

R. Beresford

1. Position Professor of Engineering

2. Home Address

3. Education

BS Engineering and Applied Science, Yale University, 1979

MS Engineering and Applied Science, Yale University, 1981

PhD Electrical Engineering, Columbia University, 1990

Dissertation: *Band Structure Engineering for Electron Tunneling Devices*

4. Professional Appointments

1978: Summer Student, Exploratory Magnetics, IBM T.J. Watson Research Center, Yorktown Heights NY

1979-1980: Engineer, Exploratory Bipolar Devices and Circuits, IBM T.J. Watson Research Center, Yorktown Heights NY

1981-1983: Solid State Editor, *Electronics*, McGraw-Hill, New York NY

1983-1987: Editor-in-Chief, Senior Editor; *VLSI Design*, CMP Publications, Manhasset NY.

1987-1990: Research and Teaching Assistant, Department of Electrical Engineering, Columbia University

1990-1996 Assistant Professor, Division of Engineering, Brown University

1996-2006 Associate Professor, Division of Engineering, Brown University

1996 Visiting Professor, Department of Electronic Engineering, Polytechnic University of Madrid

2006- Professor, School of Engineering, Brown University

2008-2010 Interim Associate Dean of the Faculty, Brown University

2010-2013 Associate Provost, Brown University

2014 Visiting Scholar, Massachusetts Institute of Technology

2014-2020 Senior Associate Dean for Academic Programs, School of Engineering, Brown University

2019-2020 Associate Provost for Academic Space, Brown University

2020-2021 IEEE / AAAS Congressional Science and Technology Policy Fellow

5. Completed Publications

a. Books/monographs

1. Papers from the 15th North American Conference on Molecular Beam Epitaxy (R. Beresford, ed.), *J. Vac Sci. Technol. B*, **14** (1996).

2. *Quantum Theory of Light Solutions Manual* (for *The Quantum Theory of Light*, 3/e, by Rodney Loudon), Oxford University Press: 2008 (oup.com/uk/, web distribution only).
3. Proceedings of the International Conference on Molecular Beam Epitaxy (MBE-XV), Z.R. Wasilewski, J.R. Beresford, and J.A. Gupta, ed.s, *J. Crystal Growth* **311** (2009).

c. Refereed journal articles

1. High-Speed Split-Emitter I²L/MTL Memory Cell, S.K. Wiedmann, D.D. Tang, and R. Beresford, *IEEE J. Solid State Circuits* **16**, 429 (1981).
2. Resonant Tunneling in AlSb/InAs/AlSb Double-Barrier Heterostructures, L.F. Luo, R. Beresford, and W.I. Wang, *Appl. Phys. Lett.* **53**, 2320 (1988).
3. Negative Differential Resistance in AlGaSb/InAs Single-Barrier Heterostructures at Room Temperature, R. Beresford, L.F. Luo, and W.I. Wang, *Appl. Phys. Lett.* **54**, 1899 (1989).
4. Inelastic Tunneling in (111) Oriented AlAs/GaAs/AlAs Double-Barrier Heterostructures, L.F. Luo, R. Beresford, W.I. Wang, and E.E. Mendez, *Appl. Phys. Lett* **54**, 2133 (1989).
5. Resonant Tunneling of Holes in AlSb/GaSb/AlSb Double-Barrier Heterostructures, R. Beresford, L.F. Luo, and W.L Wang, *Appl. Phys. Lett.* **55**, 694 (1989).
6. Heterojunction Field-Effect Transistors Based on AlGaSb/InAs, L.F. Luo, R. Beresford, W.I. Wang, and H. Munekata, *Appl. Phys. Lett.* **55**, 789 (1989).
7. Resonant Tunneling through X-Valley States in GaAs/AlAs/GaAs Single-Barrier Heterostructures, R. Beresford, L.F. Luo, W.I. Wang, and E.E. Mendez, *Appl. Phys. Lett.* **55**, 1555 (1989).
8. Band Structure Engineering for Electron Tunneling in Heterostructures, R. Beresford, L.F. Luo, and W.I. Wang, *IEEE Trans. on Electron Devices* **36**, 2618 (1989).
9. Interband Tunneling in Polytype Heterostructures, L.F. Luo, R. Beresford, and W.I. Wang, *Appl. Phys. Lett.* **55**, 2023 (1989).
10. Polytype Heterostructures for Electron Tunneling Devices, R. Beresford, L.F. Luo, K. Longenbach, and W.I. Wang, *Digest of Technical Papers, 1989 International Electron Devices Meeting*, Washington D.C., December 3-6, 1989.
11. Magnetoresistance Measurements of Doping Symmetry and Strain Effects in GaSb/AlSb Quantum Wells, W. Hansen, T.P. Smith III, J. Piao, R. Beresford, and W.I. Wang, *Appl. Phys. Lett.* **56**, 81 (1990).

