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Tailoring magnetic properties of thin films with quantum well states and external electric field TAMENE R. DASA, VALERIY S. STEPANYUK, Max Planck Institute of Microstructure Physics — Dependence of magnetic anisotropy energy (MAE) and spin-polarization of magnetic multilayers on the layer thickness is studied with *ab initio* techniques. For thin Fe films adsorbed on a Pt surface a reversal of the MAE (rotation of the easy axis) is observed with changing film thickness. Moreover, our calculation show that capping of magnetic films with Pt in most cases leads to a strong increase of MAE. Both of the later phenomena are traced back to spin-dependent quantum-well states (QWS) in the magnetic thin films. Combining the newly gained understanding with the well-known fact, that quantum well states can be tuned by external electric fields acting on the system, we show that, similar to the case of the quasi 1-D systems [1], the MAE in thin magnetic metallic films can be tailored with external electric field. For example, applying an electric field of $-1\ V/\text{Å}$ to a multilayer of Pt/Co/Pt(001), its MAE can be changed by more than 50%. To finalize the paper, changes in spin-polarization and the Stark-like shift accompanying exposure of the system to external electric fields are outlined and discussed.

[1] T. R. Dasa, P. A. Ignatiev, and V. S. Stepanyuk, Phys. Rev. B **85**, 205447 (2012).

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