

Mechanism of electrostriction in Gd doped ceria

Studying electric field-induced structural changes in ceramics is challenging due to the very small magnitude of the atomic displacements. We used **differential X-ray absorption spectroscopy (Δ -XANES and Δ -EXAFS)**, an elementally specific and spatially sensitive method, to detect such changes in Gd-doped ceria, recently shown to exhibit giant electrostriction. We found that the large electrostrictive stress generation can be associated with a few percent of unusually short Ce-O chemical bonds that change their length and degree of order under an external electric field. The remainder of the lattice is reduced to the role of passive spectator. This mechanism is fundamentally different from that in electromechanically active materials currently in use.

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