

Nanocomposites and nanomaterials

The phase content of highly dispersed particles in Cu-Mn-Al Heusler alloy and its influence on magnetic ordering and NMR spectra

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The powders of Cu-13,1%Mn-12,6%Al (mass.%) composition obtained by electrical spark dispersion from the bulk alloy [1] were investigated by X-ray structural phase analysis and nuclear magnetic resonance (NMR) method. The presence of ordered ferromagnetic phase Cu₂MnAl and copper, aluminium and manganese oxides was detected. The structural elements of these phases were nanosized particles (30-90 nm). The analysis of NMR ²⁷Al and ⁶³Cu signals configuration has shown that superfine magnetic field on nuclei of Al and Cu atoms resulted in Zeeman splitting of NMR signals was exerted due to ferromagnetism of Cu₂MnAl phase. X-Ray and NMR investigations of Cu-13,1%Mn-12,6%Al nanopowders after chemical etching demonstrated that their metallic nanoparticles were coated with metal oxides. This yielded electro-transport properties of powders different to those of cast alloy of identical composition.

1. Nadutov V. M., Perekos A. O., Kokorin V. V., Konoplyuk S. M., Yefimova T. V., Zalutskiy V. P. Effect of Electric-Spark Dispergation on Magnetic and Electrical-Transport Properties of Heusler Cu-Mn-Al Alloy// Metallofiz. Noveishie Tekhno.-2014.-**36**, №12.-P. 1679-1694.