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Synthesis and characterization of nanocrystalline Fe₇₅Si₂₅Alloy prepared by high energy ball mill

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Abstract : Mechanical alloying is a powder metallurgy processing technique involving cold welding, fracturing, and rewelding of powder particles in a high energy. It has been used to obtain nanocrystalline alloys. Fe-25wt% Si alloys were synthesized using a planetary ball mill (Retsch PM400). X-ray diffraction was used to identify and characterize various phases during the milling process. It is shown that the FeSi solid solution was formed after 4 hours of milling. The average grain size is about 10 nm. Many nanostructured magnetic materials have exhibited excellent soft magnetic properties, which suit many applications. We used electromagnetic methods and X-ray (like a reference method), to characterize the variation of structure and their influence.

Keywords : Fe-Si powder; Mechanical alloying; nanomaterials ; X-ray Diffraction