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Characterization of a gate-defined double quantum dot in a Si/SiGe nanomembrane[1] T. J. KNAPP, R. T. MOHR, YIZE STEPHANIE LI, BRANDUR THORGRIMSSON, RYAN H. FOOTE, XIAN WU, DANIEL R. WARD, D. E. SAVAGE, M. G. LAGALLY, MARK FRIESEN, S. N. COPPERSMITH, M. A. ERIKSSON, University of Wisconsin: Madison — We report the characterization of a gate-defined double quantum dot formed in a Si/SiGe nanomembrane. Previously, all heterostructures used to form quantum dots were created using the strain-grading method of strain relaxation, a method that necessarily introduces misfit dislocations into a heterostructure and thereby degrades the reproducibility of quantum devices. Using a SiGe nanomembrane as a virtual substrate eliminates the need for misfit dislocations but requires a wet-transfer process that results in a non-epitaxial interface in close proximity to the quantum dots. We show that this interface does not prevent the formation of quantum dots, and is compatible with a tunable inter-dot tunnel coupling, the identification of spin states, and the measurement of a singlet-to-triplet transition as a function of the applied magnetic field. This work was supported in part by ARO (W911NF-12-0607), NSF (DMR-1206915, PHY-1104660), and the United States Department of Defense. The views and conclusions contained in this document are those of the author and should not be interpreted as representing the official policies, either expressly or implied, of the US Government.

[1]T. J. Knapp, et al. (2015). arXiv:1510.08888 [cond-mat.mes-hall].

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