

HERMAL AND MICROSTRUCTURAL PROPERTIES OF MAGNETOCALORIC (Fe₂₅Mn₇₅)₂P POWDERS

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ABSTRACT. The mechanical alloying process has been used to prepare nanocrystalline (Fe₂₅Mn₇₅)₂P alloy from elemental Fe, Mn and P powders in a high energy planetary ball mill Retsch PM400, under argon atmosphere, using hardened steel vials and balls. Thermal stability, structural, microstructural and morphological changes of the powders were followed by differential scanning calorimetry, X-ray diffraction and scanning electron microscopy. Detailed analysis of the X-ray diffraction pattern was performed by the MAUD program which is based on the Rietveld method. A mixture of bcc Fe(Mn, P) solid solution and hexagonal type-Fe₂P phosphide is obtained after 24 h of milling. The DSC scans revealed the existence of several exothermic peaks related to the structural relaxation, recovery and grain growth. The Curie transition temperature is about 581.25 °C.

KEYWORDS: *Nanocrystalline materials; Mechanical alloying; Fe-Mn-P alloys; X-ray diffraction; DSC.*