

Conductance quantization in melt-spun $\text{Co}_x\text{Cu}_{100-x}$ and $\text{Co}_x\text{Ag}_{100-x}$ alloys

M. Szorc¹, M. Nowicki², M. Wawrzyniak³, B. Susła², B. Idzikowski¹

¹*Institute of Molecular Physics, Polish Academy of Sciences, M. Smoluchowskiego 17,
60-179 Poznań, Poland*

²*Institute of Physics, Poznań University of Technology, Nieszawska 13a,
60-965 Poznań, Poland*

³*Faculty of Electronics and Telecommunications, Poznań University of Technology,
Piotrowo 3, 60-965 Poznań, Poland*

An interesting quantum effects occurs in nanowires with quantum point contact (QPC). We present experimental results on the electrical conductance quantization in $\text{Co}_x\text{Cu}_{100-x}$ and $\text{Co}_x\text{Ag}_{100-x}$ ($x = 0, 1, 10$) nanowires produced dynamically using piezoelectric actuator. The conductance stepwise behaviour has been directly observed with a storage oscilloscope and presented in conductance curves. For all nanowires, traces show more or less pronounced plateaus. The histograms of conductance were collected from a large number of consecutive conductance curves measured at room temperature without external magnetic field. For the nanowires with ferromagnetic Co, histograms show peaks at nG_0 , with non-integer n . A description of the conductance quantization phenomena is presented in terms of the Landauer formalism. The quantum properties of conducting nanowires are determined by the nature of atomic structure and we discuss the results in the context of related physical developments. In this paper we also present surface images of our samples investigated by atomic force and scanning tunneling microscopy.