

Critical Slowing Down Mechanism and Reentrant Dipole Glass Phenomena in (1-x)BaTiO(3)-xBiScO(3) (0.1 <= x <= 0.4): The High Energy Density Dielectrics

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Abstract: The dielectric and ferroelectric switching properties of high temperature-high energy density (1-x)BaTiO(3)-xBiScO(3) (0.1 <= x <= 0.4) dielectrics were investigated over a broad temperature range. It was found that these ceramics possess dipole glass features such as critical slowing down of the dielectric relaxation, polarization hysteresis aging, rejuvenation, and holelike memory below the dipole glass transition temperature (T(DG)). The dielectric relaxation behavior is consistent with a three-dimensional Ising model with critical slowing exponents ($z\nu = 10 \pm 1$) and composition-dependent glass transition temperatures. At lower temperatures, (1-x)BaTiO(3)-xBiScO(3) ceramics transform into a reentrant dipole glass state owing to the breakup of local polar ordering. A phase diagram is developed marking the paraelectric, ferroelectric, and dipole glass regimes as a function of composition with the reentrant features.

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