

Hyperfine interactions for a number of nuclides in ferrites with a spinel structure

The poster report is devoted to the investigation of hyperfine interaction between the doping elements and the sample matrix (ferrospinel) by perturbed angular $\gamma\gamma$ -correlations ($\gamma\gamma$ -PAC).

Ferrospinel are compounds obtained from magnetite with the empirical formula MeFe_2O_4 and having a cubic face-centered lattice. Depending on the composition and the properties the ferrospinel have a wide range of applications. Ferrospinel with pronounced magnetic properties can be used for radio frequency transformers, magnetic recording devices, power supplies, and also possess good photocatalytic and sorption properties.

The $\gamma\gamma$ -PAC method is based on the implanting of a radioactive isotope into the sample (the probe nuclei are ^{44}Ti , ^{111}In , ^{140}La , ^{172}Lu), the decay of which is accompanied by emission of cascade γ -quanta. The angular distribution of the emitted cascade γ quanta provides information on the hyperfine fields (magnetic and electric) with which the sample affects the embedded nuclei.

The samples were also studied by Mossbauer spectroscopy, which consists in the absorption by the sample of the γ radiation emitted by the source. Mossbauer spectroscopy proves the ferromagnetic structure of ferrospinel with two positions of iron - tetrahedral and octahedral.

Samples were synthesized by the co-precipitation method. The isotopes used (^{44}Ti , ^{111}In , ^{140}La , ^{172}Lu) were obtained by irradiated targets (Cu, Sb, Ta) with protons on the LNP Phasotron of JINR and separated by ion exchange chromatography.

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