

Magnetoresistance Of Granular Cu-Co Alloys Prepared In The Form Of The Glass-covered Microwires

M. Ilyn¹, A. Granovsky², V. Zhukova¹, J. Gonzalez¹ and A. Zhukov¹

¹Department of Materials Physics, University of Basque Country UPV/EHU, 20080 Plaza Europa 1, San Sebastian, Spain

²Department of Physics, Moscow State University, 119992 GSP-1 Leninskye Gory, Moscow, Russia
maxim.ilin@ehu.es

Heterogeneous metallic systems consisted of magnetic nanoparticles embedded in the non-magnetic metallic matrixes were found to possess large magnetoresistance [1]. One of the techniques suitable for producing of such systems is an activation of heating-induced precipitation in the supersaturated non-equilibrium alloys of immiscible elements. Cu-Co, Cu-Fe, Ag-Co, Fe-Ni-Ag systems prepared using different methods like a co-sputtering, co-evaporation, mechanical alloying and melt-spinning followed by annealing have been already investigated [2].

Rather distinct magnetoresistance behavior has been found in granular Cu₉₀Co₁₀ alloy prepared in the form of the glass-covered microwires with various geometric parameters [3]. The reason for this difference is probably concerned with incomplete precipitation of Co during the preparation of the microwires.

This work is aimed to check the variation of the magnetoresistance in the Cu-Co glass-covered microwires with the stoichiometry and geometric parameters. Glass-covered microwires with metallic thread made of Cu_{1-x}Co_x (5<x<30) granular alloys and different diameters of the metallic cores and glass layers have been manufactured. Magnetization and magnetoresistance have been measured in the range of temperatures from 5 to 305 K and magnetic fields up to 5 T. Except the common negative magnetoresistance originated from the spin-dependent scattering, positive magnetoresistance have been observed in moderate fields in the samples with highest concentration of Co (Fig 1, 2). In the samples with the lowest concentration of Co field dependent growth of resistivity with cooling below certain characteristic temperature was observed.

References

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Figures

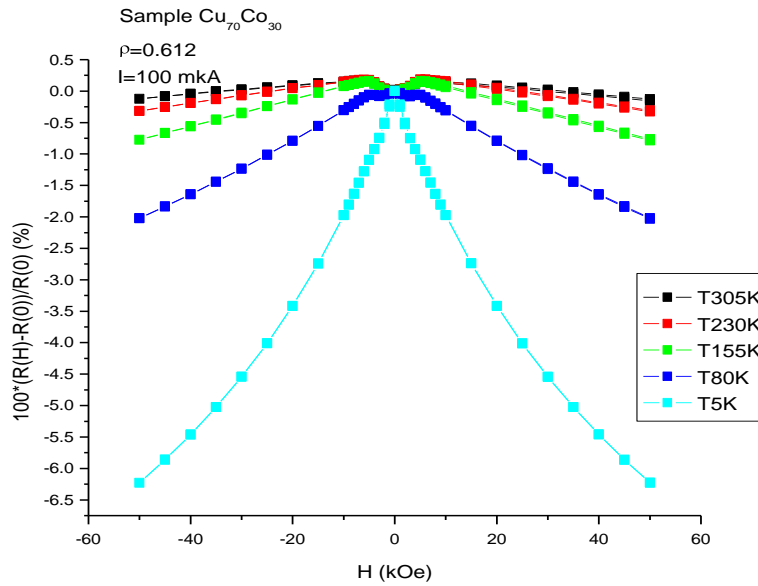


Fig. 1 Magnetoresistance of the sample with the highest in the series content of Co

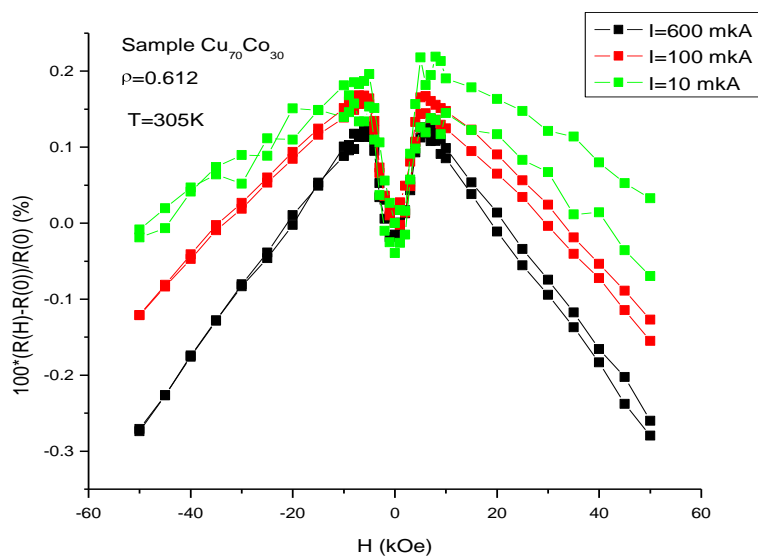


Fig. 2 Pronounced positive magnetoresistance easily seen in moderate fields