

Studies of the EPR Parameters and the Local Tetragonal Distortion of V^{4+} -doped $SrTiO_3$ Crystal

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Z. Naturforsch. **60a**, 433 – 436 (2005); received March 4, 2005

The EPR parameters (g factors g_{\parallel} , g_{\perp} and hyperfine structure constants A_{\parallel} , A_{\perp}) of V^{4+} ion in the tetragonal phase of $SrTiO_3$ crystal were studied by high-order perturbation formulas based on a two-spin-orbit-parameter model, where the contributions from the spin-orbit-coupling-parameter of central $3d^n$ ion and that of ligands are considered. It is found that the oxygen octahedron surrounding the impurity ion V^{4+} changes from elongation along the tetragonal axis in the pure crystal to compression and the magnitude of tetragonal distortion of oxygen octahedron (characterized by $|\Delta R| = |R_{\parallel} - R_{\perp}|$) in V^{4+} center is much greater than the corresponding value in the pure crystal. The cause related to the strong Jahn-Teller effect is discussed.

Key words: Electron Paramagnetic Resonance; Crystal- and Ligand-field; Jahn-Teller Effect; V^{4+} ; $SrTiO_3$.