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Difference in ferroelectric aging between A-site and B-site acceptor doped $BaTiO_3$ crystals. LIXUE ZHANG, Multi-Disciplinary Materials Research Center, Xi'an Jiaotong University, Xi'an 710049, People's Republic of China, XIAOBING REN, Ferroic Physics Group, National Institute for Materials Science, Tsukuba, 305-0047 Ibaraki, Japan — Aging, the time-dependent changing of material properties, has been widely found in acceptor-doped ABO_3 ferroelectrics. The origin is usually ascribed to gradual domain stabilization by acceptor-dopant-generated oxygen vacancies. As in ABO_3 systems both A-site and B-site acceptor doping can induce oxygen vacancies, they are expected to cause similar aging effect. However, here we report that there exists a significant difference in aging effect between A-site (K-doped) and B-site (Mn-doped) acceptor-doped $BaTiO_3$ crystals. The B-site acceptor doping has much stronger aging effect. This new phenomenon can be fully explained by a semi-quantitative model based on the defect symmetry principle[1−4]. According to this model, the "strength" of aging is determined by a symmetry-conforming force of the defect symmetry to crystal symmetry. This model may also have potential applications in predicting and understanding the strength of the aging effect in other systems. [1] X. Ren, Nat. Mater., 3:91, 2004; [2] L.X. Zhang, W. Chen and X. Ren, Appl. Phys. Lett., 85:5658, 2004; [3-4] L.X. Zhang and X. Ren, Phys. Rev. B, 71:174108, 2005; Phys. Rev. B 73:094121, 2006.

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