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Effect of milling time on the structure, particle size and morphology of FeCu nanostructures

Abstract:

FeCu alloys at different milling times (1-48 hours) were synthesized using high energy planetary ball mill method. The synthesized nanosized powders were characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM), and vibrating sample magnetometer (VSM) techniques. Results showed that the ball milling causes the overall structural disorder and the particle size reduction. XRD phase analysis results revealed that the Fe₅₀Cu₅₀ alloys was formed with a single FCC phase. The average particle size of the alloys was estimated to be in the range of 12 nm. Moreover, the synthesized Fe₅₀Cu₅₀ alloys exhibited ferromagnetic properties at room temperature with a high saturation magnetization and higher coercivity as compared to the other alloy compositions. Also, the morphology of alloys particle changes from layered to aggregates of almost rounded particles after 48 hours of milling.

Keywords : Crystal structure, Milling, Morphology, Particle size, X-ray diffraction, Magnetic properties

Affiliation de l'auteur principal

Ecole Nationale Supérieure de Technologies Industrielles ANNABA –Algérie

Auteur principal: NAOUAM, BOUDINAR (Ecole Nationale supérieure de technologies industrielles annaba-Algérie)

Co-auteurs: Prof. DJEKOUN, Abdelmalik (Laboratoire de Magnétisme et de Spectroscopie des Solides Université Badji Mokhtar Faculté des sciences B. P : 12 (23000) ANNABA -Algérie); Prof. BOUZABATA, Bouguerra (Laboratoire de Magnétisme et de Spectroscopie des Solides Université Badji Mokhtar Faculté des sciences B. P : 12 (23000) ANNABA -Algérie)

Orateur: NAOUAM, BOUDINAR (Ecole Nationale supérieure de technologies industrielles annaba-Algérie)

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