Influence of Different Proportions of Tin on the Properties of an Amorphous Fe(Co)-Sn-B System

Daniel George Grey[1, a)], and Marcel Bruno Miglierini[1, 2]

[1)] *Institute of Nuclear and Physical Engineering, Faculty of Electrical Engineering and Information Technology, Slovak University of Technology, Ilkovičova 3, 841 04 Bratislava , Slovakia*
[2)] *Department of Nuclear Reactors, Faculty of Nuclear Science and Physical Engineering, Czech Technical University in Prague, V Holešovičkách 2, 180 00 Prague, Czech Republic*

[a)] Corresponding author: daniel.grey@stuba.sk

Abstract. Tin Mössbauer spectrometry was employed to examine metallic glasses, specifically $Fe_{81}B_{12}Sn_7$ and $Fe_{83}B_{12}Sn_5$ fabricated using the planar-flow casting technique into an amorphous substance. The investigation encompassed the as-quenched state and also samples in which 25 % of iron was replaced by cobalt. This study explores the impact of slight variations in tin and iron content on the resultant microstructure. Tin Mössbauer spectrometry is a method that is not used that often, especially on alloys already containing iron., However, it can tell us more about the commonality of tin magnetization and about the extension of the magnetization of boron in this alloy. The findings reveal an interesting interaction between Co and Sn that causes a much larger increase in hyperfine magnetic field at ^{119}Sn resonant nuclei. Increasing the proportion of tin in comparison to iron in the alloy causes a reduction of the hyperfine magnetic fields at both Fe and Sn probe atoms.

ACKNOWLEDGMENTS

This work was supported by the grant VEGA 1/0010/24, by the European Regional Development Fund-Project "Centre for Advanced Applied Sciences", grant number CZ.02.1.01/0.0/0.0/16_019/0000778, and by the VR-1 Nuclear Experimental Hub project no. LM2023073. We are grateful to Dr. P. Švec from the Institute of Physics, Slovak Academy of Sciences in Bratislava for providing us with the samples of metallic glasses and to Dr. T, Kmječ from the Charles University, Prague for his help with the ^{119}Sn Mössbauer effect experiments.