Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

**Thermoelectric miniband transport in superlattice cross-plane direction**[1] ZHIXI BIAN, M. ZEBARJADI, R. SINGH, A. SHAKOURI, Electrical Engineering Department, University of California, Santa Cruz, California 95064, J-H. BAHK, G. ZENG, J. BOWERS, Department of Electrical and Computer Engineering, University of California, Santa Barbara, California 93106 — Thermoelectric materials can be used for solid-state refrigeration and thermal-to-electric power conversion. The thermoelectric transport performance can be optimized by adjusting the charge carrier concentration in bulk semiconductor materials. Further improvement can be achieved by using low dimensional structures such as multiple quantum wells. In the current transport direction parallel to the quantum well plane, this is attributed to the quantum confinement effect and the highly asymmetric electronic density of states; while in the multiple quantum well cross-plane direction, it was explained by the energy filtering of charge carriers by the band edge offset. We study the thermoelectric transport of superlattices in the cross-plane direction using the multiple-miniband structure. The barrier height and width of superlattices are optimized and the results are compared with the bulk materials.

[1]This work is supported by ONR MURI Thermionic Energy Conversion Center.

Zhixi Bian
Electrical Engineering Department, University of California,
Santa Cruz, California 95064

Date submitted: 20 Dec 2006 Electronic form version 1.4