Jamie Phillips

Assistant Professor of Electrical Engineering and Computer Science

2417D EECS Bldg
1301 Beal Avenue
The University of Michigan
Ann Arbor, MI 48109-2122

Email: jphilli@umich.edu
Phone: (734) 764-4157
Fax: (734) 763-9324

Education

Ph. D. Electrical Engineering, **The University of Michigan**, Ann Arbor 1998
Dissertation: Self-Assembled In(Al,Ga)As/Ga(Al)As Quantum Dots For Intersubband Detectors

M.S., Electrical Engineering, **The University of Michigan**, Ann Arbor 1996

B.S., Electrical Engineering, **University of Michigan**, Ann Arbor 1994

Professional Experience

Assistant Professor, The University of Michigan, Ann Arbor, MI 2002-present

- Research focus: semiconductor electronic/optoelectronic devices
- Supervise research group ~ 5-8 students, 2 Ph.Ds graduated from group
- Established MBE growth facility for ZnO and related wide bandgap semiconductors; research effort on ZnO materials growth and application to transistors, UV photodetectors, and UV emitters
- Established PLD facility for complex oxides including $(Ba,Sr)TiO_3$, $(Pb,Zr)TiO_3$, ZnO; demonstrated ferroelectric thin film optical waveguides on semiconductors; $(Ba,Sr)TiO_3$ thin film capacitors for voltage-tunable microwave electronics
- Demonstrated ferroelectric switching in $(Pb,Zr)TiO_3$/ZnO and $BaTiO_3$/ZnO
- Taught five different courses in semiconductor devices/circuits with emphasis on implementing active learning strategies

Research Scientist, Rockwell Science Center, Thousand Oaks, CA 1999-2001

- R&D of materials for infrared detectors and focal plane arrays
- Epitaxial growth of HgCdTe by MBE for infrared detector focal plane arrays
- Demonstrated improved control over HgCdTe alloy composition and IR detector response using in situ spectroscopic ellipsometry measurements
- Defect reduction in HgCdTe materials for improved FPA operability

Postdoctoral Researcher, Sandia National Laboratories, Albuquerque, NM 1998-1999

- Growth of antimonide-based semiconductors by MOCVD
- Mid-infrared lasers based on InAsSb/InPSb SLS
- AlSb buffer layer growth for metamorphic InSb on GaAs for Hall effect sensors

Graduate Student Research Assistant, The University of Michigan, Ann Arbor, MI 1995-1998

- Epitaxial growth of InGaAs/GaAs self-assembled quantum dots
- Characterization of optical and electronic properties of quantum dots
- Pioneering research of quantum dot infrared detectors, quantum dot lasers

Honors and Awards

- 2007 DARPA/MTO Young Faculty Award
- 2007 EECS Department Outstanding Achievement Award
- 2003 National Science Foundation CAREER Award
- 2001 Best Paper Award Co-Author, Military Sensing Symposium Specialty Group on Materials
- 1999 Paul Rappaport Award, IEEE Electron Devices Society
- 1997 Best Student Paper Award, 16th North American Conference on Molecular Beam Epitaxy

Professional Service

Member:	IEEE Senior Member, ASEE, AVS, Eta Kappa Nu, Phi Kappa Phi
Editor:	Journal of Electronic Materials Special issue on GaN, SiC, and ZnO, 2005, 2006, 2007
Program Committee:	Electronic Materials Conference, 2006, 2007 North American Molecular Beam Epitaxy Conference, 2007 International Workshop on ZnO and related materials, 2008
Officer:	American Vacuum Society EMPD Executive Committee, 2007-2009
Reviewer:	Invited reviewer for NSF and ARO proposals, reviewer for numerous journals including Appl. Phys. Lett., J. Appl. Phys., J. Phys. D, IEEE Trans. Electron Dev., IEEE J. Quantum Electron., J. Electron. Mater., J. Crystal Growth

University Service

- Undergraduate academic advisor for electrical engineering, Fall 2002 – present
- Electrical engineering graduate committee, Fall 2006 – present
- College of Engineering Manufacturing Council, Fall 2003 – present
- Michigan Nanofabrication Facility Operations Committee, Fall 2002 – present

Technical Expertise

Laboratory/Experimental

- III-V, II-VI, and oxide semiconductor materials growth by MBE, MOCVD
- Deposition of ferroelectric and semiconducting oxides by pulsed laser deposition
- Materials characterization by XRD, SEM, TEM, AFM, Hall effect, C-V, DLTS, P-E, photoconductive decay, photoluminescence, ellipsometry, reflectance, FTIR, UV-Vis spectroscopy
- Device fabrication processes: photolithography, wet chemistry, CVD, RIE, contact metallization
- Electrical, optical, and electro-optic device characterization
- Laser diodes, photodetectors, E-O modulators, waveguides, MOSFETs, HEMTs, FE capacitors
- Device/circuit modeling using Sentaurus Device, Medici, SPICE, and customized Matlab software

Courses Taught

- EECS 215 – Introduction to Circuits
- EECS 320 – Introduction To Semiconductor Devices
- EECS 421 – Properties Of Transistors
- EECS 429 – Semiconductor Optoelectronic Devices
- EECS 529 – Semiconductor Lasers and LEDs

Summary of Research Contributions

My research efforts have primarily focused on materials for optoelectronic and electronic devices. Materials with enhanced physical properties or new functionality will provide the basis for the advancement of device performance or new disruptive device technologies. My research has centered on the investigation of new materials, novel material heterostructures and nanostructures, and new approaches for improving existing materials for device applications. These efforts have applied to a variety of device applications including infrared detectors, laser diodes, thin film transistors, and multifunctional devices based on ferroelectric thin films. Primary focal points of my research and associated research contributions are summarized below.

ZnO and related materials: ZnO and related wide bandgap oxide semiconductors show tremendous potential for transparent electronics, optoelectronics operating in the UV and visible region, and for multifunctional devices integrating semiconducting and other oxide heterojunctions. At U-M, we are investigating the epitaxial growth and thin film deposition of ZnO, and the application of these materials to photodetectors, light emitters, and thin film transistors. We have demonstrated the epitaxial growth of single-crystal ZnO with quality similar to bulk ZnO, ZnO/MgZnO quantum wells with excellent optical properties, and ferroelectric/ZnO heterojunctions demonstrating charge control through polarization switching.

Ferroelectric thin films: Ferroelectric materials offer a variety of unique physical properties that would provide major advantage when coupled with semiconductor devices, where my group has investigated several approaches at U-M. We have demonstrated optical waveguides based on thin film ferroelectrics on GaAs and silicon, offering a potential building block for integrated optics utilizing the electro-optic properties of the material. Strong hysteretic response has been demonstrated in metal-ferroelectric-semiconductor capacitors utilizing perovskite oxides and ZnO, providing a foundation for multi-functional devices based on charge coupling between ferroelectric and semiconducting materials. Ferroelectric capacitors have also been developed for frequency agile microwave circuits, in conjunction with Prof. Mortazawi at U-M.

HgCdTe infrared detectors: HgCdTe infrared detectors offer the highest performance for infrared imaging, where future improvements in the technology rely heavily on materials technology. At Rockwell, my research emphasis was on the reduction of defect density and control over alloy composition in HgCdTe grown by MBE. These efforts contributed to dramatic improvements in compositional control and detector cutoff wavelength, and the achievement of state of the art VLWIR detectors and imaging systems. At U-M, a thorough study of optical absorption properties of HgCdTe epilayers was conducted to improve models accounting for the non-parabolic bandstructure. Current research efforts are in the advanced modeling and experimental demonstration of Auger suppression in HgCdTe photodiodes to increase operating temperature.

