PLASMODYNAMIC SYNTHESIS OF POWDERED FERRUM OXIDE WITH A HIGH CONTENT OF ε-FE_2O_3[1]

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Previously in the article [1] the possibility of plasmodynamic synthesis and preparation of heterophase ultrafine powder containing metastable crystalline phase of iron oxide in the nanodispersed state was shown. The unique feature of this structure is the appearance of the natural resonance at frequencies of the order of 0.1 THz.

In the development of this area an experimental study on the plasma dynamic synthesis and production of iron oxides was carried out. The synthesis process is realized in the hyper speed iron-erosion plasma jet flowing into the chamber filled with a gaseous atmosphere containing the mixture of oxygen with nitrogen or argon. The synthesized product was analyzed using X-ray diffractometry method (Shimadzu XRD 7000S diffractometer). It was found that the product consists of several crystalline phases such as magnetite **Fe_3O_4,** hematite **α-Fe_2O_3** and **ε-Fe_2O_3**. The mass fraction of **ε-Fe_2O_3** increases to 50% when the content of oxygen O_2 in the gas mixture is increased up to 80% at normal pressure and room temperature. It is known [2] that the metastable phase **ε-Fe_2O_3** exists in nanodispersed condition. In the resulting product the average size of coherent scattering regions is about 0.4 nm at the level of internal microdistortions about $\Delta d / d = 0.4 \cdot 10^{-3}$. Using magnetometer it was found the occurrence of natural resonance and absorption of electromagnetic radiation at a frequency of about 125 GHz, which is comparable with the known data.

REFERENCES

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