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Effect of annealing temperature on the phase state of perovskite systems based on Fe3O4 and CeO2

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Introduction. One of the important problems of modern material is the development of new materials with desired properties. Oxide compounds with structural-perovskite properties as a new material with multiple physicochemical properties. Among perovskite systems, materials with dielectric, magnetic, and conductive properties are most often used, which can be used not only in engineering, but also in modern energy. The variety of perovskite compounds is due to the great flexibility. Currently, compounds in the structural composition of ABO3 are well studied, however, the creation of materials in practice differs significantly from the ideal structural perovskite. Variants of defects, which can be fossilized when cations are replaced by crystal structures, make it possible to obtain unique properties that allow the use of perovskites of oxide compounds in various areas. Thus, the study of perovskite systems with different composition and methods of modification.

Materials and methods. The paper presents the results of studies of changes in the structure of the perovskite system based on Fe3O4 and CeO2 on the annealing temperature. After mechanical grinding of metal powders in the proportions 1: 1, 1: 2, 2: 1, 1: 3 and 3: 1, thermal separation was carried out in the temperature range of 600℃, 800℃, 1000℃ for 5 hours. In a muffle Nubertherm LE / 11 / r6 furnaces.

Summary

Based on the data obtained, the X-ray diffraction, SEM, and EDA methods were established depending on changes in crystallographic and marphological characteristics of the annealing temperature. It is established that as a result, stable phases appear in the phase of Fe2O3 and CeFeO3. This indicates that there is an increase in temperature, Ce and Fe, and an increase in the O2 concentration. In addition, the size of Fe3O4 increases, the size of grain boundaries increases, as evidenced by micrographs with a scanning electron microscope. Micrographs of morphology are presented, in which the results of various concentrations, selected at high temperatures, are obtained.

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