Abstract Submitted
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Crystallization behavior and recoilless fraction determination of amorphous and nanocrystalline Fe56Co24Nb4B13Si2Cu1 system[1] MONICA SORESCU, JULIA LIMONGELLI, CHRISTOPHER STROH, Duquesne University, KEVIN BYERLY, Spang — Amorphous ferromagnetic alloy with the composition Fe56Co24Nb4B13Si2Cu1 was obtained by rapid quenching from the melt. Samples cut from the ribbons were annealed at 450, 550, 650 and 750 C in a vacuum furnace. 57Fe Mossbauer spectroscopy was used to identify the phases formed based on the refined values of the hyperfine parameters. The as-quenched specimen was analyzed with a hyperfine magnetic field distribution and corresponded to an in-plane orientation of the magnetic moment directions. The sample annealed at 450 C was found to be in a nanocrystalline state due to observation of the (FeCo)-Si alloy with the DO3 structure. The balance of the composition was represented by a metalloid-enriched amorphous grain boundary phase. In contradistinction to this, the samples annealed at 550-750 C were totally crystallized, but the new phases formed were alpha-(FeCo), (FeCo)2(BSi) and (FeCo)3(BSi). The f factor value dropped from 0.6 to 0.37 for the sample annealed at 450 C, consistent with the onset of nanocrystallization in the system. For the completely crystallized specimens, the f factor maintained values close to 0.5. This indicates that the presence of quenched-in stresses may play a role in the ability of samples to undergo recoilless emission and absorption of gamma rays.

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