

The effect of induced magnetic anisotropy on the hysteresis parameter of nano barium strontium hexaferrite prepared by mechanical alloying and sonication

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Abstrak

In this research, analysis of the magnetic properties of the nanoscale ferromagnetic material barium strontium hexaferrite with the composition of $\text{Ba}(0.7)\text{Sr}(0.3)\text{O}_6(\text{Fe}_2\text{O}_3)$ or written as B7S3HF is conducted. The material was prepared by the ball mill method, followed by reducing the particle sizes of the material to reach a result in nanometers with a high pressure ultrasonic for 12 hours. In the compacting process, a parameter was given from the outside of the 50 mT magnetic field to determine the cause of the anisotropy phenomenon of the material. To identify the phase of material, changes in the magnetic properties and measurement of the Particle Size of the B7S3HF material were taken. The equipment used was X-Ray Diffraction (XRD), Permagraph (an automatic computer-controlled measuring system) and Particle Size Analyzer (PSA). The results of XRD were seen in their influence against the Buffered Hydrofluoric (BHF) acid, which were caused by the effects of the Strontium (Sr) substitution and by increasing the size of the material volume. Changes in the magnetic properties of the B7S3HF material, due to an induced magnetic field from the outside, were caused in contrast with the remanent value ranging from 0.18 T up to 0.249 T, respectively. This process did not occur, since the coersivity value was fixed at 275.54 kAm⁻¹. Changes in the value of the remanent material rose by 0.069 T or (6.9%). This phenomenon shows the anisotropy influence in the B7S3HF material in an external magnetic induction of 50 mT. The results of the ultrasonic measurements were performed using Particle Size Analyzer (PSA) equipment, which gained a 43.5 nm particle size.