Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

High Resolution 2D dopant profiling of FinFET structures and Silicon-based Devices using Scanning Probe Microscopies A. KHAJETOORIANS, UT at Austin Physics Dept., X.D. WANG, APRDL, Freescale Semiconductor, J. LI, UT at Austin Physics Dept., D. GARCIA-GUTIERREZ, UT at Austin Dept. of Chem. Engr., J. DENYSZYN, UT at Austin: Texas Materials Inst., H. CELIO, D. PHAM, A. DIEBOLD, International SEMATECH, J. GOODENOUGH, UT at Austin: Texas Materials Inst., M. JOSE-YACAMAN, UT at Austin Dept. of Chem. Engr., C.K. SHIH, UT at Austin Dept. of Physics — The ability to perform dopant/junction profiling with high spatial resolution is critical for development of future generation devices such as FinFET structures. Among various forms of scanning probe microscopy, scanning tunneling microscopy (STM) has demonstrated direct atomic imaging of dopant atoms on GaAs (110) surfaces. More recently, scanning thermoelectric microscopy (SThEM) (H.K. Lyeo et al *Science* v.303 p816 (2004)) has been applied to profile GaAs $p-n$ junction with unprecedented spatial resolution. The key challenge to successfully apply these techniques to silicon-based devices is to prepare a surface that is both chemically and electronically passivated. Here we present our progress toward this goal. We present STM and SThEM studies on Si $p-n$ junction devices including FinFET structures. We also present in-depth profiling of fin structures using scanning capacitance (SCM) and conductive atomic force microscopy (C-AFM) (Khajetoorians *et al* APL (submission)).

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Date submitted: 01 Dec 2005 Electronic form version 1.4