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Spin relaxation times of donor centers associated with lithium in monoisotopic ^{28}Si

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Abstract

© (2016) Trans Tech Publications, Switzerland. We report a detailed study of electron longitudinal and transverse spin relaxation times for Li donors in monoisotopic ^{28}Si over the temperature range 4–20 K using continuous wave and pulsed electron paramagnetic resonance. Comparison of the obtained spin-lattice relaxation times for the states of the isolated donor center and lithium complex LiO showed that due to the presence of orbital degeneracy, relaxation is faster for single lithium than for the LiO complexes with the nondegenerate ground state. For the isolated lithium center in silicon the relaxation is well described by Blume-Orbach process, with the parameters of the spin-orbit coupling $\sim 1 \cdot 10^{-6}$ meV compare to Orbach process for LiO complex with spin-orbit coupling parameter $\sim 1.5 \cdot 10^{-2}$ meV.

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Keywords

Electron paramagnetic resonance, Monoisotopic silicon, Shallow donors, Spin-lattice relaxation, Spin-orbit coupling