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Using Si(100) - 2 x 1:H as a Platform for Patterned Silicon Growth MATTHEW M. SZTELLE, Department of Electrical and Computer Engineering and Beckman Institute for Advanced Science and Technology, University of Illinois, Urbana, Illinois , SCOTT W. SCHMUCKER, Department of Electrical and Computer Engineering and Beckman Institute for Advanced Science and Technology, University of Illinois, Urbana, Illinois , JOSEPH W. LYDING, Department of Electrical and Computer Engineering and Beckman Institute for Advanced Science and Technology, University of Illinois, Urbana, Illinois — An ultra-high vacuum scanning tunneling microscope (UHV-STM) is used to create patterns at the atomic level by desorbing hydrogen atoms from the Si(100) – 2 x 1:H surface thereby creating a clean silicon template for selective area chemical vapor deposition (CVD). Disilane (Si_2H_6) gas, when introduced, repassivates the clean silicon pattern with an inert mix of hydride and silicon-hydride species. Subsequent layers can be grown through repeated patterning allowing controlled silicon growth at the nanometer scale. Amorphous silicon growth has been demonstrated at room temperature with nanometer scale control over feature sizes. Results will also be presented on our attempts to grow single crystal silicon features by performing these experiments at elevated temperatures to promote silicon surface diffusion.

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