Self-assembled quantum dots: The primary emphasis of my doctoral research was the epitaxial growth of InGaAs/GaAs quantum dots formed by self-assembly in the Stranski-Krastanow growth mode. Quantum dot structures with excellent optical properties were achieved, leading to infrared detectors based on intraband transitions (QDIPs), quantum dot lasers operating at room temperature, and field effect transistor structures with quantum dots coupled to the conducting channel. These devices were among the first demonstrations of devices based on quantum dots, with clear demonstration of advantages gained by the unique bandstructure in quantum dots.

Summary of Teaching Contributions

My efforts at the university have focused on the professional and personal student experience, both inside and outside of the classroom and laboratory. A summary of these contributions is provided below.

Active Learning: The traditional lecture method is often effective in broadcasting information to a large audience, but may not necessarily be the most effective technique of promoting learning in the classroom for all learning styles. My teaching approach is to engage students in the classroom learning process and to balance the effective traditional lecture format with "active learning" strategies. I regularly incorporate small group exercises, "minute quizzes", and using students as teachers to encourage active learning. Students have favored this approach, based on end of semester student evaluations. In the last ten semesters (five different courses ranging from sophomore to advanced graduate level), student evaluations on a scale of five (1 = Strongly disagree, 5= Strongly agree) have averaged a score of 4.25 for the question "Q1: Overall, this was an excellent course" and an average of 4.56 for the question "Q2: Overall, the instructor was an excellent teacher".

CAD Tools for Semiconductor Device Modeling: Modern semiconductor devices have sophisticated architectures, where one-dimensional analytical models are often insufficient to describe device characteristics. A more realistic device description will need to include a number of non-ideal effects and two or three spatial dimensions. In the Fall 2006 semester, I introduced a semiconductor device modeling component in the EECS 421 course "Properties of Transistors". The device modeling component of the course utilized state of the art commercial CAD software Sentaurus Device from Synopsys. In the class, four laboratory CAD assignments were developed and integrated in the class to provide students with the ability to analyze and design realistic semiconductor device structures, extending beyond analytic models presented in the class. Many students in the class have gone on to use the skills learned in the course for future graduate level research or engineering projects in industry.

Graduate Student Mentoring: I have developed particular interest in mentoring graduate students nearing completion of their doctoral degree to aid their decision on career path. I have a unique perspective to offer, as I have served as a postdoc at a government research laboratory, a research scientist at a corporate laboratory, and as a faculty member. I have participated in eight university programs as a panelist to share my perspectives. I have also worked with our department administration to develop a web-based mentoring function for the EECS Alumni Society to place students and alumni in contact.

Team Teaching with Graduate Students: Teaching is an important aspect of preparing graduate students for careers in academia, where standard teaching assistant positions are often inadequate. In the Fall 2004 semester, I introduced a teaching internship in the EECS 320 course with an enrollment of approximately 100 students. The internship was found to be a valuable experience in providing a mechanism to prepare graduate students for academic careers and to inspire faculty members to improve their approach to teaching. Feedback from students obtained at the beginning and end of the course suggest that the teaching internship provided a marginal benefit, though no degradation in the quality of teaching. The positive experience of this teaching internship suggest that such approaches would be beneficial for the faculty mentor, graduate student intern, and students in the course, and should be continued provided resources to support the intern may be allocated. Details of the teaching internship were presented at the 2005 ASEE Annual Conference.

Outreach activities: Interest in science and engineering can begin at a very young age. I have shared my enthusiasm through participation as a speaker at "Camp-Ins" at the Ann Arbor Hands On Museum to describe "What is an engineer?" to scouting groups. I have also developed a demonstration for these Camp-Ins of an optical transceiver that plays music, to illustrate what engineers can do. I have further contributed to local outreach efforts as a judge at middle school science fairs.

Research Advising

Ph.D. Students Graduated

Name	Thesis Title	Year Graduated	Status
Ding-Yuan Chen	Ferroelectric thin films for microwave and photonics applications	2006	TSMC, Taiwan
Kaveh Moazzami	Characterization of optoelectronic properties of HgCdTe and ZnO II-VI semiconductors for infrared and ultraviolet detector applications	2006	Maxim, San Jose, CA

Current Graduate Students

Name	Primary Research Topic	Dates	Status
Willie Bowen	Optical properties of ZnO	5/2003-present	Ph.D. candidate
Emine Cagin	Electronic properties of ZnO, ferroelectric/ZnO integration	9/2004-present	Ph.D. candidate
Albert Lin	Light trapping in a-Si solar cells using patterned ZnO back reflectors	1/2007-present	Pre-Ph.D. candidate
Pierre Emelie	Infrared detector modeling and infrared detector device technology	1/2005-present	Ph.D. candidate
Weiming Wang	ZnO epitaxial growth for optoelectronic devices	4/2006-present	Pre-Ph.D. candidate

Prior Graduate Students

Name	Primary Research Topic	Dates	Status
Timothy Murphy	ZnO-based materials for optoelectronic devices	9/2002-8/2005	Entered Law School after Master's
Jeff Siddiqui	Electronic devices based on ZnO and thin film ferroelectrics	1/2005-5/2006	Returned to Raytheon after Master's

Undergraduate Students

Name	Research Topic	Dates	Status
Michael McCormick	Modeling of wire-grid polarizers and Fabry-Perot cavities for infrared detectors	1/2008-present	Undergrad student
David Maxwell	Pulsed laser deposition of vanadium oxide thin films	1/2007-8/2007	Undergrad student
Pak Yuen Chan	Pulsed laser deposition of ZnO	6/2005-5/2006	Undergrad student
George Cramer	ZnO thin film transistors NNIN REU program	6/2006-8/2006	Undergrad. student
Vinay Alexander	Pulsed laser deposition of thin film	6/2005-8/2005	Graduated

	ferroelectrics		
Song Liang Chua	Electronic characterization of ZnO thin films	1/2005-5/2005	Grad. student MIT
William Luong	Pulsed laser deposition of ferroelectric thin films for tunable microwave capacitors	9/2004-8/2005	Grad. student Michigan
Nicole Staszkiewicz	ZnO nanowires	6/2004-8/2004	Graduated
Jeremy Tolbert	C-V measurements for optoelectronic semiconductor materials characterization	9/2003-4/2004	Undergrad. student
Nafisa Muzzafar	Thin film Mach-Zendher interferometers	2/2003-8/2003	Graduated
Sameer Walavalkar	Epitaxial growth simulation, bandstructure calculation	1/2003-3/2004	Grad. student Caltech
DaHan Liao	Optical properties of HgCdTe	6/2002-8/2002	Grad. student U-Michigan

Teaching Evaluations

The questions listed below were rated on the following scale:

1 = Strongly disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly agree

Q1: Overall, this was an excellent course.
Q2: Overall, the instructor was an excellent teacher.

