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Pulsed Laser Deposition of $Bi_{0.4}Ca_{0.6}MnO_3$ Epitaxial Films on $SrTiO_3$ Buffered Silicon[1] GRACE YONG, VERA SMOLYANINOVA, SANJAY ADHIKARI, BENJAMIN HOFMANN, RAJESWARI KOLAGANI, Towson University, YONG LIANG, Motorola Labs — $Bi_{0.4}Ca_{0.6}MnO_3$ is a photo-responsive material. Upon illumination with visible light, the resistivity of $Bi_{0.4}Ca_{0.6}MnO_3$ epitaxial thin films on oxide substrates decreases significantly in a wide temperature range due to the destruction of charge ordering, with the resistivity (ρ) recovering upon subsequent blocking of the light. We demonstrate that $Bi_{0.4}Ca_{0.6}MnO_3$ can be grown epitaxially (by PLD) on $SrTiO_3$ buffered Si(001). (The Si was buffered with $\sim$ 100Å epitaxial $SrTiO_3$ grown via a Motorola Molecular Beam Epitaxy process). In general, epitaxy on silicon is needed for integration of a detector component with complementary MOS readout. Epitaxial growth on Si also opens up the possibility of fabricating a free-standing, strain-free $Bi_{0.4}Ca_{0.6}MnO_3$ membrane via standard Si micromachining techniques. Such a free standing film may be expected to have properties similar to that of the bulk single crystal which exhibit permanent photoinduced reflectivity changes attractive for photonic device application.

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