

Abstract Submitted
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Electronic and magnetic properties of Mn/Si superlattices¹ C.Y. FONG, MEI QIAN, KAI LIU, Department of Physics, UC Davis — We recently predicted a monolayer of Mn doped in 31 layers of Si, a Mn/Si digital ferromagnetic heterostructure, is a half metal.[1] In order to explore the possibility of realizing large magnetoresistance effect, we extend our studies to superlattices composed of periodically embedded monolayers of Mn in Si. By using a first-principles algorithm, we determine whether a superlattice can exhibit half metallic behavior. We then investigate the dependence of the half metallic properties on the thickness of the Si spacer. The energetics of the ferromagnetic and antiferromagnetic phases will be compared for each half metal. For the minimum Si spacer, the band structure near the Fermi energy of the superlattice showing half metallic properties will be given. We also analyze the character of the states at the Fermi energy as well as the associated Fermi surface.

[1]M. C. Qian, et al. to appear in Phys. Rev. Lett.; cond- mat/0508269.

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