12. Interband Resonant Tunneling through a 110-mn InAs Quantum Well, R. Beresford, L.F. Luo, and W.I. Wang, *Appl. Phys. Lett.* **56**, 551 (1990).
13. Resonant Interband Tunneling Device with Multiple Negative Differential Resistance Regions, R. Beresford, L.F. Luo, K.F. Longenbach, and W.I. Wang, *Electron Device Lett.* **11**, 110 (1990).
14. Interband Tunneling through Single-Barrier InAs/AlSb/GaSb Heterostructures, R. Beresford, L.F. Luo, K.F. Longenbach, and W.I. Wang, *Appl. Phys. Lett.* **56**, 952 (1990).
15. MBE Growth of Metastable Ge-Sn Alloys, J. Piao, R. Beresford, W.I. Wang, and H. Homma, *J. Vac. Sci. Technol. B* **8**, 221 (1990).
16. Surface Structures of the (Al, Ga)Sb System, J. Piao, R. Beresford, and W.I. Wang, *J. Vac. Sci. Technol. B* **8**, 276 (1990).
17. Narrow Gap InAs for Heterostructure Tunneling, R. Beresford, L.F. Luo, and W.I. Wang, *Semiconductor Science and Technology* **5**, 195 (1990).
18. Application of Dual-Gate and Split-Gate Field-Effect Transistor Designs to InAs Field Effect Transistors, K.F. Longenbach, R. Beresford, and W.I. Wang, *Solid State Electronics* **33**, 1211 (1990).
19. Optically Induced Variability of the Strain Induced Electric Fields in (111) GaSb/AlSb Quantum Wells, B.V. Shanabrook, D. Gammon, R. Beresford, W.I. Wang, R.P. Leavitt, and D.A. Broido, *Superlatt. Microstruct.* **7**, 363 (1990).
20. A Complementary Heterostructure Field-Effect Transistor Technology Based on InAs/AlSb/GaSb, K.F. Longenbach, R. Beresford, and W.I. Wang, *IEEE Trans. on Electron Devices* **37**, 2265 (1990).
21. Resonant Interband Coupling in Single-Barrier Heterostructures of InAs/GaSb/InAs and GaSb/InAs/GaSb, L.F. Luo, R. Beresford, and W.I. Wang, *J. Appl. Phys.* **68**, 2854 (1990).
22. Analytical Approximations for the Fermi Energy of an Ideal Fermi Gas Obeying a Nonparabolic Dispersion Relation, R. Beresford, *J. Appl. Phys.* **70**, 5156 (1991).
23. Statistical Properties of an Ideal Nonparabolic: Fermi Gas, R. Beresford, *J. Appl. Phys.* **70**, 6834 (1991).
24. Effects of Nonparabolicity on Collective Intersubband Excitations, G. Brozak, B.V. Shanabrook, D. Gammon, D.A. Broido, R. Beresford, and W.I. Wang, *Phys. Rev. B* **45**, 11399 (1992).

