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Pulsed Laser Deposition of $\text{Bi}_{0.4}\text{Ca}_{0.6}\text{MnO}_3$ Epitaxial Films on SrTiO_3 Buffered Silicon¹ GRACE YONG, VERA SMOLYANINOVA, SANJAY ADHIKARI, BENJAMIN HOFMANN, RAJESWARI KOLAGANI, Towson University, YONG LIANG, Motorola Labs — $\text{Bi}_{0.4}\text{Ca}_{0.6}\text{MnO}_3$ is a photo-responsive material. Upon illumination with visible light, the resistivity of $\text{Bi}_{0.4}\text{Ca}_{0.6}\text{MnO}_3$ 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 $\text{Bi}_{0.4}\text{Ca}_{0.6}\text{MnO}_3$ can be grown epitaxially (by PLD) on SrTiO_3 buffered Si(001). (The Si was buffered with $\sim 100\text{\AA}$ 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 $\text{Bi}_{0.4}\text{Ca}_{0.6}\text{MnO}_3$ 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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