

Journal of Applied Physics 2016 vol.120 N16

Magnetization dynamics in dilute Pd_{1-x}Fe_x thin films and patterned microstructures considered for superconducting electronics

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Abstract

© 2016 Author(s). Motivated by recent burst of applications of ferromagnetic layers in superconducting digital and quantum elements, we study the magnetism of thin films and patterned microstructures of Pd_{0.99}Fe_{0.01}. In this diluted ferromagnetic system, a high-sensitivity ferromagnetic resonance (FMR) experiment reveals spectroscopic signatures of re-magnetization and enables the estimation of the saturation magnetization, the anisotropy field, and the Gilbert damping constant. The detailed analysis of FMR spectra links the observed unexpectedly high reduced anisotropy field (0.06-0.14) with the internal anisotropy, points towards a cluster nature of the ferromagnetism, and allows estimating characteristic time scale for magnetization dynamics in Pd-Fe based cryogenic memory elements to $(3 - 5) \times 10^{-9}$ s.

<http://dx.doi.org/10.1063/1.4965991>
