

Polyaniline (PANI)–Co_{0.5}Mn_{0.5}Fe₂O₄ Nanocomposite: Synthesis, Characterization And Magnetic Properties Evaluation

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Polyaniline (PANI)/Cobalt-manganese ferrite, (PANI)/Co_{0.5}Mn_{0.5}Fe₂O₄, nanocomposite was synthesized by oxidative chemical polymerization of aniline in the presence of ammonium peroxydisulfate (APS). Microwave assisted synthesis method was used for the fabrication of core CoFe₂O₄ nanoparticles. The structural, morphological, thermal and magnetic properties of the nanocomposite were investigated in detail by X-ray diffraction (XRD), fourier-transform infrared spectroscopy (FT-IR), thermogravimetric analysis (TGA), scanning electron microscopy (SEM) and vibrating sample magnetometer (VSM). The average crystallite size of (PANI)/Co_{0.5}Mn_{0.5}Fe₂O₄ nanocomposite by the line profile method was 20±9 nm. The magnetization measurements revealed that (PANI)/Co_{0.5}Mn_{0.5}Fe₂O₄ nanocomposite has superparamagnetic behavior with blocking temperature higher than 300 K. The saturation magnetization of the composite is considerably low compared to that of CoFe₂O₄ nanoparticles due to the partial replacement of Co²⁺ ions and surface spin disorder. As temperature decreases, both coercivity and strength of antiferromagnetic interactions increase which results in unsaturated magnetization of the nanocomposite.

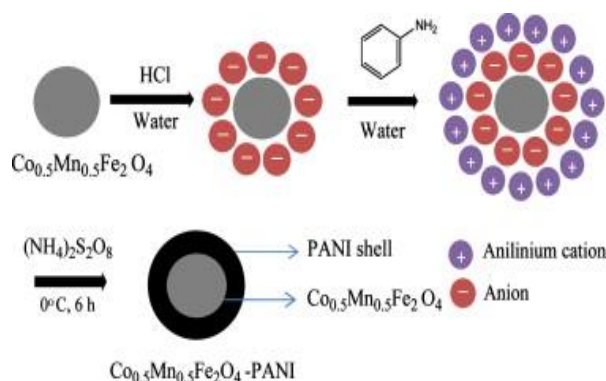


Figure 1: Synthesis of PANI/Co_{0.5}Mn_{0.5}Fe₂O₄ nanocomposite.

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