



Toughening Mechanisms of Ferroelectrics

By Yohan Seo

Shaker Verlag Okt 2013, 2013. Buch. Condition: Neu. Neuware - Despite the polycrystalline nature, piezoelectricity can be observed in ferroelectric ceramics after the electrical poling, which aligns domains along the direction of external electric field. Due to piezoelectricity, ferroelectric ceramics have been used for a variety of devices such as actuators, sensors, and transducers. In order to ensure long term reliability, it is required to understand crack growth-related fracture behavior under mechanical load. To this end, in the present work, the influence of crystal structure as well as second phase inclusion on fracture behavior of ferroelectric ceramics has been investigated. Ferroelasticity plays an important role during fracture of ferroelectric ceramics, such as PZT. Prior to examining the fracture behavior, the macroscopic stress-strain behavior as a function of PZ/PT ratio and temperature were investigated to provide an insight into ferroelasticity of PZT in the thermal operating range of many actuators. In conjunction with an X-ray diffraction (XRD) analysis, temperature- and composition-dependent ferroelastic responses are discussed in terms of the change in lattice structure. It was found that the ferroelastic characteristics, such as the coercive stress and remanent strain, were closely correlated to the lattice distortion. With decreasing lattice distortion, found either...



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