

**THEDA DANIELS-RACE, Ph.D.**  
**Michel B. Voorhies Distinguished Professor**

**LOUISIANA STATE UNIVERSITY**  
School of Electrical Engineering and Computer Science  
Division of Electrical and Computer Engineering  
3325 Patrick F. Taylor Hall  
Baton Rouge, LA 70803  
tel: (225) 578-5623; fax: (225) 578-5200  
email: tdrace@lsu.edu

**Research**

**Current:** Nanoscale electro-optical phenomena in hybrid (inorganic-organic) electronic materials and device structures. PI for AHEMS (Applied Hybrid Electronic Materials & Structures) Laboratory.  
**Previous:** Growth and characterization of III-V materials and devices. Bandgap engineered semiconductors. Electro-optical transport phenomena.

**Employment**

**Louisiana State University**

Professor of Electrical & Computer Engineering (ECE), 2015-present  
Associate Professor (ECE), 2003-2015

**Duke University**, ECE Faculty, 1989-2003

**The University of Texas at Austin**/Microelectronics Research Center  
Visiting Faculty, Spring 1995

**Education**

**Cornell University**, Electrical Engineering, PhD 1990

Major Professor: Dr. Lester F. Eastman

Dissertation: *A Spectrometric Study of High Energy Electrons Using Planar Doped Barrier Launchers*

**Stanford University**, Electrical Engineering, MS 1985

**Rice University**, Electrical Engineering, BS 1983

**Honors/Professional Societies**

- ELATE (Executive Leadership in Academic Technology & Engineering) Fellow
- Michel B. Voorhies Distinguished Professorship
- LSU Office of Strategic Initiatives/Faculty Panelist
- Carl Storm Minority Fellowship/Gordon Conference
- LSU-Clayton Award Mentor
- AT&T Fellow (Cooperative Research Fellowship Program)
- Graduate Engineering Minorities (GEM) Fellow
- Who's Who in Science and Engineering
- Who's Who Among American Colleges and Universities.
- Eta Kappa Nu, Engineering Honor Society

•Member: IEEE, American Physical Society, Materials Research Society, National Society of Black Engineers, Society of Women Engineers, National Society of Black Physicists, American Vacuum Society.

### **Selected (past) Professional Activities**

- National Science Foundation: Committee of Visitors
- Gordon Research Conference
- 2<sup>nd</sup> IUPAP International Conference on Women in Physics: US Delegation
- National Science Foundation CPCoM (Center of Physics and Chemistry of Materials: External Advisory Board
- American Physical Society: Committee on Minorities
- National Science Foundation: US-Africa Advanced Studies Institute on Photon Interactions with Atoms and Molecules
- National Society of Black Physicists: Conference Planning Committee
- North American Molecular Beam Epitaxy Conference: Program Committee/Session Chair
- North Carolina Section of the Materials Research Society: Past President
- Department of Energy: Site Reviewer
- United States of America's Council of Advisors on Science and Technology: Conference Panelist

### **Invention Disclosures**

T. Daniels-Race, K. Kanakamedala, C. O'Loughlin, "Faraday Electrospray and Electrospinning." Filed with the LSU Office of Intellectual Property, Commercialization & Development, 2015.

M. Feldman and T. Daniels-Race, "Coupler from Fiber to Spectrometer." Filed with the LSU Office of Intellectual Property, Commercialization & Development, January 2013.

### **Publications**

#### **Book Chapter**

**Daniels-Race, T.** "Nanodevices," Feldman, M. (ed.), *Nanolithography: The Art of Fabricating Nanoelectronics, Nanophotonics and Nanobiology Devices and Systems*. 1<sup>st</sup> ed. Cambridge (UK): Woodhead Publishing, 2013.

#### **Refereed Journal Articles**

S Maulik, S Basu, K Kanakamedala, **T Daniels-Race**, "A Review of Atomic Scale Characterization Techniques of Molybdenum Disulfide (MoS<sub>2</sub>)," *Journal of Electronic Materials* 48 (6), 3451-3458 (2019).

S Maulik, S Basu, **T Daniels-Race**, "Dispersed Molybdenum Disulfide Deposition onto a Conducting Substrate Using a Voltage Controlled Deposition Technique," *Advanced Science, Engineering and Medicine* 10 (12), 1224-1226 (2018).

S Maulik, A Sarkar, S Basu, **T Daniels-Race**, "Voltage-Controlled Spray Deposition of Multiwalled Carbon Nanotubes on Semiconducting and Insulating Substrates," *Journal of Electronic Materials* 47 (8), 4604-4609 (2018).

S Maulik, S Basu, HC Hou, **T Daniels-Race**, "Voltage-Controlled Deposition of Dispersed

Carbon Nanotubes onto a Conducting Substrate Without a Catalyst,” *Advanced Science, Engineering and Medicine* 10 (6), 564-567 (2018).

Srismrita Basu, Hsuan-Chao Hou, Debsmita Biswas, Subhodip Maulik, **Theda Daniels-Race**, Mandi Lopez, Michael Mathis, Martin Feldman, “A Needle Probe to Detect Surface Enhanced Raman Scattering (SERS) Within Solid Specimen,” *Review of Scientific Instruments* **88**, 023107-1-023107-4 (2017).

