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Study of retention loss in BTO heterostructure using optical second-harmonic generation microscopy YUJIN CHO, PATRICK PONATH, LU ZHENG, KEJI LAI, ALEXANDER DEMKOV, MICHAEL DOWNER, The University of Texas at Austin — Barium titanate (BTO) is a promising material for ferroelectric non-volatile memory due to its compatibility with semiconductor substrate and low operating power. Recently, it has been demonstrated that BTO film grown on Ge substrate with STO buffer layer can have out-of-plane polarization and good ferroelectricity[1]. To use it in an actual application, one of the biggest challenges is minimizing retention loss, so that the memory can retain the information for a long time without consuming additional power. Second Harmonic Generation (SHG) microscopy is a non-destructive and fast way to study polarization change over time. In this work, we studied polarization retention loss in BTO heterostructure in a long time scale using SHG, and compared it with Microwave Impedance Microscopy (MIM) and Piezo Force Microscopy (PFM). We also varied the thickness of BTO and STO film to find the optimum thickness to minimize writing voltage and still maintain good polarization. We will present this experiment data, and compare it with the theory model[2]. [1] P. Ponath *et al.*, *Nature Comm.*, **6**, 6067 (2015) [2] B. S. Kang *et al.*, *Jpn. J. Appl. Phys.* **41**, 5281 (2002)

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