

볼밀에 의한 금속간화합물의 비정질화 현상  
AMORPHIZATION PHENOMENA OF INTERMETALLIC COMPOUNDS  
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Mechanical milling [MM] of  $Nb_3Sn$ ,  $CoZr$  and  $Ni_3Si$  compounds induce lattice defects such as chemical disordering and grain boundaries of nanometer dimensions. The free energy increases due to chemical disordering and grain boundaries for  $Nb_3Sn$  and  $CoZr$  are sufficient to overcome the free energy differences between the crystalline and amorphous phases, resulting in amorphization. For  $Ni_3Si$ , however, the free energy increase due to chemical disordering and grain boundaries is much smaller than the energy gap between the crystalline and amorphous phases, resulting in the formation of the nanocrystalline phase instead of the amorphous phase. Therefore, the free energy difference between the crystalline and amorphous phase is a critical factor regarding whether the intermetallic compounds can be amorphized by MM. The contribution of the free energy increase by chemical disordering is about 35 % for the above compounds and thus the major contribution comes from grain boundary of the nanocrystallites.