S Basu, S Maulik, HC Hou, **T Daniels-Race**, M Feldman, “Surface-Enhanced Raman Spectroscopic Substrate Utilizing Gold Nanoparticles on Carbon Nanotubes,” *Journal of Applied Physics* 122 (17), 175107 (2017)

S Basu, HC Hou, D Biswas, **T Daniels-Race**, M Lopez, J Michael Mathis, M. Feldman, “Single-Fiber Surface Enhanced Raman Scattering Probe,” *Journal of Vacuum Science & Technology B, Nanotechnology and Microelectronics: Materials, Processing, Measurement, and Phenomena* 35 (6), 06GF01 (2017).

Kalyan Kanakamedala, Jared DeSoto, Anirban Sarkar, and **Theda Daniels Race**, “Study of Electrospray Assisted Electrophoretic Deposition of Carbon Nanotubes on Insulator Substrates,” *Electronic Materials Letters* **11** (6), 949-956 (2015).

Anirban Sarkar, Kalyan Kanakamedala, Naveen N. Jagadish, Atiya Jordan, Susmita Das, Noureen Siraj, Isiah M. Warner, and **Theda Daniels-Race**, “Electro-Optical Characterization of Cyanine-Based GUMBOS and nanoGUMBOS,” *Electronic Materials Letters* **10** (5), 879-885 (2014).

Jeonghwan Kim, Dooyoung Hah, **Theda Daniels-Race**, and Martin Feldman, “Clinical Probe Utilizing Surface Enhanced Raman Scattering,” *Journal of Vacuum Science & Technology B* **32** (6), 06FD02 (2014).

A. Sarkar, K. Kanakamedala, M. D. Rajathadripura, N. N. Jagadish, P. K. S. Magut, S. de Rooy, S. Das, B. El-Zahab, I. M. Warner, and **T. Daniels-Race**, “Electro-Optical Characterization of NanoGUMBOS,” *Electronic Materials Letters* **10** (4), 775-781 (2014).

A. Sarkar, H. Wang, and **T. Daniels-Race**, “Surface Enhanced Raman Spectroscopy on Silver-Nanoparticle-Coated Carbon-Nanotube Networks Fabricated by Electrophoretic Deposition,” *Electronic Materials Letters* **10** (2), 325-335 (2014).

Jeonghwan Kim, Kyung-Nam Kang, Anirban Sarkar, Pallavi Malempati, Dooyoung Hah, **Theda Daniels-Race**, and Martin Feldman, “Nanorough Gold for Enhanced Raman Scattering,” *J. Vac. Sci. Technol. B* **31** (6), 06Fe02\_1-06FE02\_4 (2013).

A. Sarkar and **T. Daniels-Race**, “Electrophoretic Deposition of Carbon Nanotubes on 3-Amino-Propyl-Triethoxysilane (APTES) Surface Functionalized Silicon Substrates,” *Nanomaterials* **3**, 272-288 (2013).

**T. Daniels-Race** and S. Thiruvengadam, “Fluorescence Spectroscopy Characterization of Cadmium Sulfide Quantum Dots on Metal, Insulator, and Semiconductor Substrates,” *Microwave Optical & Technology Letters* **53**, 1018-1021 (2011).

- T. Daniels-Race** and S. Thiruvengadam, "Characterization of AOT Capped Cadmium Sulfide Quantum Dots Using Fluorescence Spectroscopy," *Microwave Optical & Technology Letters* **52**, 912-913 (2010).
- H. X. Li, **T. Daniels-Race**, and M.-A. Hasan, "Effects of the Matrix on Self-Organization of InAs Quantum Nanostructures Grown on InP Substrates," *Applied Physics Letters* **80**, 1367-1369 (2002).
- H. X. Li, **T. Daniels-Race**, and M.-A. Hasan, "Lateral Correlation of InAs/AlInAs Nanowire Superlattices on InP (001)," *Journal of Vacuum Science and Technology B* **19**, 1471-1474 (2001).
- Q. Meng, **T. Daniels-Race**, W. P. Lowe, "Structural Calibration of Tensile-Strained GaAs/InAlAs Quantum Wells," *Microwave and Optical Technology Letters* **28**, 143-147 (2001).
- H. X. Li, **T. Daniels-Race**, and M.-A. Hasan, "Photoluminescence Properties of Dense InAs/AlInAs Quantum Wire Arrays," *Journal of Crystal Growth* **216** (1), 527-531 (2000).
- L. J. Olafsen, **T. Daniels-Race**, R. E. Kendall, and S. W. Teitsworth, "Photoluminescence of n-i-n GaAs/AlAs Single Quantum Well Structures Under Electric Field Bias," *Superlattices and Microstructures* **27** (1), 39-51 (2000).
- H. X. Li, Q. Zhuang, Z. Wang, and **T. Daniels-Race**, "Influence of Indium Composition on the Surface Morphology of Self-Organized  $\text{In}_x\text{Ga}_{1-x}\text{As}$  Quantum Dots on GaAs Substrates," *Journal of Applied Physics* **87** (1), 188-191 (2000).
- M. D. Williams, A. L. Greene, **T. Daniels-Race**, and R. M. Lum, "Comparison of InGaAs (100) Grown by Chemical Beam Epitaxy and Metal Organic Chemical Vapor Deposition," *Applied Surface Science* **157** (3), 123-128 (2000).
- H. X. Li, Q. Zhuang, Z. Wang, and **T. Daniels-Race**, "High Density InAs Quantum Wells Realized In-situ on (100) InP," *Applied Physics Letters* **75** (8), 1173-1175 (1999).
- H. X. Li, J. Wu, Z. Wang, and **T. Daniels-Race**, "Self-organization of Wire-like Nanostructures on InP (100)," *Journal of Crystal Growth* **205** (4), 613-617 (1999).
- H. X. Li, **T. M. Daniels-Race**, and Z. G. Wang, "Growth Mode and Strain Relaxation of InAs on InP (111)A Grown by Molecular Beam Epitaxy," *Applied Physics Letters* **74** (10), 1388-1390 (1999).
- H. X. Li, **T. M. Daniels-Race**, Q. R. Meng, and Z. G. Wang, "Structural and Optical Characterization of InAs Nanostructures Grown on High-Index InP Substrates," *Journal of Crystal Growth* **200** (1), 321-325 (1999).
- Q. Meng, **T. Daniels-Race**, Z. J. Luo, and L. E. McNeil, "The Polarization Sensitivity of Optical Absorption in Tensile Strained GaAs/InAlAs Double Quantum Wells," *Superlattices and Microstructures* **25** (4), 583-590 (1999).