Semester	Course	Course Title	Enroll-ment	Median Q1	Median Q2
Winter 2002	EECS 320	Intro. Semiconductor Devices	121	2.54	2.68
Fall 2002	EECS 421	Properties of Transistors	47	4.13	4.15
Winter 2003	EECS 320	Intro. Semiconductor Devices	70	4.19	4.56
Fall 2003	EECS 529	Semiconductor Lasers and LEDs	13	4.61	4.79
Winter 2004	EECS 215	Introduction to Circuits	70	4.10	4.25
Fall 2004	EECS 320	Intro. Semiconductor Devices	97	4.08	4.41
Winter 2005	EECS 429	Semicond. Optoelectronic Dev.	38	4.03	4.56
Fall 2005	EECS 215	Introduction to Circuits	56	4.67	4.83
Winter 2006	EECS 320	Intro. Semiconductor Devices	91	4.18	4.71
Fall 2006	EECS 421	Properties of Transistors	38	4.53	4.78
Winter 2007	EECS 320	Intro. Semiconductor Devices	65	3.94	4.52
Fall 2007	EECS 215	Introduction to Circuits	71	4.03	4.70

Grants and Contracts

Support: Current
Title: Oxide Electronics for Integrated Microsystems and Displays
Sponsor: DARPA
Award Period: 7/07-6/08
Total Award Amount: $149,543
PI: Phillips

Support: Current
Title: CAREER: Ferroelectric Heterostructure Integration With GaAs Optoelectronic Devices
Sponsor: NSF
Award Period: 2/2003-1/2008
Total Award Amount: $400,000
PI: Phillips

Support: Current
Title: Center for Optoelectronic Nanostructured Semiconductor Technologies (CONSRT)
Sponsor: DARPA
Award Period: 4/2004-3/2008
Total Award Amount: $4,000,000, Phillips share $308,250
PI: C. Chang-Hasnain at U-California Berkeley,
co-PIs: P. Bhattacharya, S.L. Chuang, D. Deppe, P. Delfyett, J. Phillips, H. Wang, P. Yang, and A. Zettl

Support: Current
Title: Ultraviolet Electrically Injected Light Sources With Epitaxial ZnO-Based Heterojunctions
Sponsor: AFOSR
Award Period: 9/04-8/07
Total Award Amount: $600,000, Phillips share $246,000
PI: P. Bhattacharya, co-PI: J. Phillips

Support: Prior
Title: Modeling of Infrared Detectors for High-Speed Room Temperature Imaging
Sponsor: DARPA
Award Period: 9/05-7/06
Total Award Amount: $100,000, Phillips share $32,000
STTR Phase I with EPIR, Ltd

Support: Prior
Title: Development of low stress ohmic contacts to HgCdTe
Sponsor: ARO
Award Period: 1/06-4/06
Total Award Amount: $60,000, Phillips share $15,000
SBIR Phase I with EPIR, Ltd

Support: Prior
Title: Infrared Focal Plane Array Material Science Project - Optical Properties of HgCdTe
Sponsor: ONR
PI: Phillips, joint with Rockwell Science Center

Award Period: 5/2002-1/2005
Total Award Amount: $217,062

Support: Prior
Title: Characterization of ZnO Point Defects and Schottky Diodes
Sponsor: Office of the Vice President for Research (University Of Michigan)
Award Period: 9/2003-8/2004
Total Award Amount: $12,600
PI: J. Phillips

Support: Prior
Title: Epitaxial Growth of CdZnO/MgZnO Heterostructures and Nanostructures
Sponsor: Rackham Graduate School (University Of Michigan)
Award Period: 1/2004-12/2004
Total Award Amount: $15,000
PI: J. Phillips

Invited Book Chapters

J. Phillips, A. Stiff-Roberts, and P. Bhattacharya, "Quantum Dot Infrared Detectors", *Handbook Of Semiconductor Nanostructures And Devices v. 4 (Nano-photonics and optoelectronics)*, edited by A. Balandin, American Scientific Publishers, pp. 195-218.

J. Phillips, A. Stiff-Roberts, and P. Bhattacharya, "Quantum Dot Infrared Photodetector", *Encyclopedia Of Nanoscience And Nanotechnology* vol. 9, edited by H.S. Nalwa, American Scientific Publishers, pp. 131-141 (2004).

Invited Seminars

"Compound Semiconductors for Infrared and Ultraviolet Optoelectronics", *Spire Corp.*, Hudson, NH, April 2007.

"Optoelectronic Materials and Device Research in the Phillips Group", *United Solar R&D seminar*, Troy, Michigan, January 2007.

"Novel Oxide Materials For Semiconductor Optoelectronic Devices And Sensors", *Center For Wireless Integrated Microsystems Seminar Series*, University of Michigan, Ann Arbor, Michigan, July, 2004.

"Oxide Materials For Semiconductor Optoelectronics", *Electrical Engineering Graduate Seminar*, State University of New York at Buffalo, Amherst, New York, April 2004.

"Optical Absorption Studies On HgCdTe", *Microphysics Laboratory Seminar*, University Of Illinois Chicago, Chicago, Illinois, January 2004.

"Infrared Detection: Materials and Devices", *Department Of Physics Colloquium*, Oakland University, Rochester, Michigan 2002.

Publications In Peer Reviewed Journals (64 total)

[1] J. S. Fu, X. A. Zhu, J. D. Phillips and A. Mortazawi, "Improving Linearity of Ferroelectric-Based Microwave Tunable Circuits", *IEEE Trans. Microwave Theory and Techniques* **55**, 354-360 (2007).

[2] P. Y. Emelie, J. D. Phillips, C. Fulk, J. Garland and S. Sivananthan, "Electrical Characteristics of PEDOT:PSS Organic Contacts to HgCdTe", *J. Electron. Mater.* (to appear in August issue), (2007).

[3] P. Y. Emelie, J. D. Phillips, S. Velicu and C. H. Grein, "Modeling and Design Considerations of HgCdTe Infrared Detectors Under Non-Equilibrium Operation", *J. Electron. Mater.* (to appear in August issue), (2007).

[4] E. Cagin, D. Y. Chen, J. J. Siddiqui and J. D. Phillips, "Hysteretic Metal-Ferroelectric-Semiconductor Capacitors Based on PZT/ZnO Heterostructures", *J. Phys. D* **40**, 2430-2434 (2007).

[5] J. Siddiqui, E. Cagin, D. Chen and J. D. Phillips, "ZnO Thin Film Transistors with Polycrystalline (Ba,Sr)TiO_3 Gate Insulators", *Appl. Phys. Lett.* **88**, 212903 (2006).

[6] T. E. Murphy, K. Moazzami and J. D. Phillips, "Trap related photoconductivity in ZnO epilayers", *Journal of Electronic Materials* **35**, 543-549 (2006).

[7] K. Moazzami, T. E. Murphy, J. D. Phillips, M. Cheung and A. N. Cartwright, "Sub-bandgap photoconductivity in ZnO epilayers and extraction of trap density spectra", *Semicond. Sci. Technol.* **21**, 717-723 (2006).

[8] P. Y. Emelie, J. D. Phillips, B. Buller and U. D. Venkateswaran, "Free carrier absorption and lattice vibrational modes in bulk ZnO", *Journal of Electronic Materials* **35**, 525-529 (2006).

[9] D. Chen and J. D. Phillips, "Analysis and design optimization of electrooptic interferometric modulators for microphotonics applications", *IEEE J. Lightwave Technology* **24**, 2340-2346 (2006).

[10] D. Chen and J. D. Phillips, "Electric field dependence of piezoelectric coefficient in ferroelectric thin films", *J. Electroceramics* **17**, 613-617 (2006).

