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Tuning Néel temperature and anisotropy of magnetoelectric Cr_2O_3 via doping for enhanced performance in voltage-controlled spintronic devices MICHAEL STREET, WILL ECHTENKAMP, TAKASHI KOMESU, SHI CAO, Univ of Nebraska - Lincoln, JIAN WANG, Canadian Light Source, Inc., PETER DOWBEN, CHRISTIAN BINEK, Univ of Nebraska - Lincoln — Spintronic devices have been considered a promising route to revolutionizing current logic and memory technologies. This work is an effort to realizing such spintronic devices by voltage-control of the magnetoelectric Cr_2O_3. The electrically switchable boundary magnetization of Cr_2O_3 can be used to voltage-control the magnetic states of an adjacent ferromagnet. For this technique to be utilized in a spintronic device, the Néel temperature of Cr_2O_3 must be increased above the bulk value of T_N =307K, Previously, B-doped Cr_2O_3 thin films were fabricated via PLD showing boundary magnetization at elevated temperatures via magnetometry and spin polarized inverse photoemission spectroscopy (SPIPES). Temperature dependent exchange bias measurements of B-doped Cr_2O_3 were also investigated using VSM and MOKE. The data indicate a substantial increase in the blocking temperature by about 100K accompanied, however, by a detrimental change in the anisotropy of Cr_2O_3. Conclusions from magnetometry are supported by SPIPES. Chemical straining is investigated to recover anisotropy while maintaining increased blocking temperature. This project was supported by SRC through CNFD, an SRC-NRI Center under Task ID 2398.001, and by C-SPIN, part of STARnet, an SRC program sponsored by MARCO and DARPA (SRC 2381.001).

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