H. X. Li, **T. Daniels-Race**, Z. Wang, "In-Situ Self-Organization of Two and Three Dimensional High-Density InAs Quantum Wire Arrays on (100) InP," *Journal of Electronic Materials* **28** (7), 1011-1012 (1999).

L. J. Blue, **T. Daniels-Race**, C. N. Yeh, and L. E. McNeil, "Effect of Well Width Variation on Type I/Type II Photoluminescence in GaAs/AlAs Single Quantum Wells," *Superlattices and Microstructures* **21** (2), 187-193 (1997).

Vishnu Balan, **T. Daniels-Race**, and L. E. McNeil, "Photoluminescence Study of Highly Doped Tensile Strained GaAs/In<sub>0.07</sub>Al<sub>0.93</sub>As Quantum Wells," *Microwave and Optical Technology Letters* **16** (1), 7-11 (1997).

L. J. Blue, **T. Daniels-Race**, R. E. Kendall, C. R. Schmid, and S. W. Teitworth, "Dependence of Current-Voltage Characteristics on Al Mole Fraction in GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As Asymmetric Double Barrier Structures," *Journal of Vacuum Science and Technology B* **15** (3), 696-701 (1997).

**T. Daniels-Race** and K. Banoo, "Engineering the I-V Characteristics of an Asymmetric Double Barrier Device with Variable Period GaAs/AlAs Superlattice Injectors," *Thin Solid Films* **300** (1), 202-207 (1997).

K. Banoo, **T. Daniels-Race**, C. R. Wallis, and S. W. Teitworth, "Phonon Scattering in Novel Superlattice Asymmetric Double Barrier Resonant Tunneling Structure," *Journal of Vacuum Science and Technology B* **14** (4), 2725-2730 (1996).

C. N. Yeh, L. E. McNeil, **T. Daniels-Race**, and L. J. Blue, "Photoluminescence Measurements of Tensile-Strained GaAs/In<sub>0.7</sub>Al<sub>0.93</sub>As Quantum Wells," *Journal of Applied Physics* **79** (6), 3192-3195 (1996).

C. N. Yeh, L. E. McNeil, L. J. Blue, and **T. Daniels-Race**, "Measurement of the GaAs/AlAs Valence-Band Offset from a Single Quantum Well Near the Gamma-X Crossover," *Journal of Applied Physics* **77** (9), 4541-4543 (1995).

**T. Daniels-Race** and S. Yu, "Effect of spacer layer thickness on tunneling characteristics in asymmetric AlAs/GaAs/AlAs double barrier structures," *Solid State Electronics* **38** (7), 1347-1349 (1995).

**T. Daniels-Race**, K. Yamasaki, W. J. Schaff, P. J. Tasker, and L. F. Eastman, "Investigation of Hot-electron Injection and Ballistic Transport Using Ultrathin Planar Doped Barrier Launchers in Vertical Field Effect Spectrometer Structures," *J. Appl. Phys.* **72** (12), 5735-5742 (1992).

**T. Daniels-Race**, K. Yamasaki, W. J. Schaff, and L. F. Eastman, "Observation of Ballistic Transport in Hot-Electron Vertical FET Spectrometer Using Ultra-thin Planar-Doped Barrier Launcher," *Elec. Lett.* **27** (13), 1144-1145 (1991).

Y. H. Won, K. Yamasaki, **T. Daniels-Race**, P.J. Tasker, W. J. Schaff, and L. F. Eastman, "A High Voltage-Gain GaAs Vertical Field-Effect Transistor with an InGaAs/GaAs Planar-Doped Barrier Launcher," *IEEE Electron. Dev. Lett.* **11** (9), 376-378 (1990).

K. Yamasaki, **T. Daniels-Race**, S. S. Lu, W. J. Schaff, P. J. Tasker, and L. F. Eastman, "Determination of Electron-Energy Distribution in a GaAs Vertical Field-Effect Transistor with Hot-Electron Injection," *Appl. Phys. Lett.* **54** (3), 274-276 (1989).

Y. H. Won, K. Yamasaki, P. J. Tasker, **T. Daniels-Race**, W. J. Schaff, and L.F. Eastman, "Vertical Field-Effect Transistor with an InGaAs/GaAs Pseudomorphic Planar Doped Barrier Launcher," *IEEE Trans. Electron Dev.* **36** (11), 2609-2610 (1989).

Y. H. Won, K. Yamasaki, **T. Daniels-Race**, P. J. Tasker, W. J. Schaff, and L. F. Eastman, "Improved Performance by Optimised Planar Doped Barrier Launcher in GaAs Vertical FET with Very Short Channel Width," *Electron. Lett.* **25** (21), 1413-1414 (1989).