[11] T. E. Murphy, D. Y. Chen, E. Cagin and J. D. Phillips, "Electronic Properties Of ZnO Epilayers Grown On C-Plane Sapphire By Plasma-Assisted Molecular Beam Epitaxy", *J. Vac. Sci. Technol. B* **23**, 1277-1280 (2005).

[12] T. E. Murphy, D. Y. Chen and J. D. Phillips, "Growth And Electronic Properties Of ZnO Epilayers By Plasma-Assisted Molecular Beam Epitaxy", *J. Electron. Mater.* **34**, 699-703 (2005).

[13] T. E. Murphy, J. O. Blaszczak, K. Moazzami, W. E. Bowen and J. D. Phillips, "Properties Of Electrical Contacts On Bulk And Epitaxial n-Type ZnO", *J. Electron. Mater.* **34**, 389-394 (2005).

[14] K. Moazzami, J. Phillips, D. Lee, S. Krishnamurthy, G. Benoit, Y. Fink and T. Tiwald, "Detailed Study Of Above Bandgap Optical Absorption In MBE HgCdTe", *J. Electron. Mater.* **34**, 773-778 (2005).

[15] D. Chen, T. E. Murphy and J. D. Phillips, "Properties Of Ferroelectric Pb(Zr,Ti)O_3 Thin Films On ZnO/Al_2O_3 (0001) Epilayers", *Thin Solid Films* **491**, 301-304 (2005).

[16] D. Chen and J. D. Phillips, "Extraction of Electro-Optic Coefficient in Thin-Film Linear Electro-Optic Mach-Zehnder Interferometers with Non-Periodic Intensity-Voltage Output Characteristics", *Optical Engineering* **44**, 034601 (2005).

[17] T. E. Murphy, S. Walavalkar and J. D. Phillips, "Epitaxial growth and surface modeling of ZnO on c-plane Al_2O_3", *Applied Physics Letters* **85**, 6338-6340 (2004).

[18] T. E. Murphy, D. Chen and J. D. Phillips, "Electronic Properties Of Ferroelectric $BaTiO_3$/MgO Capacitors On GaAs", *Applied Physics Letters* **85**, 3208-3210 (2004).

[19] K. Moazzami, J. Phillips, D. Lee, D. Edwall, M. Carmody, E. Piquette, M. Zandian and J. Arias, "Optical absorption studies of HgCdTe epitaxial layers for improved infrared detector modeling", *phys. Stat. Sol. (c)* **1**, 662-665 (2004).

[20] K. Moazzami, J. Phillips, D. Lee, D. Edwall, M. Carmody, E. Piquette, M. Zandian and J. Arias, "Optical Absorption Model for MBE HgCdTe and Application to Infrared Detector Photo Response", *J. Electron. Mater.* **33**, 701-708 (2004).

[21] D. Chen, T. E. Murphy, S. Chakrabarti and J. D. Phillips, "Optical Waveguiding In $BaTiO_3$/MgO/Al_xO_y/GaAs Heterostructures", *Applied Physics Letters* **85**, 5206-5208 (2004).

[22] S. Chakrabarti, S. Fathpour, K. Moazzami, J. Phillips, Y. Lei, N. Browning and P. Bhattacharya, "Pulsed Laser Annealing of Self-Organized InAs/GaAs Quantum Dots", *Journal of Electronic Materials* **33**, L5-8 (2004).

[23] J. D. Phillips, K. Moazzami, J. Kim, D. D. Edwall, D. L. Lee and J. M. Arias, "Uniformity of optical absorption in HgCdTe epilayer measured by infrared spectromicroscopy", *Applied Physics Letters* **83**, 3701-3703 (2003).

[24] K. Moazzami, D. Liao, J. D. Phillips, D. L. Lee, M. Carmody, M. Zandian and D. Edwall, "Optical Absorption Properties of HgCdTe Epilayers with Uniform Composition", *J. Electron. Mater.* **32**, 646-650 (2003).

[25] B. Kochman, A. D. Stiff-Roberts, S. Chakrabarti, J. D. Phillips, S. Krishna, J. Singh and P. Bhattacharya, "Absorption, Carrier Lifetime, and Gain in InAs-GaAs Quantum-Dot Infrared Photodetectors", *IEEE Journal of Quantum Electronics* **39**, 459-467 (2003).

[26] M. Carmody, D. Lee, M. Zandian, J. Phillips and J. Arias, "Threading and Misfit-Dislocation Motion in Molecular-Beam-Epitaxy-Grown HgCdTe Epilayers", *J. Electron. Mater.* **32**, 710-716 (2003).

[27] P. S. Wijewarnasuriya, M. Zandian, J. Phillips, D. Edwall, R. E. Dewames, G. Hildebrandt, J. Bajaj, J. Arias, A. I. D'Souza and F. Moore, "Advances in Large-Area Hg1-xCdxTe Photovoltaic Detectors for Remote-Sensing Applications", *Journal of Electronic Materials* **31**, 726-31 (2002).

[28] B. Shin, B. Lita, R. S. Goldman, J. D. Phillips and P. Bhattacharya, "Lateral indium-indium pair correlations within the wetting layers of buried InAs/GaAs quantum dots", *Applied Physics Letters* **81**, 1423-25 (2002).

[29] J. D. Phillips, D. D. Edwall and D. L. Lee, "Control Of Very-Long-Wavelength Infrared HgCdTe Detector Cutoff Wavelength", *Journal of Electronic Materials* **31**, 664-668 (2002).

[30] J. Phillips, "Evaluation of the fundamental properties of quantum dot infrared detectors", *Journal of Applied Physics* **91**, 4590-4594 (2002).

[31] S. Krishna, A. D. Stiff-Roberts, J. D. Phillips, P. Bhattacharya and S. W. Kennerly, "Features - Hot Dot Detectors - Infrared quantum dot intersubband photodetectors are a promising technology for multiwavelength IR detection", *IEEE circuits & devices* **18**, 14 (11 pages) (2002).

[32] K. Kim, J. Urayama, T. Norris, J. Singh, J. Phillips and P. Bhattacharya, "Gain dynamics and ultrafast spectral hole burning in In(Ga)As self-organized quantum dots", *Applied Physics Letters* **81**, 670-2 (2002).

[33] J. Phillips, D. Edwall, D. Lee and J. Arias, "Growth of HgCdTe for long-wavelength infrared detectors using automated control from spectroscopic ellipsometry measurements", *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)* **19**, 1580-4 (2001).

[34] D. Edwall, J. Phillips, D. Lee and J. Arias, "Composition control of long wavelength MBE HgCdTe using in-situ spectroscopic ellipsometry", *Journal of Electronic Materials* **30**, 643-6 (2001).

[35] P. Bhattacharya, S. Krishna, J. Phillips, P. J. McCann and K. Namjou, "Carrier-dynamics in self-organized quantum dots and their application to long-wavelength sources and detectors", *Journal of Crystal Growth* **227**, 27-35 (2001).

[36] B. Lita, R. S. Goldman, J. D. Phillips and P. K. Bhattacharya, "Interdiffusion, segregation, and dissolution in InAs/GaAs quantum dot superlattices", *Surface Review and Letters* **7**, 539-45 (2000).

[37] R. M. Biefeld, J. D. Phillips and S. R. Kurtz, "InAsSb/InPSb strained-layer superlattice growth using metal-organic chemical vapor deposition", *Journal of Crystal Growth* **211**, 400-4 (2000).

