

Structural, Morphological and Magnetic properties of Fe_{60-x}Co_x(Al₂O₃)₄₀ nanocomposite Coating deposited by thermal spraying

FeCo/Al₂O₃ nanoparticles thermal sprayed on a steel plate with different Co concentration from 0 to 20% by means of a thermal spraying process, Fe_{60-x}Co_x(Al₂O₃)₄₀ powder alloy was synthesized using planetary ball mill for different Co concentration at 20 h of milling. The aims of this work are to study the effect of Co concentration and milling time on the magnetic, structural behavior and mechanical properties of the FeCo/Al₂O₃ coating. Appearance of FeCo magnetic Solid solution phase after 20 h of milling, the crystallite sizes reduced from 18nm to 7nm and lattice strains increased from 0.36 % to 0.56 %, this variation are caused by the diffusion of Co atoms in iron lattice. For the coating, various phase of magnetic domains observed on surface by Atomic Force Microscopy (AFM), apparition the new phases, Al₂FeO₄ at 0%, CoAl₂O₄ at 5%, CoFe₂O₄ at 10% and CoFe at 20%. Saturation magnetization is max at 20 wt% of Ni and coercivity is min at 10 wt% of Co. Microhardness and Young module were characterized by Nanoindentation techniques that shows an improvement in mechanical properties

Summary

Topic

1. Applications and interdisciplinary subjects

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