

# Structural and magnetic studies of nanocrystalline Fe<sub>80</sub>Ni<sub>20</sub> alloy prepared by high-energy ball milling

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**Abstract:** Mechanical alloying is a powder metallurgy processing technique involving the cold welding, fracturing and rewelding of powder particles in high energy. It has been used to obtain nanocrystalline alloys. Fe-20 wt. % Ni alloys were synthesised using a planetary ball mill (Retsch PM400). X-ray Diffraction (XRD) was used to identify and characterise various phases during the milling process. It is shown that the bcc Fe(Ni) solid solution was formed after 2 h of milling. The steady state grain size is about 12 nm. Many nanostructures' magnetic materials have exhibited excellent soft magnetic properties, which suit so many applications. We used electromagnetic methods (hysteresis) to characterise the variation of the residual magnetisation and the coercive field.

**Keywords :** nanostructure, nanocrystalline alloys, Magnetic Properties, microstructure, high-energy ball milling, mechanical alloying.