Synthesis and magnetic characterization of mn-ti substituted sro.6fe2-xmnx/2tix/2o3 (x = 0.0–1.0) nanoparticles by combined destruction process

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Abstrak

Single phased SrO.6Fe2-xMnx/2Tix/2O3 (x = 0.0; 0.5; and 1.0) nanoparticles, whose mean size was comparable with the crystallite size, were successfully fabricated through mechanical alloying and a subsequent ultrasonic destruction processes. The ultrasonic destruction process employed a transducer operated under amplitudes of 35, 45, and 55 ?m. Results indicated that the mean particle size was not determined by the transducer amplitude, but the mechanical properties of the materials, as well as the initial size of the particles. After ultrasonic destruction, the mean sizes of the particles decreased to the range of 87–194 nm with a narrow distribution width. The mean particle sizes were about 1 to 3 times larger than the respective crystallite sizes. Such fine particles were aimed to decrease the coercivity, as was seen in the sample with x = 0, which showed a decrease in coercivity from 474 kA.m-1 to 24 kA.m-1 and 15 kA.m-1. A further reduction in the coercivity was observed in Mn-Ti substituted strontium hexaferrite.