MAGNETIZATION STUDY OF LI-ZN FERRITE SYNTHESIZED BY AN ELECTRON BEAM*

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In this work, the magnetization of lithium-zinc ferrite synthesized under the conditions of electron beam heating of a powdered and compacted Fe_2O_3-Li_2CO_3-ZnO mixture was studied. For the synthesis of samples, an ILU-6 pulsed electron accelerator located at the Budker Institute of Nuclear Physics of Siberian Branch Russian Academy of Sciences was used [1]. The samples were heated by a 2.4 MeV high-energy electrons beam to synthesis temperatures of 600, 700, 750 °C and kept at these temperatures for up to 120 minutes. To establish the radiation effects arising during electron beam synthesis, another part of samples was obtained using traditional thermal annealing in a laboratory furnace under the same conditions.

The magnetization of the synthesized ferrite was studied in two ways, including measurements of the specific saturation magnetization (σ_S) using a magnetometer and thermomagnetometric measurements using a thermal analyzer. The latter, based on thermogravimetry in a magnetic field, makes it possible to analyze magnetic phase transitions in samples and determine their Curie temperature [2]. The data obtained from the results of measuring the specific magnetization of the samples are shown in Fig. 1.

a **b**

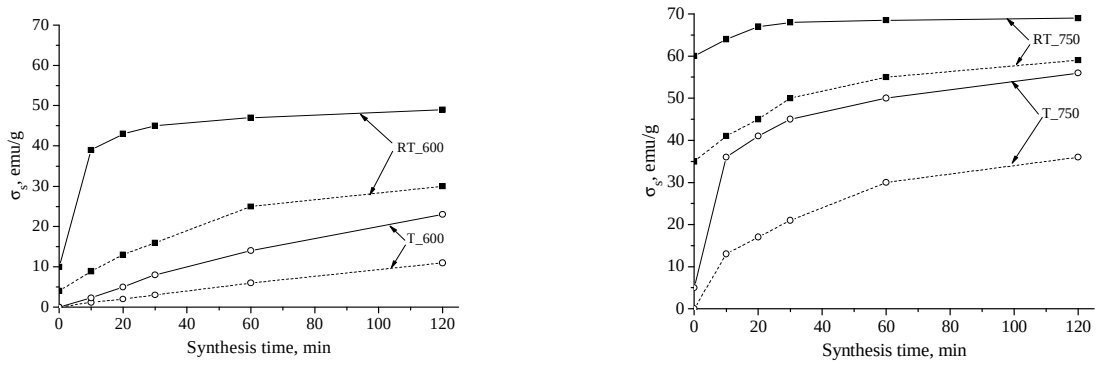

Fig. 1. Kinetic dependences of the specific magnetization of Li-Zi ferrite synthesized using an electron beam (RT) and thermal annealing (T) at a synthesis temperature of 600 (a) and 750 (b) °C: lines - compacted samples; dotted lines - powdered samples

The results obtained showed that the specific magnetization in the RT-synthesized samples significantly exceed the values of σ_S in the samples obtained by thermal annealing at the same temperature and time of synthesis. The results also revealed a higher degree of specific magnetization of compacted samples compared to powdered samples, which indicates a higher content of the spinel magnetic phase in the synthesized compacts.

Thus, it was found that the ferrite formation rate depends both on the heating method and on the density of the mixture. The specific magnetization for sample obtained from compacted mixture and RT-synthesized at 750 °C for 120 min is close to the nominal values of σ_S for Li-Zi ferrites, which indicates high content of ferrite in the synthesized samples.

Thus, measurements of the specific magnetization revealed the radiation effect of the accelerated formation of spinel magnetic phases during heating of ferrite mixtures by a beam of high-energy electrons. This conclusion is confirmed by thermomagnetometric and XRD data [3].

REFERENCES

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