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Research on CMOS compatible high K dielectrics for magnetic memory
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High K dielectrics play a key role in modern microelectronic circuitry, given their ability to provide reduced leakage currents while providing adequate capacitance in ever smaller nano-dimensioned MOSFET devices. Recently, the ability to modulate the magnetic properties of cobalt thin films by electrical bias across thin films of Gd_2O_3 was demonstrated. The reversible switching was found to be assisted by electro-migration of oxygen ions to and away from the Co/Gd_2O_3 interface. This novel process called “magneto-ionic control” creates new opportunities for nonvolatile information storage. In this study, the properties of Gd_2O_3 and related oxides are being examined systematically to establish how their defect and nano structures impact oxygen ion transport and in turn magneto-ionic device properties.