Synthesis, Characterization and Electrical Conductivity of Polyaniline-Mn_{0.8}Zn_{0.2}Fe₂O₄ Nano-composites

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The polyaniline/Mn_{0.8}Zn_{0.2}Fe₂O₄ (PANI/MZFO) nano-composites, with different ferrite contents (10, 20 and 30 wt%), were prepared via in situ polymerization technique using aniline and MZFO prepared using citrate auto-combustion route. The produced composites were characterized using X-ray diffraction (XRD), Fourier transform infrared (FT-IR), thermogravimetry (TG), transmission electron microscopy (TEM) techniques. The effect of compositional variation on the electromagnetic properties of PANI was measured using vibrating sample magnetometer (VSM) and ac-conductivity as a function of temperature. The results of XRD and FT-IR indicated an interfacial interaction between PANI and MZFO crystallites. TEM images showed that MZFO particles are embedded in the PANI matrix and formed core-shell structure. TG curves exhibited an increase in the thermal stability of PANI with the addition of MZFO. The hysteresis measurements indicate an improvement in the magnetic properties by the addition of ferrite. The conductivity measurements confirmed the interaction between PANI and MZFO and showed a change from metallic to semi-conducting properties by the addition of MZFO.

Keywords: Conducting polymer; Mn_{0.8}Zn_{0.2}Fe₂O₄; Thermal stability; Conductivity; VSM.

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