

Synthesis and crystallization of FeSiB nanocrystalline alloy prepared by mechanical alloying

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Abstract:

Structural, microstructural and thermal stability of FeSiB nanopowder alloys prepared by mechanical alloying from elemental powder mixture Fe₇₅Si₁₅B₁₀ were studied as function of milling times. X-ray diffraction results show the formation of Fe₂B after 5 h of milling, and Silicon diffraction peaks disappeared after 50 h of milling. Rietveld refinement of XRD patterns reveals the presence of 74 % Fe(Si, B) solid solution and 26 % Fe₂B boride with crystallite size about 13 nm and 6 nm, respectively. Differential scanning calorimetry (DSC) measurements on FeSiB alloy present an exothermic peak at 580 °C, which is associated to the crystallization of the α-Fe(Si, B) and Fe₂B phases.

Keywords: Nanomaterials; Mechanical alloying; nanopowder; DSC; X-ray diffraction.

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