Michael J. Grundmann

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Objective: Research position in compound semiconductors for energy saving and/or sensor applications.

Education

January 2007, expected	**Ph.D.,** Electrical and Computer Engineering University of California, Santa Barbara **Dissertation Title:** Polarization-Induced Tunnel Junctions in III-Nitrides for Optoelectronic Applications **Dissertation Advisor:** Prof. Umesh K. Mishra
2006	**M.S.,** Electrical and Computer Engineering, GPA: 3.98 University of California, Santa Barbara
2001	**B.S.,** Applied and Engineering Physics, *Magna Cum Laude,* GPA: 3.99 Minor: Computer Science Cornell University, Ithaca, New York

Research Experience

2001-2006 Graduate Research Assistant, University of California, Santa Barbara

Polarization-Induced Tunnel Junctions

- MBE growth of III-nitride material for tunnel junctions and LEDs
- Designed, fabricated and characterized first polarization-engineered tunnel junctions; applied results to create proof-of-concept multi-active region, multi-color, and P-type free LEDs

Top-down Nano-patterned LED

- Developed P-type coalescence growth by MBE for MOCVD/MBE hybrid nano-patterned devices

Software

- Conceived of and developed **BandEng**, a Windows-based graphical Poisson-Schrödinger band diagram solver for polarized heterojunction research
- Created OS X-based interactive kinetic Monte Carlo simulator, **KMCInteractive**, for MBE instruction

Research Skills

Molecular Beam Epitaxy: growth of material for optoelectronic applications and tunnel junctions, maintenance of equipment

Material Characterization: photoluminescence, atomic force microscopy, x-ray diffraction, SIMS interpretation

Electrical Characterization: electroluminescence, dc I-V measurements, temperature-dependent electrical measurement setup, Hall and C-V measurements, TLM contact characterization

Device Modeling: tunneling-current calculations, polarized heterostructure band diagram modeling using custom software, C-V and trap modeling, drift-diffusion numerical modeling
Fabrication: contact alignment, photolithography, e-beam deposition, reactive ion etching (RIE), rapid thermal annealing (RTA)
Programming: extensive experience with C++/objective C, experience in Java, Mathematica, Matlab, computational physics, LabView, and graphical user interfaces

Patents

Polarization-Induced Tunnel Junction (pending)
Dual Surface-Roughened N-face High-Brightness LED (provisional)

Awards and Achievements

National Science Foundation (NSF) LEAPS fellowship (2004-2005)
MICRO fellowship (2001-2002)

Journal Publications

Polarization-induced tunnel junctions for III-nitride optoelectronic applications
M. J. Grundmann and U. K. Mishra, accepted for publication phys. stat. solidi. (c).

InGaN/GaN Nanopillar-Array Light Emitting Diodes
C. Neufeld, C. Schaake, **M. Grundmann**, N. Fichtenbaum, S. Keller, U. K. Mishra, accepted for publication phys. stat. solidi (c).

MOCVD regrowth of InGaN on N-polar and Ga-polar pillar and stripe nanostructures
N. A. Fichtenbaum, C. J. Neufeld, C. Schaake, Y. Wu, M. H. Wong, **M. Grundmann**, S. Keller, S. P. DenBaars, J. S. Speck and U. K. Mishra, accepted for publication.

Conference Presentations

Multi-Color Light Emitting Diode using Polarization-Induced Tunnel Junctions
M. J. Grundmann and U. K. Mishra, International Workshop on Nitride Semiconductors, October 22-27 2006, Kyoto, Japan.

InGaN/GaN Nanopillar-Array Light Emitting Diodes
C. J. Neufeld, C. Schaake, **M. Grundmann**, N. Fichtenbaum, S. Keller and U. K. Mishra, International Symposium on Compound Semiconductors, August 13-17, Vancouver, Canada.

Advanced Transistor Structures Based on N-face GaN
S. Rajan, A. Chini, M. Wong, C. Suh, Y. Fu, **M. J. Grundmann**, F. Wu, J. S. Speck and U. K. Mishra, 32nd International Symposium on Compound Semiconductors (ISCS), Sept 18-22 2005, Europa-Park Rust, Germany.

Multiple Active Region LED in III-nitrides
M. J. Grundmann and U. K. Mishra, 6th International Conference on Nitride Semiconductors, August 28-September 2 2005, Bremen, Germany.

Tunnel Junctions in GaN/AlN for Optoelectronic Applications
M. J. Grundmann, J. S. Speck and U. K. Mishra, 63rd Device Research Conference, June 20-22 2005, University of California, Santa Barbara, USA.

Tunneling in III-Nitrides
M. Grundmann, J. S. Speck and U. K. Mishra, WOCSEMMAD 2005, February 2005, Miami, USA.

Software

BandEng – http://my.ece.ucsb.edu/mgrundmann/bandeng/

KMCInteractive - http://my.ece.ucsb.edu/mgrundmann/kmcinteractive/

References available upon request