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Correlation between magnetic softness, sample surface and magnetoimpedance in $Co_{69}Fe_{4.5}X_{1.5}Si_{10}B_{15}$ (X = Ni, Al, Cr) amorphous ribbons A. CHATURVEDI, T. DHAKAL, S. WITANACHCHI, M.H. PHAN, H. SRIKANTH, University of South Florida, A.T. LE, Hanoi University of Technology, Vietnam — In this work we have studied the giant magnetoimpedance (GMI) effect and its field sensitivity (η) in $Co_{69}Fe_{4.5}X_{1.5}Si_{10}B_{15}$ (X = Ni, Al, Cr) amorphous ribbons in the frequency (f) range of 0.1 to 10 MHz. We find that at f $<$ 5 MHz, the GMI effect and η reach the largest values for the Al-containing sample and the smallest values for the Ni-containing sample, while an opposite trend is observed at f $>$ 5 MHz. Magnetization and atomic force microscopy (AFM) experiments reveal that the largest values of the low-frequency GMI effect and η for the Al-containing sample result from the largest value of magnetic permeability, while the largest values of the high-frequency GMI effect and η for the Ni-containing sample are attributed to the smallest surface roughness of this sample. These results point to the importance of the sample surface in determining high-frequency GMI behavior. A correlation between the sample surface and high-frequency GMI is established in the investigated ribbons.

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