25. Intersubband Transitions in Piezoelectric Superlattices, G. Brozak, B.V. Shanabrook, D. Gammon, D.A. Broido, R. Beresford, and W.I. Wang, *Surf. Sci.* **267**, 120 (1992).
26. Exact Eigenfunctions of a Two-Band Semiconductor in a Uniform Electric Field, R. Beresford, *Semiconductor Sci. and Technol.* **8**, 1957 (1993).
27. Growing GaN by Plasma-Assisted Molecular Beam Epitaxy, R. Beresford, *Minerals, Metals, and Materials Soc.* **46**, 54 (1994).
28. Growth of Group III Nitrides on Si (111) by Plasma-Assisted Molecular Beam Epitaxy, K.S. Stevens, A. Ohtani, A.F. Schwartzman, and R. Beresford, *J. Vac. Sci. Technol. B* **12**, 1186 (1994).
29. Growth and Characterization of GaN on Si (111), A. Ohtani, K.S. Stevens, and R. Beresford, *Proc. Mater. Res. Soc.* **339**, 471 (1994).
30. Envelope Functions for a Three-Band Semiconductor in a Uniform Electric Field, R. Beresford, *Phys. Rev. B* **49**, 13663 (1994).
31. Microstructure and Photoluminescence of GaN Grown on Si (111) by Plasma-Assisted Molecular Beam Epitaxy, A. Ohtani, K.S. Stevens, and R. Beresford, *Appl. Phys. Lett.* **65**, 61 (1994).
32. Microstructure of AlN on Si (111) Grown by Plasma-Assisted Molecular Beam Epitaxy, K.S. Stevens, A. Ohtani, M. Kinniburgh, and R. Beresford, *Appl. Phys. Lett.* **65**, 321 (1994).
33. Analysis and Optimization of the Electron Cyclotron Resonance Plasma for Nitride Epitaxy, A. Ohtani, K.S. Stevens, M. Kinniburgh, and R. Beresford, *J. Cryst. Growth.* **150**, 902 (1995).
34. Influence of Substrate Electrical Bias on the Growth of GaN in Plasma-Assisted Epitaxy, R. Beresford, A. Ohtani, K.S. Stevens, and M. Kinniburgh, *J. Vac. Sci. Technol. B* **13**, 792 (1995).
35. Demonstration of a Silicon Field-Effect Transistor Using AlN as the Gate Dielectric, K.S. Stevens, M. Kinniburgh, A. Ohtani, A.F. Schwartzman, and R. Beresford, *Appl. Phys. Lett.* **66**, 3179 (1995).
36. Photoconductive Ultraviolet Sensor Using Mg-Doped GaN on Si(111), K.S. Stevens, M. Kinniburgh, and R. Beresford, *Appl. Phys. Lett.* **66**, 3518 (1995).
37. Optical and Electrical Characterization of GaN Layers Grown on Silicon and Sapphire Substrates, M.A. Sanchez-Garcia, F.J. Sanchez, F. Calle, E. Munoz, E. Calleja, K.S.

