The Reference Object Identifier – ROI: jbc-01/20-63-7-79
The Digital Object Identifier – DOI: 10.37952/ROI-jbc-01/20-63-7-79
Submitted on July 22, 2020.

Study of structural characteristics of the FePt nanosystem by TEM

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Keywords: transmission electron microscopy, TEM, XRD, cell parameters, crystal lattice, FePt, nanoparticles.

Abstract

In this work, using the example of a bimetallic nanoscale system FePt, a new approach to the assessment of the structural parameters of nanoscale mono- and polymetallic systems by transmission electron microscopy (TEM) is proposed. The data obtained by the TEM method are compared with the data obtained by the method of X-ray structural analysis. Some crystallographic parameters, such as the interplanar distances, average sizes, and phase compositions of the studied nanoparticles of the FePt system are calculated.

The most widespread method for obtaining information about the crystal structure of nanosized particles is the method based on the phenomenon of X-ray diffraction. It allows one to determine the phase composition and perform structural analysis of a substance, as well as to estimate the size of the resulting particles. In this method, crystallographic information arises due to X-ray diffraction from the entire surface of the powder. Thus, the researcher sees an integral diffraction pattern. In this case, the study of individual nanoparticles by X-ray structural analysis is extremely difficult.

However, the number of methods for assessing structural parameters is not limited to X-ray diffraction methods. In this work, an approach is made to study the structural characteristics of FePt nanoparticles by transmission electron microscopy (TEM), since high-resolution microimages obtained by the TEM method provide a unique opportunity to distinguish individual atoms of the crystal lattice of the objects under study.

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