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Effect of milling time on structure, microstructure and hardness of Fe-based nanocomposites synthesized by high-energy ball milling

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Abstract

Iron-based nanocomposites were prepared by high energy ball milling process. Mössbauer spectroscopy was used to investigate the structure and its correlation with micro hardness behavior as a function of milling time. The spectrum obtained after 1 h of milling contains a magnetically split sextet with the hyperfine field Hhf = 33.1T and isomer shift IS = 0.00 mm/s, characteristic of the starting bcc Fe powder. The spectrum recorded after 32 h of milling reveals more advanced alloying. A significant decrease of the intensity of the bcc Fe sextet in favour of the intensity of the paramagnetic doublet was observed at this stage. The doublet seen in the centre of the Mossbauer spectrum was attributed to the paramagnetic solid solution. The microhardness increased gradually with increasing milling time due to grain refinement and solid-solution formation.

Biography

Hacene Hachache PhD Student in the Institute of Aeronautics and Space Studies - Saad Dahleb Blida 01 University. Highly motivated for working in the Nanomaterial field also Nanocomposites.

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