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Relaxation dynamics of ferroelectric domains in epitaxial BiFeO3 (111) films YI-CHUN CHEN, CHENG-HUNG KO, WEN-CHUAN HSIEH, Department of Physics, National Cheng Kung University, Tainan, Taiwan, YING-HAO CHU, Department of Materials Science and Engineering, National Chiao Tung University, Hsinchu, Taiwan — Advances in thin-film growth techniques by strain engineering had improved various physical properties in advanced functional materials. The epitaxial strain in multiferroic BiFeO3 (BFO) films induced relatively large ferroelectric polarization at room temperature, which makes BFO materials appealing for applications in non-volatile devices. Moreover, single-domain like environment was obtained in strained epitaxial BFO (111) films and provided an ideal system for the observation of 180- degree domain wall motion. In this study, the dominant mechanism of domain relaxation dynamics in BFO (111) films were investigated. The domains were initially written by different voltage pulses and then relaxed thorough time. A two-step depolarization process was observed, which varied with the initial domain sizes. The transitions of relaxation curves agreed with the meta-stable sizes observed during domain growth, indicating that the electrostatic boundary condition can be an important factor. The results of surface potential measurement implied switching voltages may inject asymmetry charges to the domain surfaces and increase the stable domain size. The dissipation of surface charges affected the 1st step relaxation significantly.

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