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

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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\textsubscript{80−x}B\textsubscript{20}Nb\textsubscript{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\textsubscript{hf}) distributions in as-quenched amorphous alloys Fe\textsubscript{80−x}B\textsubscript{20}Nb\textsubscript{x}, for x = 10 the minimal value of B\textsubscript{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\textsubscript{2}B and Fe\textsubscript{3}B. 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.