

Voltage control of magnetic anisotropy in monocrystalline ferromagnetic metal/oxide layered structures

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Voltage control of magnetic anisotropy (VCMA) is of particular importance in the emerging technologies of magnetic random access memories. Large interface perpendicular magnetic anisotropy and its voltage effect were reported in monocrystalline Fe/MgO heterostructures [1,2], suggesting that monocrystalline systems can be a good playground in the research.

In this study, interface perpendicular magnetic anisotropy and its voltage effect were investigated for various monocrystalline ferromagnetic metal/oxide layered structures such as Cr/Fe/MgO and Ru/Co₂FeAl/MgO. We found relatively large voltage effect of magnetic anisotropy in the Co₂FeAl/MgO system [3] and observed temperature-independent characteristic behaviors in the applied electric field dependence of magnetic anisotropy in the Fe/MgO system. The detailed results of VCMA will be presented as well as the current status in development of new materials for monocrystalline ferromagnetic metal/oxide layered structures and magnetic tunnel junctions.

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