Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Manganese doping of group IV semiconductor surfaces and nanostructures[1] PETRA REINKE, CHRISTOPHER NOLPH, KIRIL SIMOV, University of Virginia — The combination of Si and Ge with Mn is a critical step in the development of novel spintronics devices. We investigate the magnetic doping of Si, Si-surfaces and Ge- quantum dots with Mn. A surface-driven route is used for the addition of Mn and allows a stringent control of the Mn-Si and Mn-Ge interaction. The evolution of nanostructures is observed with STM and PES. Monoatomic Mn-wires form on the Si(100) surface in the low-mobility regime and dissolve into sub-surface structures at elevated temperatures. The phase diagram for Mn-Si nanostructures is developed and leads to embedded Mn structures. The interaction of Mn with Ge-quantum dots poses a new set of constraints. The Mn-addition leads to the formation of surface clusters on the wetting layer whose spatial distribution is driven by the surface relaxation. The Mn-adatom clusters on the 105 facet of the Ge-quantum dots are oriented with respect to the surface reconstruction, which predetermines diffusion pathways into the Ge-QD. The characteristics of Mn-nanostructure formation and the possibility of the synthesisof magnetic structures will be discussed.

[1]Support by NSF, CTRF-Virginia, DOE-ALS is gratefully acknowledged.

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Date submitted: 23 Dec 2008 Electronic form version 1.4