[38] R. M. Biefeld, J. D. Phillips and S. R. Kurtz, "Exploring new active regions for type I InAsSb strained-layer lasers", *Journal of Electronic Materials* **29**, 91-3 (2000).

[39] R. M. Biefeld and J. D. Phillips, "Growth of InSb on GaAs using InAlSb buffer layers", *Journal of Crystal Growth* **209**, 567-71 (2000).

[40] Z. Weidong, O. Qasaimeh, J. Phillips, S. Krishna and P. Bhattacharya, "Bias-controlled wavelength switching in coupled-cavity In/sub 0.4/Ga/sub 0.6/As/GaAs self-organized quantum dot lasers", *Applied Physics Letters* **74**, 783-5 (1999).

[41] O. Qasaimeh, W. D. Zhou, J. Phillips, S. Krishna, P. Bhattacharya and M. Dutta, "Bistability and self-pulsation in quantum-dot lasers with intracavity quantum-dot saturable absorbers", *Applied Physics Letters* **74**, 1654-6 (1999).

[42] J. Phillips, K. Kamath, P. Bhattacharya and U. Venkateswaran, "Temperature-dependent photoluminescence of In/sub 0.5/Al/sub 0.5/As/Al/sub 0.25/Ga/sub 0.75/As self-organized quantum dots", *Journal of Applied Physics* **85**, 2997-9 (1999).

[43] J. Phillips, P. Bhattacharya and U. Venkateswaran, "Pressure-induced energy level crossings and narrowing of photoluminescence linewidth in self-assembled InAlAs/AlGaAs quantum dots", *Applied Physics Letters* **74**, 1549-51 (1999).

[44] J. D. Phillips, P. K. Bhattacharya and U. D. Venkateswaran, "Photoluminescence studies on self-organized InAlAs/AlGaAs quantum dots under pressure", *Physica Status Solidi B* **211**, 85-9 (1999).

[45] J. Phillips, P. Bhattacharya, S. W. Kennerly, D. W. Beekman and M. Dutta, "Self-assembled InAs-GaAs quantum-dot intersubband detectors", *IEEE Journal of Quantum Electronics* **35**, 936-43 (1999).

[46] B. Lita, R. S. Goldman, J. D. Phillips and P. K. Bhattacharya, "Interdiffusion and surface segregation in stacked self-assembled InAs/GaAs quantum dots", *Applied Physics Letters* **75**, 2797-9 (1999).

[47] B. Lita, R. S. Goldman, J. D. Phillips and P. K. Bhattacharya, "Nanometer-scale studies of vertical organization and evolution of stacked self-assembled InAs/GaAs quantum dots", *Applied Physics Letters* **74**, 2824-6 (1999).

[48] K. K. Linder, J. Phillips, O. Qasaimeh, X. F. Liu, S. Krishna, P. Bhattacharya and J. C. Jiang, "Self-organized In/sub 0.4/Ga/sub 0.6/As quantum-dot lasers grown on Si substrates", *Applied Physics Letters* **74**, 1355-7 (1999).

[49] K. K. Linder, J. Phillips, O. Qasaimeh, P. Bhattacharya and J. C. Jiang, "In(Ga)As/GaAs self-organized quantum dot light emitters grown on silicon substrates", *Journal of Crystal Growth* **201**, 1186-9 (1999).

[50] K. K. Linder, J. Phillips, O. Qasaimeh, X. F. Liu, S. Krishna and P. Bhattacharya, "Growth and electroluminescent properties of self-organized In/sub 0.4/Ga/sub 0.6/As/GaAs quantum dots grown on silicon", *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)* **17**, 1116-19 (1999).

[51] D. Klotzkin, J. Phillips, H. Jiang, J. Singh and P. Bhattacharya, "Electron intersubband energy level spacing in self-organized In/sub 0.4/Ga/sub 0.6/As/GaAs quantum dot lasers from temperature-dependent modulation measurements", *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)* **17**, 1276-80 (1999).

[52] P. Bhattacharya, K. K. Kamath, J. Singh, D. Klotzkin, J. Phillips, H. T. Jiang, N. Chervela, T. B. Norris, T. Sosnowski, J. Laskar and M. R. Murty, "In(Ga)As/GaAs self-organized quantum dot lasers: DC and small-signal modulation properties", *IEEE Transactions on Electron Devices* **46**, 871-83 (1999).

[53] P. Bhattacharya, K. Kamath, J. Phillips and D. Klotzkin, "Self-organized growth of In(Ga)As/GaAs quantum dots and their opto-electronic device applications", *Bulletin of Materials Science* **22**, 519-29 (1999).

[54] O. Qasaimeh, K. Kamath, P. Bhattacharya and J. Phillips, "Linear and quadratic electro-optic coefficients of self-organized In/sub 0.4/Ga/sub 0.6/As/GaAs quantum dots", *Applied Physics Letters* **72**, 1275-7 (1998).

[55] J. Phillips, K. Kamath and P. Bhattacharya, "Far-infrared photoconductivity in self-organized InAs quantum dots", *Applied Physics Letters* **72**, 2020-2 (1998).

[56] J. Phillips, K. Kamath, T. Brock and P. Bhattacharya, "Characteristics of InAs/AlGaAs self-organized quantum dot modulation doped field effect transistors", *Applied Physics Letters* **72**, 3509-11 (1998).

[57] J. Phillips, K. Kamath, X. Zhou, N. Chervela and P. Bhattacharya, "Intersubband absorption and photoluminescence in Si-doped self-organized InAs/Ga(Al)As quantum dots", *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)* **16**, 1343-6 (1998).

[58] J. Phillips, K. Kamath, X. Zhou, N. Chervela and P. Bhattacharya, "Photoluminescence and far-infrared absorption in Si-doped self-organized InAs quantum dots", *Applied Physics Letters* **71**, 2079-81 (1997).

[59] K. Kamath, P. Bhattacharya and J. Phillips, "Room temperature luminescence from self-organized In/sub x/Ga/sub 1-x/As/GaAs (0.35<x<0.45) quantum dots with high size uniformity", *Journal of Crystal Growth* **175**, 175-1762 (1997).

[60] K. Kamath, J. Phillips, H. Jiang, J. Singh and P. Bhattacharya, "Small-signal modulation and differential gain of single-mode self-organized In/sub 0.4/Ga/sub 0.6/As/GaAs quantum dot lasers", *Applied Physics Letters* **70**, 2952-3 (1997).

[61] J. Phillips, K. Kamath, J. Singh and P. Bhattacharya, "Adatom migration effects during molecular beam epitaxial growth of InGaAs/GaAs quantum wells on patterned substrates with vertical sidewalls: blue shift in luminescence spectra", *Applied Physics Letters* **68**, 1120-2 (1996).

[62] K. Kamath, J. Phillips, J. Singh and P. Bhattacharya, "Large blueshift in the photoluminescence of pseudomorphic InGaAs/GaAs quantum wells grown in patterned (100) GaAs grooves and ridges with vertical sidewalls", *Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures)* **14**, 2312-14 (1996).

[63] K. Kamath, P. Bhattacharya, T. Sosnowski, T. Norris and J. Phillips, "Room-temperature operation of In/sub 0.4/Ga/sub 0.6/As/GaAs self-organised quantum dot lasers", *Electronics Letters* **32**, 1374-5 (1996).

