

Nanocomposites and nanomaterials

The Study of the Influence of Contact Non-Equilibrium Plasma on the Nickel Ferrite Formation

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One of the promising directions in materials science is the creation of nanostructured magnetic materials. Nanostructured ceramics is assumed to have a complex of new properties in comparison with their macro-dimensional analogues. Such materials are especially promising in electronic engineering.

At present, the hydrophase method is one of the most modern and technologically advanced for obtaining ferrites. There are problems in obtaining ferrite with certain technological properties. They include obtaining a given phase, granulometric composition determining its technical characteristics. In this work, nickel ferrite has been obtained by precipitation in the ferrous sulphate solution by sodium hydroxide under the action of contact non-equilibrium plasma (CNP). The methods of potentiometric titration, measurement of residual concentrations, electrical conductivity and apparent height of the sediment have been used to study the mechanism of its formation. These methods make it possible to establish the conditions for the compounds formation if the main factors are the ratio of reagents, acidity of the medium and the CNP effect. Electron microscopy has been used to estimate the average particle size. Identification of the products obtained has been carried out by X-ray phase analysis. The pH value and the redox potential have been measured with an I135M1 ionometre. The following conditions have been accepted for the study: concentration of FeSO_4 - 0.5 mol / l, NiSO_4 - 0.5 mol / l concentration of NaOH - 1.5 mol / l, temperature - 25 ° C, pH 6-12. The laboratory installation described in detail in previous works has been used. The processing time of the CNP has been constant. The conducted study has shown that the phase composition of the product obtained depends to a large extent on the initial pH of the solution. With an increase in pH from 6 to 12 and the same synthesis parameters, such a sequence of phase formation has been recorded: - polyhydroxocomplexes - oxyhydroxides - hydroferrite. When the CNP used, the saturation magnetization value increases.

1. Safari A., Gheisari K., Farbod M. Characterization of Ni ferrites powders prepared by plasma arc discharge process //Journal of Magnetism and Magnetic Materials.- 2017.- 421,-P. 44-51.