

Fabrication and characterization of Manganese–Zinc Ferrite nanoparticles produced utilizing heat treatment technique

ABSTRACT

In this research, the thermal treatment technique has been employed to produce $\text{Mn}_{0.5}\text{Zn}_{0.5}\text{Fe}_2\text{O}_4$ nanoparticles. Manganese, Zinc and iron nitrates have been mixed with capping agent of polyvinylpyrrolidone. Several techniques have been used to examine the structural, morphological and optical properties of the prepared product. X-ray diffraction (XRD) has demonstrated the prepared product and showed that the product contains tetragonal crystalline structures. Scanning electron microscopy (SEM) has showed that the sample grain size is increasing alongside temperature calcination. Energy dispersive X-ray (EDX) has showed that the presence of Mn, Zn, Fe and O in the product nanoparticle was confirmed as original from the precursor starting materials. Transmission electron microscopy (TEM) images have demonstrated that elevating the different of calcination temperature from 500 °C to 650 °C has resulted in an increase average nanoparticle size from 12 nm to 19 nm. Fourier Transform Infrared Spectroscopy (FT-IR) has been used to describe compounds of the samples prepared before and after calcination.

Keyword: Calcination; Polyvinyl pyrrolidine; Manganese–Zinc Ferrite nanoparticle