

Eddy Current Characterization of $(\text{Fe}_{65}\text{Co}_{35})_x\text{Al}_{1-x}$ Nanocrystalline Alloy Synthesized by Mechanical Alloying Process

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Abstract: An investigation was conducted to explore the applicability of Eddy Current (EC) and magnetic techniques to characterize the formation and grains size variation during Mechanical Alloying (MA) and the formation of a new mixture due to the variation of crystallography parameters. The change in apparent density was attributable to the irregular particles of the metal powders. A series of Nanocrystalline $(\text{Fe}_{65}\text{Co}_{35})_x\text{Al}_{1-x}$ samples have been prepared using M.A based on planetary ball mill under several milling conditions. M.A is a non-equilibrium process for materials synthesis. The structural effects of MA of powders were investigated by X-Ray diffraction analysis, SEM, microwaves, hysteresis magnetic and Eddy Current technique. Consequently, a nanostructure alloy was obtained with an average grain size of 8 nm. Experimental results show that fine nanocrystalline alloy powders prepared by mechanical milling are very promising for microwave applications and it is suggested that Eddy current measurement technique is a useful tool for the characterization of nanocrystalline materials.

Keywords : Eddy Current, Fe-Co-Al Powder, Magnetic Properties, Mechanical Alloying, Microwave