K. Yamasaki, **T. Daniels-Race**, J. R. Wendt, W. J. Schaff, P. J. Tasker, and L. F. Eastman, "Electron Velocity Enhancement by Planar-Doped Barrier Source in GaAs Vertical FET," *Electron. Lett.* **24** (22), 1383-1384 (1988).

### Conference Presentations/Proceedings/Publications

S. Maulik, S. Basu, and **T. Daniels-Race**, "Electrospray-Assisted Carbon Nanotube Deposition on Aluminum Without A Binding Agent," Bulletin of the American Physical Society **61** (19), 2016.

K. Kanakamedala and **T. Daniels-Race**, "Alternativem of electrospraying for scalable deposition of nanomaterials," Bulletin of the American Physical Society **59** (18), 2014.

**Theda Daniels-Race**, Madhavi D. Rajathadripura, and Kalyan Kanakamedala, "Characterization of functionalized substrates for hybrid electronic materials applications," Gordon Research Conference, Biddeford, ME, July 13-18, 2014 (poster).

Noureen Siraj, Susmita Das, Farhana Hasan, Kalyan Kanakamedala, **Theda Daniels-Race**, Isiah M Warner, "Evaluation of thin films based on fluorescent and conductive GUMBOS," Abstracts of Papers of the American Chemical Society **245**, 2013.

Jared Desoto<sup>1</sup>, Anirban Sarkar, and **Theda Daniels-Race**, "A study of electrophoretic deposition (EPD) of carbon nanotubes on insulator substrates," Bulletin of the American Physical Society **58** (17), 2013.

Madhavi D. Rajathadripura, Kalyan C. Kanakamedala, and **T. Daniels-Race**, "Characterization of surface morphology of biopolymer coated substrates using non-contact atomic force microscopy," 16<sup>th</sup> International Conference on Non-Contact Atomic Force Microscopy, Hyattsville, MD, August 5-9, 2013 (poster)<sup>2</sup>.

Anirban Sarkar and **Theda Daniels-Race**, "Adhesion measurement of carbon nanotube films deposited on silicon substrates," Bulletin of the American Physical Society **57** (16), 2012.

---

<sup>1</sup> Obtained both a contributed talk spot and a Student Travel Grant via the American Physical Society (APS) for an *undergraduate* (DeSoto) to make a presentation at the 80<sup>th</sup> Annual SESAPS Conference.

<sup>2</sup> Research accepted as a 1<sup>st</sup> time applicant to the 16th International Conference on Non-Contact Atomic Force Microscopy (see above). **This is considered to be one of the most prestigious conferences (if not *the* most prestigious) in the field of AFM research.** Contributed works are reviewed by an international panel of peer reviewers that select a limited number of poster presenters in addition to even fewer, and primarily invited, talks.

Kalyan Kanakamedala, Noureen Siraj, Madhavi Divakar, Farhana Hasan, Susmita Das, Susmita; Isiah Warner, and **Theda Daniels-Race**, “Morphology and conductivity studies on carbazole based GUMBOS thin films,” *Bulletin of the American Physical Society* **57** (16), 2012.

N. N. Jagadish, S. L. deRooy, A. Jordan, A. Wright, S. Das, B. El-Zahab, I. M. Warner, **T. Daniels-Race**, “Characterization of NanoGUMBOS Using Conductive-Probe Atomic Force Microscopy,” *Bulletin of the American Physical Society* **56** (9), 2011.

K. Kanakamedala, S. L. deRooy, S. Das, B. El-Zahab, I. M. Warner, **T. Daniels-Race**, “Determination of the Current-Voltage Signatures of NanoGUMBOS,” *Bulletin of the American Physical Society* **56** (9), 2011.

**T. Daniels-Race**, K. Kanakamedala, N. N. Jagadish, S. L. deRooy, A. Jordan, S. Das, B. El-Zahab, and I. M. Warner, “Electrical Characterization of NanoGUMBOS,” *Organic Microelectronics and Optoelectronics Workshop VII*, San Francisco, CA, July 18-20, 2011 (poster).

**T. Daniels-Race**, “Characterization of Hybrid Electronic Materials for Molecular Based Device Electronics,” *Bulletin of the American Physical Society* **53** (2), 439 (2008).

R. Ramachandran, K. M. Lewis, S. Thiruvengadam, Royston Siow, and **T. Daniels-Race**, “AFM Study of Current Transport through Porphyrin Based Molecules,” *TMS Electronic Materials Conference*, Pennsylvania State University, University Park, PA, June 28-30, 2006.

**T. Daniels-Race**, “Molecular Beam Epitaxial Control of Quantum Well Based Phenomena in III-V Optoelectronic Structures,” *US-Africa Advanced Studies Institute on Photon Interactions with Atoms and Molecules*, Durban, S. Africa, November 3-12, 2005.

T. Arockiadass, N.S. Sundaram, F.P. Xavier, S. Thiruvengadam, and **T. Daniels-Race**, “Development of Collagen Based Organic Semiconductor,” *AVS 52<sup>nd</sup> International Symposium & Exhibition* **23** (5), 2005.

K.M.Lewis, Raghu Ramachandran, Sathish Thiruvengadam, Royston Siow, **Theda Daniels-Race**, “Characterization of Porphyrin-Based Molecules for Molecular Electronics by Conductive Probe Atomic Force Microscopy,” *Joint Meeting of the National Society of Black Physicists and the National Society of Hispanic Physicists*, Orlando, FL, February 16-19, 2005.

