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Abstract

The polycrystalline $ErMnO_3$ with a hexagonal structure, synthesized by ceramic technology, and its derivative samples obtained by mechanical activation were studied by high-temperature X-ray diffraction analysis and magnetometry. It has been found that the phase transition from the polar *$P6_3cm$* structural modification to the centrosymmetric *$P6_3/mmc$* proceeds in $ErMnO_3$ in two stages (at 650°C and 1150°C). Grain growth kinetics in mechanically activated $ErMnO_3$ samples was studied; the activation energy values were determined. The magnetic phase transitions, corresponding to the antiferromagnetic ordering, were detected for all samples. The Neel point was found to decrease from 75 to 62 K with decreasing grain size from ~300 to ~50 nm. It was found that the electronic structure of the materials does not change noticeably upon mechanical activation. The observed lowering of the Neel temperatures in the mechanically activated samples was accounted for by multiple lattice distortions.

Keywords: rare earth alloys and compounds, nanostructured materials, mechanochemical processing, phase transitions, magnetization