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Enhanced magneto-ionic switching of interface anisotropy in Pt/Co/GdOx films AIK JUN TAN, MAX MANN, UWE BAUER, GEOFFREY BEACH, MIT — Voltage control of magnetic anisotropy is of great interest for reducing the switching energy barrier in spintronic devices. It has recently been shown that electric field-driven oxygen ion migration near the interface of ferromagnet/oxide bilayers can lead to very large changes in magnetic anisotropy at elevated temperature. Here, we examine magneto-ionic switching in ultrathin Pt(3nm)/Co(0.9nm)/GdOx(t_{ox})/Au(t_{Au}) films with perpendicular anisotropy, in which the GdOx layer and gate structure are optimized for efficient room-temperature oxygen conduction. We study voltage-induced switching dynamics as a function of the GdOx stoichiometry and the thickness of the Au gate layer. We find that for optimally oxidized GdOx, a positive bias voltage applied to the Au electrode results in a transition from PMA to in-plane magnetization, and at zero bias, the PMA spontaneously returns. The rate of this transition depends on the thickness of the Au gate which suggests that the rate-limiting step is removal and reintroduction of oxygen by gate voltage. This toggling of PMA under positive bias does not require oxidation of the Co layer, in contrast to earlier work by Uwe et al . We demonstrate that by optimizing the electrode materials, extremely fast room-temperature switching can be achieved in these devices.

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