

Liu, M., Hsia, K., and Sardela, M., In Situ X-Ray Diffraction Study of Electric Field Induced Domain Switching and Phase Transition in PZT-5H, Journal of the American Ceramic Society, 88, 1, 2005, pp. 210-215

Abstract

In situ X-ray experiments were conducted to examine the electric-field-induced phase changes in PZT-5H materials. The X-ray diffraction profiles at different electric-field levels were analyzed by peak fitting and were used to identify the occurrence of non-180° domain switching and phase transition. We found that in depolarized samples, there exists a threshold electric field for the phase changes, whereas in polarized samples, no such threshold exists. The profound difference in the diffraction profile changes under positive and negative electric fields in polarized samples is responsible for the asymmetry of piezoelectric effects. Peak fitting results show phase transition as well as domain switching at different electric-field levels. These observations further indicate the importance of residual stresses in materials' behavior.

Key words

X-ray diffraction, Ferroelectric, Domain switching, Phase transition, PZT-5H