[64] P. F. Baude, M. A. Haase, G. M. Haugen, K. K. Law, T. J. Miller, K. Smekalin, J. Phillips and P. Bhattacharya, "Conduction band offsets in CdZnSe/ZnSSe single quantum wells measured by deep level transient spectroscopy", *Applied Physics Letters* **68**, 3591-3593 (1996).

Conference Presentations (81 total)

[1] W. Wang, W. Bowen, S. Lin, S. Spanninga and J. Phillips, "Pulsed laser deposition of ZnO_xTe_{1-x} thin films and application to p^+-Si/ZnOTe/n-ZnO heterojunction diodes", Materials Research Society Fall Meeting, Boston, Massachusetts (2007 (submitted)).

[2] W. Wang, W. Bowen and J. Phillips, "Mixed anion ZnOTe thin films by pulsed laser deposition", American Vacuum Society 54th International Symposium, Seattle, Washington (2007).

[3] W. Bowen and J. Phillips, "Growth and Optical Characterization of ZnO/MgZnO Quantum Wells", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Baltimore, Maryland (2007).

[4] W. Bowen, W. Wang, E. Cagin and J. Phillips, "Optical and Structural Characterization of $ZnO/Mg_xZn_{1-x}O$ Quantum Wells Synthesized by Pulsed Laser Deposition", Electronic Materials Conference, South Bend, Indiana (2007).

[5] P. Emelie, S. Velicu, C. H. Grein, J. Phillips, P. S. Wijewarnasuriya and N. K. Dhar, "Modeling of LWIR HgCdTe Infrared Detectors Under Non-Equilibrium Operation", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Baltimore, Maryland (2007).

[6] (INVITED) J. Phillips, "ZnO: Candidate Material for Ultra-Low Loss Optical Waveguides?" DARPA Ultra-Low Loss Waveguide Workshop, Arlington, VA (2007).

[7] X. Zhu, J. D. Phillips and A. Mortazawi, "A DC Voltage Dependent Switchable Thin Film Bulk Wave Acoustic Resonator Using Ferroelectric Thin Film", IEEE MTT-S International Microwave Symposium, Honolulu, Hawaii (2007).

[8] E. Cagin, D. Chen, J. Siddiqui and J. D. Phillips, "Metal-Ferroelectric-Semiconductor Capacitors Based on PZT/ZnO Heterostructures", Electronic Materials Conference, University Park, PA (2006).

[9] E. Cagin, J. Siddiqui, W. Wang and J. Phillips, "ZnO/Ferroelectric Thin Film Heterostructure Capacitors and Thin Film Transistors", 4th International Workshop on ZnO, Giessen, Germany (2006).

[10] E. Cagin, W. Wang, J. Yang and J. Phillips, "Epitaxial Growth of m-Plane (10-10) Wurtzite ZnO on Cubic (001) MgO Substrates", 4th International Workshop on ZnO, Giessen, Germany (2006).

[11] E. Cagin, J. Yang, J. D. Phillips and P. K. Bhattacharya, "Growth of ZnO on Cubic Substrates by Molecular Beam Epitaxy", Electronic Materials Conference, University Park, PA (2006).

[12] P. Y. Emelie, E. Cagin, J. Siddiqui, J. D. Phillips, C. Fulk, J. Garland and S. Sivananthan, "Electrical Characteristics of PEDOT:PSS Organic Contacts to HgCdTe", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Newport, CA (2006).

[13] P. Y. Emelie, J. D. Phillips, S. Velicu and C. H. Grein, "Modeling and Design Considerations of HgCdTe Infrared Detectors Under Non-Equilibrium Operation", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Newport, CA (2006).

[14] (INVITED) J. Phillips, "Semiconducting and ferroelectric oxide materials for optoelectronics", Nano-Optoelectronic Workshop and Summer School of Advances in Photonics, Berkeley, CA (2006).

[15] W. Wang, E. Cagin, W. Bowen and J. Phillips, "In-Situ Arsenic Doping of ZnO Grown on GaN/Sapphire and ZnO Substrates by Molecular Beam Epitaxy", Materials Research Society Fall Meeting, Boston, MA (2006).

[16] E. Cagin, J. Siddiqui, D. Chen, S. Chua, V. Alexander and J. Phillips, "Electrical properties of ferroelectric/ZnO heterojunctions", Materials Research Society Fall Meeting, Boston, Massachusetts (2005).

[17] D. Chen and J. Phillips, "Hysteretic electro-optic response in ferroelectric thin films", Proc. SPIE, (2005).

[18] D. Chen and J. Phillips, "Electric field dependence of piezoelectric coefficient in ferroelectric thin films", International Conference on Electroceramics, Seoul, Korea (2005).

[19] P. Emelie, K. Moazzami, J. Phillips, B. Buller and U. Venkateswaran, "Infrared Absorption Characteristics Of Bulk ZnO And Relationship To Electronic Properties", 47th Electronic Materials Conference, Santa Barbara, California (2005).

[20] K. Moazzami, T. Murphy and J. Phillips, "Photoconductive Behavior of ZnO for Below Bandedge Excitation", 47th Electronic Materials Conference, Santa Barbara, California (2005).

[21] T. Murphy and J. Phillips, "Preparing for an Academic Career Through Team Teaching as a Graduate Student", 2005 ASEE Annual Conference and Exposition, Portland, Oregon (2005).

[22] J. Phillips, "Epitaxial Growth and Optoelectronic Properties of ZnO", Nano-Optoelectronics Workshop, University of California, Berkeley (2005).

[23] J. Phillips and T. Murphy, "Mentoring Graduate Students In Engineering Education Through Team Teaching", 2005 ASEE Annual Conference and Exposition, Portland, Oregon (2005).

[24] J. Siddiqui, E. Cagin, P. Shea, J. Phillips and J. Kanicki, "Incorporation of perovskite oxides into gate insulator of zinc oxide TFTs", Materials Research Society Fall Meeting, Boston, Massachusetts (2005).

[25] X. Zhu, D. Chen, Z. Jin, J. D. Phillips and A. Mortazawi, "Characterization of Thin Film BST Tunable Capacitors Using A Simple Two Port Measurement Technique", IEEE MTT-S International Microwave Symposium, (2005).

[26] D. Beloin-St. Pierre, B. Buller, U. Venkateswaran, D. Chen, T. E. Murphy and J. D. Phillips, "Temperature and Pressure Dependence of the Raman Modes in Barium Titanate Films", Annual APS March Meeting 2004, Montreal, Quebec, Canada (2004).

[27] M. Cheung, A. N. Cartwright, T. E. Murphy, J. D. Phillips and W. E. Bowen, "Time-resolved spectroscopy of ZnO thin films grown by Pulsed Laser Deposition", 2004 Materials Research Society Fall Meeting, Boston, Massachussetts (2004).

[28] K. Moazzami, T. E. Murphy and J. D. Phillips, "Transient Properties Of ZnO/Al_2O_3 Photoconductors", 2004 Materials Research Society Fall Meeting, Boston, Massachussetts (2004).

[29] K. Moazzami, J. D. Phillips, D. Lee, S. Krishnamurthy, G. Benoit and Y. Fink, "Detailed Study Of Above Bandgap Optical Absorption In MBE HgCdTe", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Chicago, Illinois (2004).

