Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Profiling the Seebeck Coefficient of III-V Superlattice Structures with nanometer resolution using Scanning Thermoelectric Microscopy (SThEM) JIANLONG LI, ALEXANDER KHAJETOORIANS, HO-KI LYEO[1], COLIN FOLTA, The Univ. of Texas at Austin, Dept. of Mech. Engr., ALI SHAKOURI, Univ. of California Santa Cruz, Dept. of Elect. Engr., Quantum Electronics Group, LI SHI, The Univ. of Texas at Austin, Dept. of Mech. Engr., CHIH-KANG SHIH, The Univ. of Texas at Austin, Dept. of Physics — Recent theoretical efforts demonstrate that quantum well structures such as superlattices, nanowires, and quantum dots are good candidates for high ZT materials. The ability to probe the thermoelectric properties of these materials on the nanometer scale requires the ability to resolve thermoelectric parameters with high spatial resolution. Recently, Scanning Thermoelectric Microscopy (SThEM) has demonstrated the ability to resolve the Seebeck coefficient and the carrier profile of GaAs $p-$n junctions with unprecedented spatial resolution (H.K. Lyeo et al *Science* v.303 p816 (2004)). By applying this new technique, this work focuses on direct measurement of local thermoelectric power of GaAs/AlAs and GaAs/InGaAs superlattice structures using ultra high vacuum SThEM. We observed that the thermoelectric power in the superlattice region is greatly enhanced. Moreover, oscillations of Seebeck coefficient within the superlattice regions, with a periodicity commensurating with the superlattice structure, are also observed.

[1]Now at Korea Research Institute of Standards and Science

Alexander Khajetoorians
The University of Texas at Austin, Department of Physics

Date submitted: 03 Dec 2005 Electronic form version 1.4