Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Investigation of Mn-Co surface alloy on Si(100)-2x1[1] GOPALAKRISHNAN RAMALINGAM, Materials Science and Engineering, University of Virginia, JEAN-FRANCOIS JACQUOT, INAC/SCIB, CEA-Grenoble, ROBERT MOREL, INAC/SP2M, CEA-Grenoble, MATTHIEU JAMET, INAC/NM, CEA-Grenoble, PETRA REINKE, Materials Science and Engineering, University of Virginia — Understanding of magnetic doping of Group-IV semiconductors is critical for the realization of spintronics devices. We present STM investigations of room temperature, sequential and co-deposition of Mn and Co on Si(100)-2x1. Monoatomic Mn-nanowires, which self-assemble on the Si surface, lose their continuity after deposition of 0.04-0.08 ML of Co. This loss in continuity is expressed in the wire length distributions, which are dominated by Mn dimers and ultrashort wires. Protrusions with a height of 0.5-0.8 Å above the surface of the Mn wire are observed, which is evidence for adsorption of Co on wires. The Si defect structure is similar to exclusive Co deposition experiments on Si, and in agreement with the model of subsurface diffusion of Co atoms present in literature. Only 25% of the deposited Co is observed on the surface and the rest are attached to the Mn structures. Wires form even during co-deposition of Mn and Co, indicating stronger Mn-Si and Mn-Mn interaction over Mn-Co interaction. The wire length distribution is dominated by ultrashort wires, similar to sequential deposition. A detailed discussion of the role of Co in breaking up the Mn wires will be presented. SQUID measurements are being performed to study the magnetic properties of Co-Mn-Si structures and will be discussed. DFT calculations for co-deposition of Mn and Co are presented and compared with experimental data.

[1]We acknowledge NSF for support of this work through award number DMR-0907234.

Gopalakrishnan Ramalingam
Materials Science and Engineering, University of Virginia

Date submitted: 09 Nov 2012 Electronic form version 1.4