

Synthesis of nanocrystalline Ni-ferrite as superparamagnetic materials

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The synthesis and magnetic structure characterizations of spinel metastable nano-ferrites have been investigated in recent years as a great interest[1-3]. Nanocrystalline NiFe_2O_4 with crystallite size 10nm was synthesized by coprecipitation method at pH=10 and treated in hydrothermal vessel at 140°C for 18 h. The BET surface area of synthesized nanocrystalline NiFe_2O_4 was 133.9 m^2/g with single phase of spinel ferrite. The magnetization measured at room temperature under applied field of 10 kOe was about 38 emu/g and superparamagnetic behavior was exhibited as shown in Fig. 1. The observed superparamagnetic relaxation of NiFe_2O_4 was accompanied by the reduction of crystallite size 10 nm or less with good crystallinity which was determined from XRD analysis and estimated from FE-SEM observation. The Mössbauer spectra of nanocrystalline NiFe_2O_4 taken at room temperature consisted of broadened sextets with unresolved A and B site subspectra. In order to analyze the complex magnetic structure with temperature the low-temperature Mössbauer spectroscopy were found to be necessary.

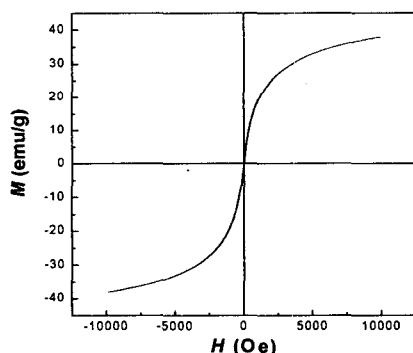


Fig. 1. Hysteresis loop of nanocrystalline NiFe_2O_4 .

References

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