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Development of Electrically Controlled Magnetism in all Oxide Multiferroic Systems[1] DAVID KIRKWOOD, JIWEI LU, STUART WOLF, Department of Materials Science and Engineering, University of Virginia — Multiferroic materials have been shown to provide electrical control of magnetism through several different mechanisms. The coupling of ferroic properties in these materials holds promise for new material functionalities that will strongly impact technologies in several fields such as data storage, sensors and switches. In this study we have examined the growth of the multiferroic bismuth iron oxide ($BiFeO_3$) and the ferromagnetic oxide Fe_3O_4 with a novel pulsed electron deposition (PED) tool. An experimental phase space was built using available deposition parameter manipulation. Conditions have been found yielding single phase epitaxial $BiFeO_3$ and Fe_3O_4 as well as mixed phase ($BiFeO_3$ + Fe_3O_4) thin films on STO (100) template substrates. The magnetic properties and electrical field control of magnetism have been studied using MOKE microscopy.

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