Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Measurements of Bandgap of Epitaxial $BiFeO_3$ Films by UV-VIS Absorption and Cathodoluminescence Spectroscopies A.J. HAUSER, Department of Physics, The Ohio State University, J. ZHANG, Department of Electrical Engineering, The Ohio State University, L. MIER, R. RICCIARDO, P.M. WOODWARD, T.L. GUSTAFSON, Department of Chemistry, The Ohio State University, L.J. BRILLSON, Department of Electrical Engineering, The Ohio State University, F.Y. YANG, Department of Physics, The Ohio State University — We report measurements of the bandgap of pure-phase epitaxial $BiFeO_3$ thin films on (001)-oriented $SrTiO_3$ substrates, via UV-VIS absorption and cathodoluminescence (CL) spectroscopies. 70 nm thick $BiFeO_3$ films were grown using ultrahigh vacuum RF magnetron sputtering at substrate temperatures between 500 $^\circ$C and 600 $^\circ$C. X-ray diffractometry shows that samples grown in this temperature range are epitaxial and pure-phase. UV-VIS absorption spectra show a consistent bandgap of 2.5 $\pm$ 0.03 eV for all growth temperatures. A small tail in the UV-VIS absorption spectra just below the band gap extends down to 2.2 eV, indicating some electronic states within the bandgap. The bandgap was confirmed via CL measurements, where a bandgap of 2.46 $\pm$ 0.01 eV was obtained for samples at growth temperatures of 550 $^\circ$C and 600 $^\circ$C. To our knowledge, this report is the first sdetailed measurement of electronic band and defect structure for epitaxial $BiFeO_3$ films and confirms theoretical predictions.

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Date submitted: 04 Dec 2007 Electronic form version 1.4