

## Thermal Activation of Valley-Orbit States of Neutral Magnesium in Silicon

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Interstitial magnesium acts as a moderately deep double donor in silicon, and is relatively easily introduced by diffusion. Unlike the case of the chalcogen double donors, parameters of the even-parity valley-orbit excited states  $1s(T_2)$  and  $1s(E)$  have remained elusive. Here we report on further study of these states in neutral magnesium through temperature dependence absorption measurements. The results demonstrate thermal activation from the ground state  $1s(A_1)$  to the valley-orbit states, as observed by transitions from the thermally populated levels to the odd-parity states  $2p_0$  and  $2p_{\pm}$ . Analysis of the data makes it possible to determine the thermal activation energies of transitions from the donor ground state to  $1s(T_2)$  and  $1s(E)$  levels, as well as the binding energies of an electron with the valley-orbit excited states.

**Keywords:** magnesium impurity in silicon, deep center, optical spectroscopy.

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