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Surface magnetic properties and magnetoimpedance of Co-rich amorphous and nanocrystalline $(Co_{1-x}Fe_x)_{89}Zr_7B_4$ ribbons with oxide layer formed by long-term exposure to air TATIANA EGGERS, Dept. of Physics, Univ. of South Florida, ALEX LEARY, MICHAEL MCHENRY, Materials Science and Engineering, Carnegie-Mellon University, IVAN SKORVANEK, Institute of Experimental Physics, Slovak Academy of Sciences, HARIHARAN SRIKANTH, MANH-HUONG PHAN, Department of Physics, University of South Florida, Tampa — The surface magnetic properties and magnetoimpedance (MI) of amorphous and nanocrystalline $(Co_{1-x}Fe_x)_{89}Zr_7B_4$ melt-spun ribbons with x= 0, 0.025, 0.05 & 0.1 was investigated. A 540C heat treatment for 1 hour under a 2 T transverse field formed a large volume fraction of nanocrystalline phases in the ribbons, in addition to a well-defined transverse anisotropy indicated by x-ray diffraction and magneto-optical Kerr effect microscopy. After the heat treatment, the ribbon samples were exposed to open air for an extended period of time producing a visible oxide layer on the surfaces. High frequency magnetoimpedance measurements in the driving frequency range of 1-1000 MHz were made to characterize the potential impact of the surface oxide layer on the ac magnetization process. Unique field-dependent behavior of the real and imaginary components of the MI was found in nanocrystalline ribbons with higher Co content ($x \geq 0.05$), showing multiple peaks above 50 MHz driving current.

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