

ATOMIC- AND MAGNETIC-FORCE MICROSCOPY IN VARIABLE APPLIED MAGNETIC FIELDS ON CoFe/IrMn MULTILAYER

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Majority of spin valves used in spintronics make use of exchanged biased multilayers that act as a „pinned“ reference layer for the valve [1]. In this study, the domain structure evolution in externally applied magnetic fields of a „pinned“ multilayer with perpendicular exchange bias consisting of an anti-ferromagnetic (AF) IrMn and four ferromagnetic (FM) CoFe layers was investigated using magnetic force microscopy and vibrating sample magnetometry.

Both VSM (Fig 1) and 42 MFM (Fig 2) measurements in range of +/- 120 mT were performed. Based on these results a detailed description of the domain reversal in ferromagnetic (FM) CoFe layers was derived. It was shown that four FM layers are aligned in parallel and reverse uniformly in respect to the pinning antiferromagnetic IrMn layer. There is an exchange bias between one of the CoFe and IrMn layer, which shifts the hysteresis to values $\pm H_{EX}$. (Fig 1)

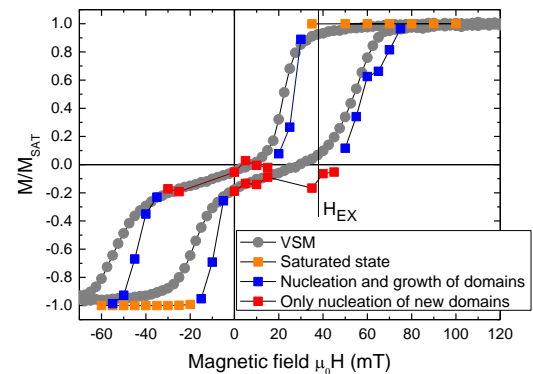


Fig.1 VSM measured and MFM derived magnetic hysteresis loop of the sample.

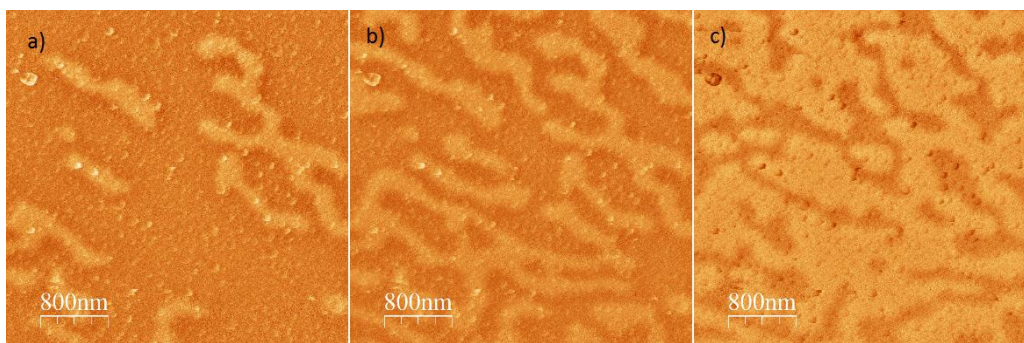


Fig.2 Domain structure imaged by MFM at field strengths of a) -10 mT b) 0 mT c) +55 mT .

References

1. J. Chen et al, 2014, *Applied Physics Letters*, 104, 152405.



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