Raghu Ramachandran, Kim Lewis, Sathish Thiruvengadam, Royston Siow, and **Theda Daniels-Race**, “CP-AFM Study of Current Transport Through Porphyrin Based Molecules,” *Bulletin of the American Physical Society*, **50**(1), 926 (2005).

Sathish Thiruvengadam, Kim M. Lewis, Raghu Ramachandran, Royston Siow, and **Theda Daniels-Race**, “Characterization of the Porphyrin Molecule as an Electronic Component,” *Bulletin of the American Physical Society* **50** (1), 926 (2005).

P. G. Datskos, T. Thundat, D. M. Nicholson, G. Muralidharan, S. Rajic, **T. M. Daniels-Race**, and H. X. Li, “Electron Tunneling in Stepped Nanostructured Barrier,” *Tokyo 2001-Scanning Probe Microscopy, Sensors, and Nanostructures*, Makuhari, Chiba, Japan, May 27-31, 2001.

Hanxuan Li, **Theda Daniels-Race**, and Mohamed-Ali Hasan, "Lateral correlation of InAs/AlInAs nanowire superlattices on InP (001)," Papers from the 19<sup>th</sup> North American Conference on Molecular Beam Epitaxy-Nanostructures, *Journal of Vacuum Science & Technology B* **19** (4), 1471 (2001).

H. X. Li, **T. Daniels-Race**, and M.-A. Hasan, "Matrix Effect on the Stacking Behavior of InAs Nanostructures Grown on InP (001) Substrates," Electronic Materials Conference (EMC), South Bend, IN, June 27-29, 2001.

**T. Daniels-Race**, Q. Meng, L. E. McNeil, and W.P. Lowe, "Examination of GaAs/InAlAs Tensile Strained Quantum Well Growth Characteristics for Polarization Independent Phenomena," Eleventh International Conference on Molecular Beam Epitaxy, Beijing, China, September 10-15, 2000 (poster).

H. X. Li, **T. Daniels-Race**, and M.-A. Hasan, "Shape Transition of InAs Islands on InP (111)A," Materials Research Society Proceedings **618**, 109 (2000).

**T. Daniels-Race**, "Characterization of Variable Quantum-Well Structures Grown by Solid-Source Molecular Beam Epitaxy," Proceedings of the 23<sup>rd</sup> Annual Day of Scientific Lectures and 19<sup>th</sup> Annual Meeting, NC A&T University, Greensboro, NC, March 15-18, 2000.

Q. Meng and **T. Daniels-Race**, "Tensile Strain in GaAs/InAlAs Quantum Wells," Pratt School of Engineering Graduate Research Poster Session, December 3, 1999 (poster).

Q. Meng, **T. Daniels-Race**, and W. P. Lowe, "Double Crystal X-ray Diffraction Analysis of Tensile Strained GaAs Quantum Wells Grown on Relaxed InAlAs Grid Layers," Bulletin of the American Physical Society **44**, 40 (1999).

H. X. Li, **T. Daniels-Race**, Z. Wang, "Indium Composition Effect on the Self-Organization of  $\text{In}_x\text{Ga}_{1-x}\text{As}$  Quantum Dots," Bulletin of the American Physical Society **44**, 20 (1999).

H. X. Li, **T. Daniels-Race**, Z. Wang, "In-Situ Self-Organization of Two and Three Dimensional High-Density InAs Quantum Wire Arrays on (100) InP, Proceedings of the Electronic Materials Conference (EMC), Santa Barbara, CA, June 30-July 2, 1999.

Q. Meng and **T. Daniels-Race**, "The Essence of Absorption Modulation in Double Well Structures," North Carolina Section Meeting of the Materials Research Society, Research Triangle Park, NC, November 20, 1998.

Tze-tzen Ong and **T. Daniels-Race**, "Software Automation Enhancement of Riber 32 R&D Molecular Beam Epitaxy (MBE) Equipment," 65<sup>th</sup> Annual Southeastern Section Meeting of the American Physical Society (Society of Physics Students Meeting: Undergraduate Research Papers/Session DE), Miami, FL, November 13-15, 1998.

Q. Meng, **T. Daniels-Race**, Z. J. Luo, and L. E. McNeil, "Electro-optical Characterization of Asymmetric Tensile Strained Double Quantum Wells," Bulletin of the American Physical Society **43**, 1609 (1998).



Q. Meng and **T. Daniels-Race**, “Optical Absorption in Tensile-Strained GaAs/InAlAs Quantum Wells,” Proceedings of the Electronic Materials Conference (EMC), Charlottesville, VA, June 24-26, 1998.

Z. J. Luo, L. E. McNeil, Q. R. Meng, and **T. Daniels-Race**, Photoluminescence Measurement of Tensile Strained GaAs/InAlAs Double Quantum Wells,” Bulletin of the American Physical Society **42**, 1789 (1997).

L. J. Blue, S. W. Teitsworth, **T. Daniels-Race**, and H. O. Everitt, “Photoluminescence of Type-I/Type-II Transitions in GaAs/AlAs Single Quantum Wells,” Bulletin of the American Physical Society **42**, 189 (1997).

Q. Meng, **T. Daniels-Race**, Z. J. Luo, and L. E. McNeil, “Coupling Effects of Tensile Strained GaAs/InAlAs Double Quantum Wells (DQWs),” Proceedings of the International Semiconductor Device Research Symposium (ISDRS), Charlottesville, VA, December 10-13, 1997.

K. Banoo and **T. Daniels-Race**, “Resonant Tunneling with Superlattice Emitters,” Proc. IEEE Southeastcon, Raleigh, NC, March 1995.

