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STM-induced passivation of Si (100) surface from physisorbed molecular hydrogen at 5 K AMENA L. T. KHAN, ALLAN R. MACDAIRMID, DAVID C. FORTIN, XIAOBIN ZHU, MARK R. FREEMAN, Department of Physics, University of Alberta, Edmonton, Canada T6G 2G7 — Gas phase adsorption of hydrogen on silicon surfaces is usually achieved through reaction with molecular hydrogen at elevated temperatures and/or exposure of the surface to atomic hydrogen.[1] In the present work, we introduce molecular hydrogen to a silicon (100) surface at T = 5 K. In these conditions we observe physisorption of molecular hydrogen,[2] which can act as a precursor for the formation of hydrides on the silicon surface. It is found that scanning tunneling microscopy can be used to induce patterned chemisorption of hydrogen on silicon. Upon repetitive scanning of the same area at negative sample bias, complete passivation of the area can be achieved. The route to complete termination involves two stages, the second of which appears to proceed via nucleation and growth of completely terminated islands from within a disordered, partially terminated phase. At positive sample bias the second stage is not observed, with the induced chemisorption ending in an unreactive "locked" configuration of the surface still containing silicon dangling bonds. This work is supported by NSERC, iCORE and CIAR. References: [1] A. J. Mayne, D. Riedel, G. Comtet, G. Dujardin, Prog. Surf. Sci., 81, 1, 2006. [2] T. R. Govers, L. Mattera, G. Scoles, J. Phys. Chem., 72, 5446, 1980

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