Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Sorting Category: 13.3 (C)

Feasibility of Superconductivity in Semiconductor Superlattices KENNETH P. WALSH, U. S. ArmyEnergetics, Pyrotechnic Research and Technology, ANTHONY T. FIORY, N. M. RAVINDRA, New Jersy Institute of Technology, DALE R. HARSHMAN, Physikon Research Corporation, JOHN D. DOW, Arizona State University — The possibility of designing a semiconducting superlattice of alternating electron and hole layers that exhibits high temperature superconductivity is studied by numerical simulation of modulation-doped $GaAs/Al_xGa_{1-x}As$ superlattices. The feasibility of superconductivity is based on observations of high-temperature superconductors by Harshman and Mills[1], who concluded that the mechanism for Cooper pairing is a Coulomb interaction that is optimum when the mean distance between charge carriers within the layers equals the distance between the layers. Superlattice design considers optimum layer spacings, doping concentrations, and alloy concentration, x. The program employed in the superlattice simulations is a one-dimensional Schrödinger-Poisson solver developed by Snider[2].

1. D. R. Harshman and A. P. Mills, *Concerning the nature of high-Tc superconductivity*, Phys. Rev. B 45, 707 (1992).
2. G. Snider, *1D Poisson/Schrödinger User's Manual: A Band Diagram Calculator*, (http://www.nd.edu/∼gsnider, Univ. Notre Dame, Notre Dame, Indiana).

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[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 29 Nov 2005 Electronic form version 1.4