K. Banoo, **T. Daniels-Race**, C. R. Wallis, S. W. Teitsworth, “Study of Phonon Scattering in Novel Superlattice Emitter Asymmetric Double Barrier Resonant Tunneling Structure,” North Carolina Section Meeting of the Materials Research Society, Research Triangle Park, NC, November 1995.

C. R. Wallis, S. W. Teitsworth, L. J. Blue, and **T. Daniels-Race**, “Alloy Dependence of Phonon-Assisted Tunneling Currents in GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As Double Barrier Structures,” Bulletin of the American Physical Society **40**, 21 (1995).

L. J. Blue, S. W. Teitsworth, **T. Daniels-Race**, C.-N. Yeh, and L. E. McNeil, “Photoluminescence in GaAs/AlAs Single Quantum Wells Under Electric Field Bias,” Bulletin of the American Physical Society **40**, 75 (1995).

K. Banoo and **T. Daniels-Race**, “Study of I-V Characteristics of Asymmetric Double Barrier Resonant Tunneling Diodes with Superlattice Emitters,” Proceedings of the International Semiconductor Device Research Symposium (ISDRS) **1**, 123 (1995).

C. N. Yeh, L. E. McNeil, L. J. Blue, and **T. Daniels-Race**, “Photoluminescence Study of Gamma-X Mixing in GaAs/AlAs Quantum Wells,” Bulletin of the American Physical Society **39**, 542 (1994).

S. H. Nagaraja, **T. Daniels-Race**, C. R. Wallis, P. J. Turley, C. N. Yeh, and L. E. McNeil, “A Study of Aluminum Flux Variation Effects on Asymmetric Double Barrier Resonant Tunneling Diodes,” Proceedings of the International Semiconductor Device Research Symposium (ISDRS-93), 791 (1993).

#### Other publications

Barbara L. Whitten, Beverly K. Hartline, **Theda Daniels-Race**, and Yevgeniya V. Zastavker,

“What Can We Learn From International Women in Physics?” *Society of Women Engineers Magazine* **52** (1), 62-65 (Winter 2006).

Kimberly S Budil, Karen E Daniels, **Theda Daniels-Race**, Melissa Eblen-Zayas, Beverly K Hartline, R Hazeltine, Apriel K Hodari, K Renee Horton, Rachel Ivie, L Kay, LJ Martinez-Miranda, A Michelman-Ribeiro, M Ong, JI Rudati, J Valentine, B Whitten, E Williams, YV Zastavker, “Women in Physics in the United States: A Progress Report,” AIP Conference Proceedings **795** (1), 175-178 (2005).

### **Invited Presentations**

"Observation of Ballistic Electron Injection with a Narrow Energy Distribution Using An Ultra-thin PDB Launcher," 2nd Annual Symposium on System Theory & Communications, Signal Processing Expert Systems and ASIC VLSI Design, North Carolina A&T University; Spring 1990.

"The Physics and Technology of MBE or MBE 1-2-3's as Applied to Novel Device Heterostructures," University of Wisconsin-Madison Department of Electrical Engineering Seminar Series; Fall 1992.

"Growth of Novel Asymmetric Double Barrier Structures," Physics of Materials and Materials Science Meeting, Howard University; Fall 1994.

"MBE Growth and Characterization of Quantum Structures," Microelectronics Research Center Seminar, The University of Texas at Austin; Fall 1994.

"An Examination of Molecular Beam Epitaxially Grown Structures for Electron-Phonon Interactions in Quantum Wells," Science-Technology Center Seminar Series, The University of Texas at Austin; Spring 1995.

"Quantum Phenomena in Double Barrier Structures," Packard Lecture Series Program, Morgan State University; Spring 1995.

"An Examination of MBE-Grown Structures for Electron-Phonon Interactions in Quantum Wells," Condensed Matter Physics Seminar Series, University of North Carolina at Chapel Hill; Fall 1995.

"MBE Controlled Phenomena in Quantum Well Based Structures," Physics Department Colloquium Series, University of Iowa; Fall 1997.

"MBE Controlled Phenomena in Quantum Well Based Structures," Department of Chemical Engineering, North Carolina A&T University; Fall 1997.

"An Examination of Electron-Phonon Interactions in MBE Grown Quantum Wells," Department of Physics Seminar Series, Clark Atlanta University; Summer 1998.

"Molecular Beam Epitaxial Growth of Phonon-Assisted Tunneling Structures," Physics Department Colloquium, University of North Carolina-Charlotte; Fall 1998.

"Women in Engineering: So Where is My Sister?" Helen G. Edmonds New South Annual Lecture Series and Conference: Global Women, Global Village, North Carolina Central University, Durham, NC; Spring 1999.

"Quantum Effects in Resonant Tunneling Structures," Physics Department Colloquium, Wake Forest University, Winston-Salem, NC; Spring 1999.

"Characterization of Variable Quantum Well Structures Grown by MBE," Department of Electrical and Computer Engineering Seminar Series, Virginia Commonwealth University, Richmond, Virginia; Spring 2000.

"Experiences and Insights of an African-American Woman in Science and Engineering," Urban Girls: Entering the New Millennium Conference, The State University of New York, University at Buffalo, Buffalo, N.Y.; Spring 2000.

"Quantum Well Based MBE Grown Structures: Studies in Tunneling and Strain," Department of Chemistry Seminar Series, City College of New York; Spring 2000.

"Tensile Strain Induced Phenomena in Quantum Wells," 6th Joint Conference on Information Sciences, Research Triangle Park, North Carolina; Spring 2002.

