

Sintering temperature dependence on evolving microstructure and magnetic characteristics of cobalt ferrites

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ABSTRACT

This paper focuses on the effect of sintering temperature on the structural, microstructural and magnetic properties of cobalt ferrite (CF). CF with sintering temperatures of 600 °C to 1400 °C, was synthesized using the oxide mixture route technique. The structural and microstructural development of the samples were investigated using X-Ray Diffractometer, Transmission Electron Microscope and Scanning Electron Microscope, while the magnetic dynamic properties of the samples were analyzed using Impedance/ Material Analyzer over 1 MHz to 1 GHz. The results show that the complex permeability which include the real permeability and loss factor of the samples at 10 MHz have shown an increase in their values through increasing the sintering temperature. As sintering temperature acted as a temporary agent for structural and microstructural development, the improvement of crystallization and microstructure by heat treatment, contributed to a single CF phase formation and grain growth, resulting in the removal of porosity and microstrain in the samples. This in turn enhanced the superexchange interactions between magnetic moments via elimination of domain wall pinning point, thus contributes to the improvement of magnetic characteristics of the samples.

KEYWORDS

Cobalt ferrite; Crystallization; Magnetic permeability; Microstructure

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