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Material Designs and Combinational Growth Techniques to Enable Novel Multiferroic Devices MELANIE COLE, ERIC NGO, MATHEW IVILL, S. GARY HIRSCH, CLIFF HUBBARD, RYAN TOONEN, WENDY SARNEY, US Army Resarch Laboratory, WMRD, INTEGRATED ELECTROMAGNETIC MATERIALS RESEARCH GROUP COLLABORATION — Voltage control of magnetism in magnetic/ferroelectric bilayers has been most recently demonstrated in ultrathin metallic magnetic films through an electric field induced spin polarized charge screening effect. Voltage-controlled magnetism in magnetic/ferroelectric multilayers would provide a unique opportunity for integrating voltage-tunable RF/microwave magnetic devices on integrated circuits. It has been theoretically predicted that the voltage-control of magnetism in ferromagnetic/ferroelectric heterostructures can be significantly enhanced by utilizing high-K dielectrics. The critical challenge is how to enhance the permittivity of the ferroelectric film while maintaining low loss and low leakage characteristics and accomplishing this in an affordable manner by employing industry standard processing methods and large area low cost substrates. In this work we demonstrate the achievement of high-k, low loss and low leakage BST films utilizing optimized sputtered SrTiO3 buffer layers combined with a MOSD grown Mg-doped Ba0.60Sr0.40TiO3 overgrowth film on affordable large area substrates. Results of this research serves to promote enhanced EM coupling to enable a new class of charge mediated integratable voltage control multiferroic devices exploiting the converse ME effect.

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