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Coherent control of single spins in a silicon carbide pn junction device at room temperature SANG-YUN LEE, MATTHIAS WIDMANN, 3rd Institute of Physics, University of Stuttgart, IAN BOOKER, Department of Physics, Chemistry and Biology, Linköping University, MATTHIAS NIETHAMMER, 3rd Institute of Physics, University of Stuttgart, TAKESHI OHSHIMA, Japan Atomic Energy Agency, ADAM GALI, Wigner Research Centre for Physics, Hungarian Academy of Sciences, NGUYEN T. SON, ERIK JANZÉN, Department of Physics, Chemistry and Biology, Linköping University, JOERG WRACHTRUP, 3rd Institute of Physics, University of Stuttgart — Spins in single defects have been studied for quantum information science and quantum metrology. It has been proven that spins of the single nitrogen-vacancy (NV) centers in diamond can be used as a quantum bit, and a single spin sensor operating at ambient conditions. Recently, there has been a growing interest in a new material in which color centers similar to NV centers can be created and whose electrical properties can also be well controlled, thus existing electronic devices can easily be adapted as a platform for quantum applications. We recently reported that single spins of negatively charged silicon vacancies in SiC can be coherently controlled and long-lived at room temperature[1]. As a next step, we isolated single silicon vacancies in a SiC pn junction device and investigated how the change in Fermi level, induced by applying bias, alters the charge state of silicon vacancies, thus affects the spin state control. This study will allow us to envision quantum applications based on single defects incorporated in modern electronic devices.

[1]M. Widmann, et al., Nat Mater 14, 164 (2015)

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