

# Investigation of the Electric-field Effect in EPR Spectra of $\text{Fe}^{3+}$ in $\text{KTaO}_3$

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The displacements of  $\text{Fe}^{3+}$  (at the  $\text{Ta}^{5+}$  site) along the [001] direction in  $\text{KTaO}_3$  crystal, caused by the electric field, have been studied by calculating the electric-field-induced zero-field splittings from the microscopic mechanisms and the empirical superposition model. It is found that the  $\text{Fe}^{3+}$  displacements obtained by the two methods at the same electric-field strength and temperature are close to each other. These displacements are also close to that estimated from the force-balance equation. It is suggested that the electric-field-induced zero-field splitting can be attributed primarily to the above displacement and the temperature dependence of the electric-field-induced zero-field splitting is mainly due to the change in the dielectric constant of  $\text{KTaO}_3$  with temperature.

*Key words:* Electron Paramagnetic Resonance; Electric-field Effect; Crystal-field Theory;  $\text{Fe}^{3+}$ ;  $\text{KTaO}_3$ .