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Electric field assisted magnetization reversal in FePt films. PAVEL LUKASHEV, University of Nebraska, Omaha, KIRILL BELASHCHENKO, University of Nebraska, Lincoln, RENAT SABIRIANOV, University of Nebraska, Omaha
— We propose to use strain assisted reduction in anisotropy of FePt in order to make magnetization reversal easier in the writing of the magnetic storage devices. We performed first-principles calculations of the magnetocrystalline anisotropy of FePt under bi-axial stress using full-potential LAPW implemented in FLEUR code. Magnetocrystalline anisotropy decreases by 25% with application of 1.5% tensile biaxial strain. This is partially due to the reduction of the c/a ratio by about 1.5% (calculated Poisson ratio is 0.33) in the tetragonal cell and partially due to the increase in volume by about 1.5%. Biaxial strain can be obtained by placing piezoelectric film under FePt layer, and by applying electric field on the system. Modern ferroelectric systems can provide stress up to 2%. Besides, we propose using thin ferroelectric films with asymmetric interfaces, which provides a simple way to generate bias field in the polarization reversal and related properties. The existence of the polar interfaces results in a different average polarization in the film upon reversal. As a result, the strain in the film depends on the direction of polarization. This asymmetric strain can be used do modulate magnetic properties.

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