscopy (SEM) tool, respectively. AC conductivity of the prepared samples has been measured using the impedance technique within a frequency range of 10 KHz to 1 MHz at room temperature. Additionally, the DC electrical transport property of the composites have been experimented within a temperature range of 30-200°C. It is observed that the incorporation of nanosized  $\text{Co}_3\text{O}_4$  into the PA matrix has an impact on the AC electrical properties of the samples. The variation in electrical resistance of both Pn and  $\text{Pn}/\text{Co}_3\text{O}_4$  composites has been noted when exposed to 1000 ppm concentration of LPG gas. Both samples exhibit a quick resistance change on exposure to LPG gas with the  $\text{Pn}/\text{Co}_3\text{O}_4$  composite demonstrating higher sensitivity and suitability for LPG sensing compared to Pn.

**Keywords:** Polyaniline,  $\text{Co}_3\text{O}_4$ , LPG, AC, DC, XRD, SEM