

MICROSTRUCTURAL STUDY OF THE MECHANICALLY ALLOYED AMORPHOUS Fe-8Nb-30B POWDER MIXTURES

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Abstract : In the metallurgical process of mechanical alloying (MA), powder particles are subjected to severe mechanical deformation from collisions with steel balls. High energy milling forces can be obtained by using high frequencies. During the continuous deformation, important microstructural changes such as grain refinement down to the nanometer scale and amorphization occur. Using X-ray diffraction (XRD), structural and microstructural changes of the mechanically alloyed Fe-8Nb-30B powder mixtures were investigated. Different deformation processes were observed. It was found that structural defects such as dislocations, grain boundaries (GB), vacancies and interstitials, play an important role in the nanostructure formation and amorphization processes. As a result, increase in some physical parameters such as dislocation density is similar to that obtained during severe deformation processes.

Keywords : Mechanical Alloying, microstructure, DRX