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Investigation by MOKE and MFM of the domain structure transformation under mechanical deformations in permalloy microparticles

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Abstract

© Published under licence by IOP Publishing Ltd. In this work, the change in the domain structure of planar permalloy microparticles due to mechanical stress has been studied. For this purpose, an array of particles in a mechanically stressed state was formed on a silicon substrate. In addition, the samples with the array of particles without tension were manufactured. The magnetic structure of the samples was visualized by magnetic force microscopy and hysteresis loops were obtained using the magneto-optical Kerr effect. It was established that the easy magnetization axis collinear to the direction of mechanical stress appears in particles due to mechanical compression. The distribution of magnetization of unstrained particles is mainly determined by the shape anisotropy.

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References

[1] Morozov A I 2014 Phys. Solid State 56 865
[2] Belyaev B A and Izotov A V 2007 Phys. of the Solid State 49 1731
[3] Bizyaev D A, Bukhraev A A, Kandrashkin Yu E, Mingalieva L V, Nurgazizov N I and Khanipov T F 2016 Technical Physics Lett. 42 1034-37
[4] Peng R C, Wang J J, Hu J M, Chen L Q and Nan C W 2015 Appl. Phys. Lett. 106 142901
[5] Finizio S, Foerster M., Buzzi M, Kruger B, Jourdan V, Vaz C A F, Hockel J, Miyawaki T, Tkach A, Valencia S et al 2014 Phys. Rev. Applied 1 021001
[6] Kumar D, Singh S, Vishawakarma P, Dev A S, Reddy V R and Gupta A 2016 J. Magn. Magn. Mater. 418 99-106
[7] Dai G, Zhan Q, Yang H and Li R W 2013 J. Appl. Phys. 114 173913
[8] Donahue M J and Porter D G. URL: http://math.nist.gov/oommf - ref-separator -
[9] Ovchinnikov D V and Bukharaev A A 2001 Tech. Phys. 46 1014
[10] Vonsovskii S V 1974 Magnetism (New York: J. Wiley) 1256