"An Analysis of Quantum Well Based Phenomena Produced via Solid-Source Molecular Beam Epitaxially Grown Structures and Other Thoughts," Department of Physics Weekly Seminar, Southern University, Baton Rouge, Louisiana; Spring 2004.

"Molecular Beam Epitaxial Control of Quantum Well Based Phenomena in III-V Optoelectronic Structures," US-Africa Advanced Studies Institute on Photon Interactions with Atoms and Molecules, Durban, S. Africa; Fall 2005.

"Women in Physics: A Panel Discussion," Joint Meeting of the National Society of Black Physicists and the National Society of Hispanic Physicists, Boston, Massachusetts; Spring 2007.

"Characterization of Hybrid Electronic Materials for Molecular Based Device Electronics," American Physical Society (March Meeting), New Orleans, Louisiana; Spring 2008.

"If I Knew Then What I Know Now: Advice to Junior Women Faculty," 2009 NSF ADVANCE Conference-Navigating Your Pathway to Success, Virginia Commonwealth University, Summer 2009.

"The Under-Represented Majority (Part 1)," 78<sup>th</sup> Annual Meeting of the Southeastern Section of the APS, Roanoke, VA, October 19-22, 2011. (Panelist)

"The Under-Represented Majority (Part 2)," 79<sup>th</sup> Annual Meeting of the Southeastern Section of the APS, Tallahassee, FL, November 14<sup>th</sup>- 17<sup>th</sup>, 2012. (Panelist)

"Hybrid Electronic Materials from the Perspective of a 'Hybrid' Researcher," Society of Physics Students Regional Zone 7 Meeting: Eastern Michigan University, Ypsilanti, MI, March 16, 2013.

"Hybrid Electronic Materials from the Perspective of a 'Hybrid' Researcher," Society of Physics Students (Zone 10) Colloquium: Hendrix College, Conway, AR, April 2, 2013.

“Hybrid Materials: Interdisciplinary Electronics at the Nanoscale,” Conference for Undergraduate Women in Physical Sciences (WoPhyS'13), University of Nebraska-Lincoln, Lincoln, NE, October 24-26, 2013. (Plenary Speaker)

“Hybrid Electronics at the Nanoscale,” Physics and Engineering Physics Colloquium, Tulane University, New Orleans, LA, December 4, 2013.

Hidden Figures (Office of the Baton Rouge Mayor-President/LSU College of Engineering) Community Event, Fall 2016. (Panelist)

LSU Women in Engineering, Fall 2018. (Panelist)

Women in Science & Tech Careers, DragonCon: Electronics Forum, Fall 2018. (Panelist)

“LSU College of Engineering New Faculty: Must Know, Must Have, Must Do,” 2018 Leader's Forum of the Executive Leadership in Academic Technology & Engineering (ELATE) Program Lafayette Hill, PA, March 14, 2018.

Admitted Students' Day, LSU College of Engineering, Spring 2019. (Panelist)

### **Funded Research History**

•Source: North Carolina Board of Science and Technology

Title: "Growth and Electronic Measurement of Quantum Well Structures"

Amount: \$20,000 (1 of 2 co-PIs)

Awarded 1990

•Source: Dupont Young Faculty Award

Amount: \$75,000

Awarded 1990

•Source: National Science Foundation/Minority Planning Grant

Title: "Determination of Hot Electron Versus Phonon-Assisted Tunneling Effects in Double Barrier Resonant Tunneling Structures"

Amount: \$12,000

Awarded 1992

•Source: National Science Foundation

Title: "Electron-Localized Phonon Interactions in GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As Quantum Well Structures"

Amount: \$270,000 (1 of 2 co-PIs)

Awarded 1992

•Source: National Science Foundation

Title: "Polarization-Insensitive Double Quantum Wells for Electro-Optical Applications"

Amount: \$84,968

Awarded 1997

•Source: National Science Foundation

Title: Research Experiences for Undergraduates

Amount: \$5,000  
Awarded 1997

•Source: University Instrumentation Fund  
Amount: \$25,000  
Awarded 1997

•Source: Department of Energy  
Title: "Growth and Characterization of MBE Parametric Variations Upon Polarization Independent Strained Films"  
Amount: \$303,485  
Awarded 1997

•Source: Lord Foundation of North Carolina  
Title: "Optoelectronic Research Development for the School of Engineering"  
Amount: \$37,200 (with supplemental funds up to \$75,000)  
Awarded 1998

•Source: National Science Foundation  
Title: "Acquisition of a Variable Temperature Four-Circle X-ray Diffraction System"  
Amount: \$259,710 (co-PI)  
Awarded 1999

•Source: Oak Ridge National Laboratory  
Title: "Compound Semiconductor Materials Growth for Micromechanical Chemical Sensors"  
Amount: \$25,000  
Awarded 2000

•Source: Department of Energy  
Title: "Growth and Characterization of MBE Parametric Variation Upon Polarization Independent Strained Films" (renewal)  
Amount: \$300,000  
Awarded 2001

•Source: Louisiana State University  
Title: "Theoretical Investigation of a Novel Optoelectronic Low Dimensional Structure"  
Amount: \$10,000  
Awarded: 2004

•Source: Department of Energy  
Title: "Growth and Characterization of MBE Parametric Variation Upon Polarization Independent Strained Films"  
Amount: \$143,164  
Awarded: 2004

•Source: Louisiana Board of Regents  
Title: "Exploration of Novel Electronic Hybrid (Organic-Inorganic) Nanoscale Phenomena"  
Amount: \$12,000

