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Effect of epitaxial strain on magnetization and photo-control of spontaneous polarization in $BiFeO_3$ films on $(LaAlO_3)_{0.3}(Sr_2AlTaO_6)_{0.7}(110)$ substrate D.S. RANA, I. KAWAYAMA, H. MURAKAMI, M. TONOUCHI, Institute of Laser Engineering, Osaka University, Japan — Recent researches on thin films of $BiFeO_3$ have been driven by the need to obtain better multiferroic properties by either inducing epitaxial strain or fabrication of magnetoelectric superlattices. The BFO (100) thin films on $(LaAlO_3)_{0.3}(Sr_2AlTaO_6)_{0.7}$ (100) substrate are highly strained with different physical properties than that of bulk [1]. Given the dependence of ferroelectric polarization of BFO on crystallographic directions, epitaxial thin films – 70nm and 180nm - of BFO were deposited on LSAT (110) substrate. Structure and surface morphology of BFO/LSAT(110) films show that the films with thickness $\leq$ 80 nm possess a strong in-plane strain while thicker films (150-200nm) are partially relaxed with a bulklike structure. Though the magnetic properties of BFO/LSAT(110) films are nearly independent of structure, the spontaneous polarization and the ferroelectric properties (probed by terahertz emission) are strong characteristic of structure. These results emphasize the importance of epitaxial strain induced tailoring of the ferroelectric properties of $BiFeO_3$ film along (110) crystallographic direction. 1. D.S. Rana *et al*, Phys. Rev. B **75**, 060405 (2007).

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