[30] T. Murphy, K. Moazzami, J. Phillips, M. Cheung and A. N. Cartwright, "Time-Resolved Optoelectronic Properties Of ZnO Epilayers", 3rd International Conference on ZnO and Related Materials, Sendai, Japan (2004).

[31] T. E. Murphy, W. E. Bowen, J. O. Blaszczak, K. Moazzami and J. D. Phillips, "Ohmic and blocking contacts to n-type ZnO (0001) epitaxial and bulk material", 46th Electronic Materials Conference, South Bend, Indiana (2004).

[32] T. E. Murphy, D. Chen and J. D. Phillips, "Growth and Electronic Properties of ZnO Epilayers By Plasma-Assisted Molecular Beam Epitaxy", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Chicago, Illinois (2004).

[33] T. E. Murphy, K. Moazzami, D. Chen and J. D. Phillips, "Electronic Properties Of ZnO Epilayers Grown On C-Plane Sapphire By Plasma-Assisted Molecular Beam Epitaxy", North American Conference on Molecular Beam Epitaxy, Banff, Alberta, Canada (2004).

[34] (INVITED) J. D. Phillips, "Optical Properties Of HgCdTe And Relationship To Infrared Detector Applications", The 4th International Symposium on Quantum Functional Systems, Seoul, Korea (2004).

[35] S. Chakrabarti, K. Moazzami, S. Fathpour, P. K. Bhattacharya, J. D. Phillips, Y. Lei and N. Browning, "Pulsed Laser Annealing of Self-Organized InAs/GaAs Quantum Dots", 45th Electronic Materials Conference, Salt Lake City, Utah (2003).

[36] D. Chen, T. E. Murphy and J. D. Phillips, "Deposition Of $BaTiO_3$ Thin Films And MgO Buffer Layers On Patterned GaAs Substrates for Integrated Optics Applications", 2003 Materials Research Society Fall Meeting, Boston, MA (2003).

[37] K. Moazzami, J. Phillips, D. Lee, D. Edwall, M. Carmody, E. Piquette, M. Zandian and J. Arias, "Optical Absorption Studies Of HgCdTe Epitaxial Layers For Improved Infrared Detector Modeling", 11th International Conference on II-VI Compounds, Niagara Falls, New York (2003).

[38] K. Moazzami, J. Phillips, D. Lee, D. Edwall, M. Carmody, E. Piquette, M. Zandian and J. Arias, "Optical Absorption Model for MBE HgCdTe and Application to Infrared Detector Photo Response", U. S. Workshop On The Physics And Chemistry Of II-VI Materials, New Orleans, Louisiana (2003).

[39] T. E. Murphy, D. Chen and J. D. Phillips, "Integration of $BaTiO_3$ Ferroelectric Thin Films with GaAs Using MgO and Al_xO_y Buffer Layers", 45th Electronic Materials Conference, Salt Lake City, Utah (2003).

[40] T. E. Murphy, D. Chen and J. D. Phillips, "Integration of $BaTiO_3$ Ferroelectric Thin Films With GaAs for Functional Devices", IEEE 15th Biennial University/Government/Industry Microelectronics Symposium, Boise, Idaho (2003).

[41] M. Carmody, D. Lee, M. Zandian, J. Arias and J. Phillips, "Threading and Misfit Dislocation Motion in MBE Grown HgCdTe Epi-layers", Military Sensing Symposium Specialty Group On Materials, (2002).

[42] M. Carmody, D. Lee, M. Zandian, J. Phillips and J. Arias, "Misfit Dislocation Formation And Motion In HgCdTe Cap Layers", U.S. Workshop On The Physics And Chemistry Of II-VI Materials, San Diego, CA (2002).

[43] K. Moazzami, D. Liao, J. Phillips, D. Lee, M. Carmody, M. Zandian and D. Edwall, "Optical Absorption Properties Of HgCdTe Epilayers With Uniform Composition", U.S. Workshop On The Physics And Chemistry Of II-VI Materials, San Diego, CA (2002).

[44] J. Phillips, "Evaluation of Performance Limitations in Quantum Dot Infrared Detectors", Electronic Materials Conference, Santa Barbara, CA (2002).

[45] J. Phillips, D. Chen, Z. Zhang and P. Pronko, "Properties of ferroelectric materials deposited on semiconductors by ultrafast pulsed laser deposition", ONR Workshop On Ferroelectric-Semiconductor Interfaces, Kona, Hawaii (2002).

[46] D. Edwall, J. Phillips, E. Piquette, M. Zandian and J. Arias, "HgCdTe MBE At Rockwell", Military Sensing Symposia Specialty Group On Infrared Materials, Tysons Corner, Virginia (2001).

[47] D. Lee, H. Sankur, R. Bailey, W. McLevige, D. Edwall, J. Phillips, J. Chow, G. Hildebrandt and W. Tennant, "High-performance VLWIR microlensed FPAs", Military Sensing Symposia Specialty Group On Infrared Materials, Tysons Corner, Virginia (2001).

[48] J. Phillips, D. Edwall, D. Lee and J. Arias, "Control of composition and detector cutoff for long-wavelength HgCdTe grown by molecular beam epitaxy", Military Sensing Symposia Specialty Group On Infrared Materials, Tysons Corner, Virginia (2001).

[49] J. D. Phillips, D. D. Edwall and D. L. Lee, "Control of VLWIR detector cutoff wavelength", U.S. Workshop On The Physics And Chemistry Of II-VI Materials, Orlando, Florida, USA (2001).

[50] P. S. Wijewarnasuriya, M. Zandian, J. Phillips, D. Edwall, R. E. DeWames, G. Hildebrandt, J. Bajaj, J. Arias, A. I. D'Souza and F. Moore, "Advances in large area HgCdTe photovoltaic detectors for remote sensing applications", SPIE International Symposium on Optical Science and Technology, San Diego, California (2001).

[51] P. S. Wijewarnasuriya, M. Zandian, J. Phillips, D. Edwall, G. Hildebrandt, J. Bajaj, J. Arias, A. I. D'Souza and F. Moore, "Advances in larger area HgCdTe photovoltaic detectors for remote sensing applications", U.S. Workshop On The Physics And Chemistry Of II-VI Materials, Orlando, Florida (2001).

[52] (INVITED) P. Bhattacharya, S. Krishna, J. D. Phillips, D. Klotzkin and P. J. McCann, "Quantum dot carrier dynamics and far-infrared devices", Photonics Taiwan, Taipei, Taiwan (2000).

[53] (INVITED) P. Bhattacharya, S. Krishna, J. D. Phillips, P. J. McCann and K. Namjou, "Carrier dynamics in self-organized quantum dots and their applications to long-wavelength sources and detectors", XIth International Conference on Molecular Beam Epitaxy, Beijing, China (2000).

[54] (INVITED) P. Bhattacharya, S. Krishna, D. Zhu, J. Phillips, D. Klotzkin, O. Qasaimeh, W. Zhou, J. Singh, P. J. McCann and K. Namjou, "Optoelectronic device applications of self-organized In(Ga,Al)As/Ga(Al)As quantum dots", Materials Research Society Spring Meeting, (2000).

[55] D. Edwall, J. Phillips, D. Lee and J. Arias, "Composition control of long wavelength MBE HgCdTe using in situ spectroscopic ellipsometry", U.S. Workshop on the Physics and Chemistry of II-VI Materials, Albuquerque, New Mexico (2000).