Awarded: 2005

•Source: Louisiana Board of Regents

Title: “A Study of Opto-Electronic Transport Mechanisms in Hybrid Semiconductor Materials”

Amount: \$7,000

Awarded: 2005

•Source: Louisiana Board of Regents Enhancement

Title: Acquisition of a Micro-Raman Spectroscopy System

Amount: \$78,878 + \$47,800 LSU match (co-PI)

Awarded: 2005

•Source: Clarkson Aerospace

Title: Minority Leaders for Research in Aerospace Sensors/Radio Frequency (RF) and Electro-Optical (EO) Sensor Thrust

Amount: \$735,000 (co-PI)

Awarded: 2006

•Source: National Academy of Sciences (via NSF)

Title: Begin at the Beginning: A Strategy to Promote the Retention of Electrical and Computer Engineering (ECE) Undergraduate Women

Amount: \$500

Awarded: 2009

•Source: Louisiana Board of Regents

Title: Investigation of Solid-State Ionic Liquid Nanoparticles for Materials Engineered Device Electronics

Amount: \$10,000

Awarded: 2010

•Source: NASA/Louisiana Board of Regents

Title: Hybrid Electronic Materials for Energy/Aerospace Applications

Amount: \$30,000

Awarded: 2011

•Source: Louisiana Board of Regents

Title: Nanoscale Electronic Characterization of Hybrid Electronic Materials

Amount: \$147,194

Awarded: 2011

•Source: Dr. Kristina Johnson (Enduring Hydro) & AES Corporation

Title: Nanoscale Characterization of Hybrid Electronic Materials Research Support Fund

Amount: \$85,000

Awarded: 2011-2018ff\*

•Source: National Institutes of Health

Title: Feasibility study: endoscopic surface-enhanced Raman spectroscopy (SERS) for in situ molecular imaging application

Amount: \$148,000 (co-PI)

Awarded: 2012  
(transferred from original PI)

•Source: Clarkson Aerospace/Dept of Air Force Research Laboratory  
Title: Nanotechnology Research: Fabrication of Nano-Devices with Minimal Lithography  
Amount: \$150,010 (co-PI)  
Awarded: 2012

•Source: Louisiana Board of Regents/LIFT<sup>2</sup> Grant Program  
Title: High Throughput/Low Maintenance Electrospaying for Thin Film Deposition  
Amount: \$43,500  
Awarded: 2017

\*Ongoing funding

### **Student Research Supervision**

#### Current:

Fawwaz Hazzazi (PhD), Christopher Connell (MS/PhD), Alex Young (MS/PhD), David Hooks (MS),

PhD (LSU/Duke U.)

Subhodip Maulik  
Kalyan Kanakamedala  
Anirbar Sarkar  
Raghu Ramachandran (transferred to RPI).  
Qingru Meng  
Linda J. Blue (co-supervised)  
Kausar Banoo (transferred to Purdue)

Masters (LSU/Duke U.)

Kalyan Byrisetty  
Madhavi D. Rajathadripura  
Hao Wang  
Chen Fang  
Surendra Kumar Sunkarai  
Naveen Narayan Jagadish  
Royston Siow  
RaviShankar Madduri  
Sathish Thiruvengadam  
Vishnu Balan  
Kausar Banoo  
Satyadev H. Nagaraja  
Shau-Tsung Yu  
David Smullen (partial)

Undergraduate (LSU, Southern U., Duke U.): Elizabeth Reiner, Bryce Ferrara, James Kirsch, Evan Wong, Jared De Soto, Giovanni King, Brandon Richard, Rainier Siow, Sihon Crutcher, Joe Oswald, Kristine Singley, Jennifer McCutcheon, Jeremy Peters, Tze-tzen Ong, Renee Payne

### **Teaching (LSU)**

EE7220 (Semiconductor Devices I: Bipolar), EE7222 (Semiconductor Devices II: MOSFET), EE7260 (Semiconductor Materials), EE3232 (Solid-State Devices I), EE4332 (Solid-State Devices II), EE 7230 (Physics of Device Electronics), EE7232 (High Speed and Small Geometry Devices), Independent Study.

### **Committees (LSU)**

Division :Graduate Studies Committee; Chair Search; Computer Manager Search; Curriculum Committee; Laboratory Manager Search; Internal Advisory Committee; Scholarship Committee; PEAC (Program Evaluation & Assessment) Committee; Sub-Committee on Circuits I/II Textbook; Committee on Freshman Course(s); Faculty (Electronics Area) Search Committee; Promotions and Tenure Committee, several faculty searches.

School: School of EECS Chairman (Director) Search Committee

College: Policy Committee; Chair Review Committee, College Awards Committee, Diversity Advisory Board

University: Dean's Representative for Ph.D. Defense Committee; Engineering Dean Search Committee; Vice Chancellor for the Office of Research and Economic Development Search Committee; Provost's Committee on Student Diversity; PS-69 Investigative Committee; Materials Science & Engineering Instrumentation Committee; Educational Curriculum Committee for Materials Science & Engineering; Provost Search Committee

National: National Science Foundation's (NSF) Committee of Visitors; American Physical Society's Committee on Minorities; National Society of Black Physicists Conference Planning Committee; NSF's External Advisory Board to the Center of Physics and Chemistry of Materials (CPCoM), at Fisk University; Beyond the Double Bind Project Advisory Board (NSF sponsored)

Community Involvement: Louisiana (Legal) Disciplinary Board, Baton Rouge International School