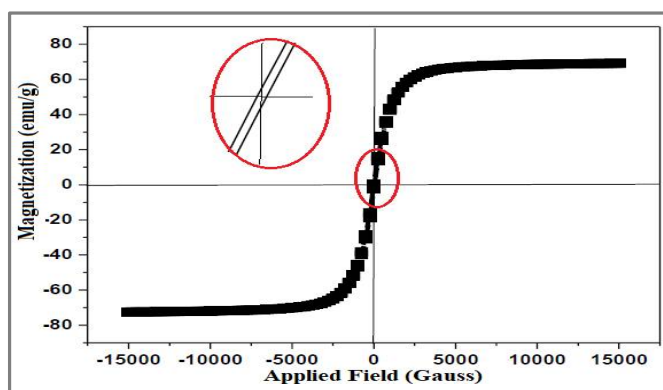


**Investigation of the Structure, Thermal and Magnetic Properties of  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  Ferrite Material****Manyazewal Kebede Woldemedhin\***Department of Physics, College of Natural Science, Arba Minch University,  
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Email: [manukebede@gmail.com](mailto:manukebede@gmail.com)Accepted on 16<sup>th</sup> January, 2019**ABSTRACT**

Spinel cubic  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  magnetic material was synthesized by two steps solid state reaction method. The thermogravimetric analysis-differential thermal analysis (TGA/DTA), x-ray powder diffraction (XRD) and vibrational sample magnetometer (VSM) characterization techniques were utilized to investigate the thermal, structural and magnetic properties of  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  sample. Analysis of TGA-DTA confirmed that 900 °C is the appropriate temperature for synthesizing  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  sample using CuO, ZnO and  $\text{Fe}_2\text{O}_3$  as precursors. From the structural analysis by XRD, it was found that the synthesized sample exhibited single phase with cubic spinel structure having space group of Fd-3m. The lattice parameter and crystal size of  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  sample were found to be 8.428 Å and 38.54 nm, respectively. Different structural parameters such as x-ray density, bulk density, porosity, particle size, hopping lengths in both tetrahedral and octahedral sites, etc. were estimated from XRD data. The magnetic characterization was conducted at room temperature and found that  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  sample exhibited a ferromagnetic behavior with a saturation magnetization of 66.7 emu g<sup>-1</sup>. From the obtained hysteresis loop, the remnant magnetization (Mr) and coercivity (Hc) of  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  sample were estimated and are found to 16.5 emu g<sup>-1</sup> and 45 Gauss, respectively, indicating that  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  is a soft magnetic material.

**Graphical Abstract**The room temperature magnetic hysteresis loop of  $\text{Cu}_{0.8}\text{Zn}_{0.2}\text{Fe}_2\text{O}_4$  ferrite.**Keywords:** Characterization, Solid state reaction method, Thermal property, Magnetic property.