

- **Nanocomposites and nanomaterials**

Peculiarities of cobalt ferrite nanopowders synthesis with using contact nonequilibrium plasma

L.A. Frolova, A.I. Kushnerev, Yu. D. Galivets, E.G. Tsepich

¹ *Department of Inorganic Materials Technology and Ecology, Ukrainian State Chemical Technology University. Prospect Gagarina, 8, Dnepropetrovsk-49005, Ukraine.*

E-mail: frolova_la@mail.ru

² *Department of Experimental and Metal Physics, Dnipropetrovsk national university Oles Honchar. Naukova Street, 9, Dnipropetrovsk-49010, Ukraine.*

Nowadays a lot of attention is paid to the development of nanotechnology, nanoformation processes. Among the most promising methods of using electrical discharges, there's one based on contact nonequilibrium plasma (CNP) of reduced pressure contact influence on the disperse environment.

Numerous studies have shown that aqueous solutions non-equilibrium plasma treatment causes oxidation and reduction of solution components. Thus, metal ions oxidize and form insoluble or sparingly soluble compounds. The aim of this work was to study the effect of CNP on the structure and magnetic properties cobalt ferrite. To carry out the task samples were synthesized under different conditions: the ratio of cations cobalt and iron, pH, reaction time, parameters glow discharge. Synthesis conditions were varied so that it was possible to find the mechanism of glow discharge ferritization effect.

Structural identification of the samples was carried out using the method of differential thermal analysis (DTA) and differential thermogravimetric analysis (DTGA), X-ray diffraction, Fourier transform infrared spectroscopy, Scanning electron microscopy. Vibrating sample magnetometer was used for the magnetic investigation of the samples. Magnetic properties of nanoparticles show strong dependence on the phase composition. The magnetic properties increase with pH of the precipitating medium. The coercivity also increases with increasing pH, goes through a maximum, peaking at around 11,5.

1. *Yamamoto S. Fabrication of high permeability ferrite by spark plasma sintering method. / S.Yamamoto, S.Horie, N. Tanamachi, H. Kurisu and M. Matsuura // J. Magn. Mater. – 2001. – 235. – P. 218-222.*