The influence of Nb atoms on the crystallization process of Fe-B-Nb amorphous alloys

R. Babilas[1] and M. Kądziołka-Gaweł[2]

[1] *Institute of Engineering Materials and Biomaterials, Silesian University of Technology, Konarskiego 18a, 44-100 Gliwice, Poland*

[2] *Institute of Physics, University of Silesia, Uniwersytecka 4, 40-007 Katowice, Poland*

The ferromagnetic Fe-based amorphous alloys have been studied due to the attractive properties for soft magnetic applications. Depending on different Nb concentration, we studied the formation of crystalline phases in annealed samples of amorphous metallic alloys for $Fe_{80-x}B_{20}Nb_x$ (x = 0, 4, 10). The nature of the crystallization products as well as the phase structure was determined using Mössbauer Spectroscopy combined with XRD and DSC results. Substitution of Fe atoms by Nb lead to significant changes in hyperfine magnetic field (B_{hf}) distributions in as-quenched amorphous alloys $Fe_{80-x}B_{20}Nb_x$, for x = 10 the minimal value of B_{hf} is observed. Addition of this element causes shift of crystallization process towards higher temperatures and induces formation of phase complex including the α-Fe, Fe_2B and Fe_3B. Combination of X-ray diffraction and Mössbauer Spectroscopy is very useful method in studying the structural environment of Fe atoms on a nearest-neighbor length scale.