Microwave absorption and Magnetization of $(Tl_{0.5}Pb_{0.5})Sr_2(Ca_{0.8}Gd_{0.2})Cu_2O_z$ Superconductor

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The bulk $(Tl_{0.5}Pb_{0.5})Sr_2(Ca_{1-x}Gd_x)Cu_2O_z$ superconductors with x = 0.1, 0.2 and 0.3 were prepared by a wet chemical gel technique followed by a special heat-treatment procedure. X-ray diffraction analysis yielded practically phase pure samples with tetragonal structure (space group P/4mmm). Some very interesting magnetic and electrical properties of the bulk $(Tl_{0.5}Pb_{0.5})Sr_2(Ca_{1-x}Gd_x)Cu_2O_z$ superconductors with x = 0.1, 0.2 and 0.3 were published in our previous papers [1].

In this paper we have focused our attention on the superconductor with content of the gadolinium atom x=0.2. The critical temperature of this sample is T_c=105.3 K and the transition width $\Delta T_{90\%-10\%}$=3.6 K. The critical current of this superconductors is J_c = 1 824 (A/cm^2) at 77 K. We have measured the microwave absorption as well as the magnetization at the low applied magnetic field. From the virgin magnetically modulated microwave absorption (MMMA) curves the low field maximum (LFM) was obtained. The loops of the MMMA were also measured and the selected curve is shown in figure 1. From the virgin curve of the magnetization measurement the full penetration field was determined. The magnetization as a function of the angle between direction of the applied magnetic field and surface of the sample was also measured. The theoretical models were used to fit the experimental data.

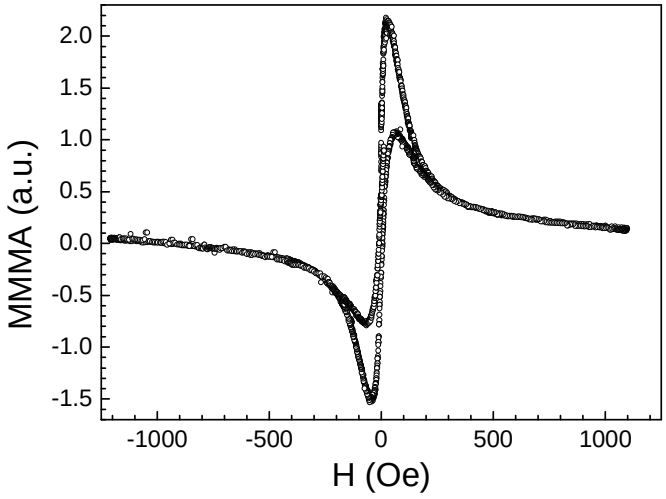

Fig. 1. The loop of MMMA of bulk $(Tl_{0.5}Pb_{0.5})Sr_2(Ca_{0.8}Gd_{0.2})Cu_2O_z$ superconductor at 77 K.

1. W.M. Woch, R. Zalecki, A. Kołodziejczyk, H. Sudra, G. Gritzner, *Supercond. Sci. Technol*. **21** (2008) 085002. W.M. Woch, R. Zalecki, A. Kołodziejczyk, H. Sudra, G. Gritzner, *Materials Science- Poland*, **26** (2008) 1091.