Short Communication

Electromagnetic properties of nanocrystalline Mn-Zn ferrite synthesized from spent Zn-C battery via Egg-white route

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Nanocrystalline $\text{Mn}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$ was successfully synthesized via egg-white auto-combustion route using waste Zn-C batteries as raw materials. The objective of this recycling process is to turn the contents of these waste batteries into valuable magnetic products, which realizes both environmental and economic benefits. Differential thermal analysis-thermogravimetry (DTA-TG) measurements were used to characterize the auto-combustion route and ferrite formation. X-ray diffraction (XRD), Fourier transform infrared (FT-IR), transmission electron microscopy (TEM) techniques were used to characterize the produced ferrite. The obtained weak magnetic properties measured via vibrating sample magnetometer (VSM) indicated the effect of the entire egg-white fuel on the combustion process and ferrite formation. Ac-conductivity measurements indicated semiconducting properties with transition at about 555 K attributed to change in the magnetic characterization from ferro- to paramagnetic one. The dielectric measurements as a function of frequency and temperature showed a gradual decrease with increasing frequency, which considered as a normal behavior of all ferrites.

Keywords: Mn-Zn ferrite, Egg-white, auto-combustion, ac-conductivity, dielectric.

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