Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

On the feasibility of magnetic doping with a surface driven route: Manganese on group IV semiconcuctor surfaces and quantum dots[1] PETRA REINKE, CHRISTOPHER NOLPH, KIRIL SIMOV, University of Virginia — The magnetic doping of group IV semiconductors and quantum dots is a critical to combine charge and spin driven devices. The incorporation of the magnetic element Mn is hampered by low solubility and competition with compound formation. The primary step in our surface driven approach to Mn-incorporation in a semiconductor matrix is the adsorption of Mn on the Si(100), Ge(100) and Ge(105), the quantum dot facet. The presentation will discuss the formation and bonding of Mn-wires to the Si(100) surface, and the subsequent thermally driven conversion to sub-surface bonding with an n-type characteristic. The adsorption of Mn on Ge-quantum dots leads to a roughening of the wetting layer, and the formation of Mn-clusters which are defined by the surface reconstruction of the QD facet. The consequences of cluster agglomeration, ripening and dissolution in the QDs as a function of temperature for the feasibility of magnetic doping will be discussed. The surface structures, Mn-wires and clusters can be stabilized by the deposition of a Si or Ge capping layer which in turn modifies the magnetism in these nanostructures.

[1]The support from NSF (Chemistry/DMR) is acknowledged.

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Date submitted: 30 Nov 2009 Electronic form version 1.4