Contribution ID: **127** Type: **Poster**

Change in microhardness of iron-copper nanocomposites depending on the content of multi-walled carbon nanotubes

Friday, 17 November 2023 15:00 (5 minutes)

The use of mechanochemical activation of metal powders and their mixtures in planetary mills opens wide prospects for the creation of new nanocomposite materials. Mechanochemical synthesis provides the possibility of obtaining a uniform distribution of the dispersed phase, of expanding the solubility limits of elements, of reducing the grain size to the nanoscale, and of obtaining new crystalline and quasi-crystalline phases. The paper investigated the dependence of the microhardness of samples of iron, copper (Fe-Cu) and iron, copper with multi-walled carbon nanotubes on the time of processing in a planetary ball mill and the influence of multi-walled carbon nanotubes on the microhardness of nanocomposites Fe-Cu with multi-walled carbon nanotubes. Microhardness in the work was studied on the multifunctional device “Micron-Gamma” by the method of continuous indentation. A detailed study of the dependence of the microhardness of Fe-Cu (4:1) and Fe-Cu (6:1) nanocomposite materials on the processing time in a planetary ball mill (20 min, 60 min, 120 min) was carried out at loads of 20, 50 and 100 grams. It has been established that the mechanochemical activation of a mixture of Fe and Cu powders in a planetary mill and their interaction, which changes the dispersion, morphology, and phase composition of the processed particles, open the prospects for the creation of composite materials with fundamentally new physical and mechanical characteristics necessary for the use of these nanocomposites as structural materials in instrument building and the aerospace industry.

Topics

Session A. Physics of condensed matter and spectroscopy

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Session Classification: Poster session