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Investigation of magnetic domains in [Pt/Co/Ta]10 multilayers using magnetic force microscopy

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Multilayers composed of heavy metals and ferromagnets with strong perpendicular anisotropy are potential candidates for magnetic memory applications [1,2]. Magnetic skyrmions in particular may enable ultra-dense storage devices due to their extremely low spin currents [2]. Pt/Co-based multilayers generally exhibit worm domains, which can nucleate into domains of skyrmions through breaking/nucleation processes [3,4]. Recent studies have demonstrated the nucleation of skyrmions by varying external magnetic field, temperature and current in Pt/Co/Ta multilayers prepared by sputtering [4,5].

In this work, [Pt/Co/Ta]10 multilayers with cobalt layer thickness between 5 Å to 21 Å were grown by molecular beam epitaxy. We assessed the dependence of the magnetic domain structure on the cobalt thickness of [Pt/Co/Ta]10 multilayers by means of magnetic force microscopy (MFM). The magnetic domains were manipulated by applying different magnetic fields and measuring either in field or in remanence. The results of the systematic investigation are presented and discussed in detail.

References:

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