[56] J. Phillips, D. Edwall, D. Lee and J. Arias, "Growth of HgCdTe for long-wavelength infrared detectors using automated control from spectroscopic ellipsometry measurements", 19th North American Conference On Molecular Beam Epitaxy, Tempe, Arizona (2000).

[57] (INVITED) P. Bhattacharya, J. Phillips, S. Krishna, O. Qasaimeh and W. Zhou, "Carrier dynamics and ultrafast photonic device application of self-organized quantum dots", Femtosecond Science and Technology Conference, Chiba, Japan (1999).

[58] R. M. Biefeld, S. R. Kurtz and J. D. Phillips, "Exploring New Active Regions for Type I InAsSb Strained-Layer Lasers", 9th Biennial Workshop On Organometallic Vapor Phase Epitaxy, Ponte Vedra Beach, Florida (1999).

[59] (INVITED) R. M. Biefeld and J. D. Phillips, "Growth of InSb on GaAs substrates using InAlSb buffers for magnetic field sensor applications", Materials Research Society Fall Meeting, Boston, Massachussetts (1999).

[60] R. M. Biefeld, J. D. Phillips and S. R. Kurtz, "InAsSb/InPSb Strained-Layer Superlattice Growth Using Metal-Organic Chemical Vapor Deposition", 11th American Conference On Crystal Growth & Epitaxy, Tucson, Arizona (1999).

[61] R. M. Biefeld, J. D. Phillips and S. R. Kurtz, "The growth of InAsSb/InAs/InPSb/InAs mid-infrared emitters by metal-organic chemical vapor deposition", Materials Research Society Fall Meeting, Boston, Massachussetts (1999).

[62] (INVITED) S. Krishna, J. Phillips, P. Bhattacharya and S. Kennerly, "Self-organized quantum dot intersubband detectors: Carrier dynamics and performance characteristics", Gordon Research Conference on Thin films and crystal growth mechanisms, Plymouth, New Hampshire (1999).

[63] (INVITED) J. Phillips, D. Klotzkin, O. Qasaimeh, W. Zhou and P. Bhattacharya, "High-speed modulation of quantum-dot lasers", IEEE/LEOS Summer Topical Meeting, San Diego, California (1999).

[64] P. Bhattacharya, K. Kamath, J. Phillips and D. Klotzkin, "Self-organized growth of In(Ga)As/GaAs quantum dots and their opto-electronic device applications", International Union of Materials Research Societies Conference, Bangalore, India (1998).

[65] P. Bhattacharya, K. Kamath, J. Phillips and D. Klotzkin, "Self-organized growth of In(Ga)As/GaAs quantum dots and their device applications", International Electron Devices and Materials Symposium, Taiwan (1998).

[66] P. K. Bhattacharya, Z. Xiangkun, K. Kamath, D. Klotzkin, J. Phillips, C. Caneau and R. Bhat, "High-speed quantum well and quantum dot lasers", *Proceedings of the SPIE The International Society for Optical Engineering* **3547**, 350-60 (1998).

[67] D. Klotzkin, J. Phillips, H. Jiang, J. Singh and P. Bhattacharya, "Electron intersubband energy level spacing in self-organized In0.4Ga0.6As/GaAs quantum dot lasers from temperature-dependent

modulation measurements", 17th North American Conference on Molecular Beam Epitaxy, State College, Pennsylvania (1998).

[68] K. K. Linder, J. Phillips, S. Krishna, Z. Mouffak and P. Bhattacharya, "Growth and electroluminescent properties of self-organized In0.4Ga0.6As/GaAs quantum dots grown on silicon", 17th North American Conference on Molecular Beam Epitaxy, State College, Pennsylvania (1998).

[69] K. K. Linder, J. Phillips, S. Krishna, O. Qasaimeh and P. Bhattacharya, "Growth and properties of self-organized In/sub 0.4/Ga/sub 0.6/As-GaAs quantum dot light emitting diodes on silicon substrates", IEEE LEOS Annual Meeting, Orlando, Florida (1998).

[70] K. K. Linder, J. Phillips, O. Qasaimeh and P. Bhattacharya, "In(Ga)As/GaAs self-organized quantum dot light emitters grown on silicon substrates", Tenth International Conference on Molecular Beam Epitaxy, Cannes, France (1998).

[71] B. Lita, R. S. Goldman, J. Phillips and P. Bhattacharya, "Nanometer-scale studies of vertical organization and evolution of stacked self-assembled InAs/GaAs quantum dots", Materials Research Society Fall Meeting, Boston, Massachussetts (1998).

[72] (INVITED) J. Phillips, P. Bhattacharya and D. Klotzkin, "Self-assembled In(Ga)As/Ga(Al)As quantum dots: High speed lasers and novel quantum dot detectors and transistors", Semiconductor Science And Technology Conference, La Jolla, California (1998).

[73] J. Phillips, K. Kamath and P. Bhattacharya, "InAs/GaAs self-organized quantum dot far-infrared detectors", Conference On Lasers And Electro-Optics, San Francisco, California (1998).

[74] J. Phillips, K. Kamath, K. T. Brock and P. Bhattacharya, "Room temperature self-organized quantum dot transistors", Device Research Conference, Charlottesville, Virginia (1998).

[75] J. D. Phillips, P. K. Bhattacharya and U. D. Venkateswaran, "Photoluminescence studies on self-organized InAlAs/AlGaAs quantum dots under pressure", Eighth International Conference on High Pressure Semiconductor Physics, Thessaloniki, Greece (1998).

[76] K. Kamath, H. Jiang, D. Klotzkin, J. Phillips, T. Sosnowski, T. Norris, J. Singh and P. Bhattacharya, "Strain tensor, electronic spectra and carrier dynamics in In(Ga)As/GaAs self-assembled quantum dots", IEEE International Symposium on Compound Semiconductors, Santa Barbara, California (1997).

[77] D. Klotzkin, K. Kamath, T. Sosnowksi, J. Phillips, T. Norris and P. Bhattacharya, "Modulation properties and the phonon bottleneck in self-organized single and multilayer In/sub 0.4/Ga/sub 0.6/As/GaAs quantum dot room temperature lasers", IEEE Cornell University Conference, Ithaca, New York (1997).

[78] J. Phillips, K. Kamath, X. Zhou, N. Chervela and P. Bhattacharya, "Intersubband absorption and photoluminescence in Si-doped self-organized InAs/Ga(Al)As quantum dots", 16th North American Conference on Molecular Beam Epitaxy, Ann Arbor, Michigan (1997).

[79] K. Kamath, J. Phillips, T. Sosnovski, X. Zhang, T. Norris and P. Bhattacharya, "Room temperature operation of MBE self-organized InGaAs quantum dot lasers", IEEE International Semiconductor Laser Conference, Haifa, Israel (1996).

[80] J. Phillips, K. Kamath, T. Sosnowski, T. Norris and P. Bhattacharya, "Room temperature luminescence and 1 mu m junction laser operation of In/sub x/Ga/sub 1-x/As/GaAs quantum dot lasers", IEEE LEOS Annual Meeting, Boston, Massachussets (1996).

[81] K. Kamath, J. Phillips, J. Singh and P. Bhattacharya, "Large blueshift in the photoluminescence of pseudomorphic InGaAs/GaAs quantum wells grown in patterned (100) GaAs grooves and ridges with vertical sidewalls", 15th North American Conference on Molecular Beam Epitaxy, College Park, Maryland (1995).