Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Surface-state mediated indirect exchange interaction between magnetic nanodots on metallic substrates[1] DI XIAO, LIFENG YIN, Oak Ridge National Laboratory, WENGUANG ZHU, U of Tennessee-Knoxville and Oak Ridge National Laboratory, G. MALCOLM STOCKS, JIAN SHEN, Oak Ridge National Laboratory, ZHENYU ZHANG, Oak Ridge National Laboratory and U of Tennessee-Knoxville — We investigate theoretically the ferromagnetic ordering of magnetic nanodots grown on flat or vicinal metal substrates. We first show that, on a flat substrate, the surface state-mediated indirect exchange interaction between the nanodots can be significant enough to account for the high ferromagnetic transition temperature observed in recent experiments. We obtain the quantitative coupling strength and characteristic length scale of the magnetic interaction via detailed Monte Carlo simulations. We then study how the reduced dimensionality of the surface state on vicinal surfaces affects the collective magnetic behavior of the systems, and discuss the findings in connection with latest experimental observations.

[1]Supported by DMSE/BES of DOE and NSF

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Date submitted: 20 Nov 2008 Electronic form version 1.4