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Transport, Charge Sensing, and Quantum Control in Si/SiGe Double Quantum Dots[1] KE WANG, PANU KOPPINEN, YULIYA DOVZHENKO, JASON PETTA, Department of Physics, Princeton University, Princeton, NJ 08544 — Si/SiGe quantum dots hold great promise as ultra-coherent qubits [1]. In comparison with the GaAs system, Si has a weaker hyperfine interaction due to the zero nuclear spin of ^{28}Si and smaller spin-orbit coupling due to its lighter atomic weight [2]. However, the fabrication of highly controllable Si/SiGe quantum dots is complicated by valley degeneracy, the larger effective electron mass, and the difficulty of obtaining high quality samples [3]. Here we develop a robust fabrication process for depletion mode Si/SiGe quantum dots, demonstrating high quality ohmic contacts and low-leakage Pd top gates. We report DC transport measurements as well as charge sensing in single and double quantum dots. The quantum dot gate electrode pattern allows a relatively high level of control over the confinement potential, tunneling rates, and electron occupation.

[1] C. B. Simmons *et al.*, arXiv:1010.5828v1 (2010).
[2] R. Hanson *et al.*, Rev. Mod. Phys. **79**, 1217 (2007).
[3] F. Schäffler, Semicond. Sci. Tech. **12**, 1515 (1997).

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