

Preparation of Polyaniline/Zinc Oxide Nanocomposite Thin Films by Microwave Plasma

Ahmed S. Wasfi^{1*}, Hammad R. Humud¹, Mohammed A. Abed²,
 Mohammed E. Ismael¹

¹Department of Physics, College of Science, University of Baghdad, Iraq

²Department of Physics, College of Science, University of Thi-qar, Iraq

Abstract: Polyaniline (PANI)/ZnO nanocomposite thin films were prepared through polymerization in a microwave plasma system that was built in our laboratory. The maximum attained plasma electron temperature and density were 0.5 eV and $1.75 \times 10^{17} \text{ cm}^{-3}$, respectively. ZnO powder of 50 nm average particle size was used to prepare the PANI/ZnO nanocomposite thin films. They were characterized by UV-VIS, FTIR, AFM and SEM to study the influence of zinc oxide nanoparticles on the optical properties, morphology and structure of the thin films. The optical properties studies indicated that the optical energy band gap of the PANI/ZnO nanocomposite decreased systematically from 3.50 eV to 3.37 eV with increasing ZnO nanoparticles concentration from 1 to 9 wt% respectively. FTIR measurement revealed a shift in the FTIR absorption peaks with ZnO concentration. AFM and SEM images indicated a uniform distribution of the ZnO nanoparticles in the PANI matrix. It can be concluded that PANI/ZnO nanocomposite thin films of good morphological quality and controlled optical energy band gap, which could be suitable for the supercapacitor applications, can be prepared by microwave plasma polymerization technique.

Keywords: plasma polymerization, polyaniline nanocomposite, microwave induced plasma.

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