- Stevens, M. Kinniburgh, R. Beresford, and P. Gibart, *Solid State Electronics* **40**, 81 (1996).
38. Downstream Ion Drift in an Electron Cyclotron Resonance Plasma Process, R. Beresford, *J. Appl. Phys.* **79**, 1292 (1996).
 39. Material and Device Characteristics of MBE-Grown GaN Using a New rf Plasma Source, R. Beresford, K. Stevens, Q. Cui, A. Schwartzman, and H. Cheng, *MRS Proceedings* **449**, 361 (1996).
 40. Problems and Prospects in the Analysis of Epitaxial Growth of the Wide Bandgap Group III Nitrides, R. Beresford, *Computational Mater. Sci.* **6**, 113 (1996).
 41. Epitaxial Growth of GaN on Lattice-Matched Hafnium. Substrates, R. Beresford, K.S. Stevens, C. Briant, R. Bai, and D.C. Paine, *Proc. Mater. Res. Soc.* **395**, 55 (1996).
 42. Group IV-B Refractory Metal Crystals as Lattice-Matched Substrates for Growth of the Group III Nitrides by Plasma-Source Molecular Beam Epitaxy, R. Beresford, D.C. Paine, and C.L. Briant, *J. Cryst. Growth* **178**, 189 (1997).
 43. Feasibility of the Synthesis of AlAsN and GaAsN Films by Plasma-Source Molecular Beam Epitaxy, G. Mendoza-Diaz, K.S. Stevens, A.F. Schwartzman, and R. Beresford, *J. Cryst. Growth* **178**, 45 (1997).
 44. High Growth Rate (0.8 $\mu\text{m/hr}$) of GaN in Plasma-Source Molecular Beam Epitaxy, R. Beresford, K.S. Stevens, Q. Cui, and H. Cheng, *Proc. Mater. Res. Soc.* **449**, 361 (1997).
 45. Exciton and Donor-Acceptor Recombination in Undoped GaN on Si(111), F. Calle, F.J. Sanchez, J.M.G. Tijero, M.A. Sanchez-Garcia, E. Calleja, and R. Beresford, *Semicond. Sci. Technol.* **12**, 1396 (1997).
 46. The Effect of the III/V Ratio and Substrate Temperature on the Morphology and Properties of GaN- and AlN-Layers Grown by Molecular Beam Epitaxy on Si(111), M.A. Sanchez-Garcia, E. Calleja, E. Monroy, F.J. Sanchez, F. Calle, E. Munoz, and R. Beresford, *J. Cryst. Growth* **183**, 23 (1998).
 47. Investigation of the Annealing Texture Evolution in Hafnium, R. Bai, C.L. Briant, D.C. Paine, and J.R. Beresford, *Metallurgical and Mat. Trans. A* **29**, 757 (1998).
 48. Microstructure and Composition of InAsN Alloys Grown by Plasma-Source Molecular Beam Epitaxy, R. Beresford, K.S. Stevens, and A.F. Schwartzman, *J. Vac. Sci. Technol. B* **16**, 1293 (1998).

49. A Study of Low Temperature Crystallization of Amorphous Thin Film Indium Tin Oxide, D.C. Paine, T. Whitson, D. Janiac, R. Beresford, C. Ow-Yang, and B. Lewis, *J. Appl. Phys.* **85**, 8445 (1999).
50. In Situ Measurements of Stress Relaxation During Strained Layer Heteroepitaxy, E. Chason, J. Yin, K. Tetz, R. Beresford, L. Freund, M. Gonzalez, and J. Floro, *MRS Proceedings*, **583**, 167 (1999).
51. Real-Time Measurements of Stress Relaxation in InGaAs/GaAs, R. Beresford, J. Yin, K. Tetz, and E. Chason, *J. Vac. Sci. Technol. B* **18**, 1431 (2000).
52. Metastability of InGaAs/GaAs Probed by *In Situ* Optical Stress Sensor, R. Beresford, K. Tetz, J. Yin, E. Chason, and M.U. González, *J. Vac. Sci. Technol. B* **19**, 1572 (2001).
53. Intrinsic Stress Evolution in Aluminum Nitride Thin Films and the Influence of Multistep Processing, A. Rajamani, R. Beresford, and B.W. Sheldon, *Appl. Phys. Lett.* **79**, 3776 (2001).
54. Dislocation Structure and Relaxation Kinetics in InGaAs/GaAs Heteroepitaxy, C. Lynch, E. Chason, R. Beresford, E.B. Chen, and D.C. Paine, *J. Vac. Sci. Technol. B* **20**, 1247 (2002).
55. Kinetics of Dislocation-Mediated Strain Relaxation in InGaAs/GaAs Heteroepitaxy, R. Beresford, C. Lynch, and E. Chason, *J. Crystal Growth* **251**, 106 (2003).
56. Intrinsic Compressive Stress in Polycrystalline Films with Negligible Grain Boundary Diffusion, B.W. Sheldon, A. Ditkowski, R. Beresford, E. Chason, and J. Rankin, *J. Appl. Phys.* **94**, 948 (2003).
57. Nanoheteroepitaxy of GaN on a Nanopore Array Si Surface, J. Liang, S.-K. Hong, N. Kouklin, R. Beresford, and J. M. Xu, *Appl. Phys. Lett.* **83**, 1752 (2003).
58. Analysis of the Thin-Oxide Growth Kinetic Equation, R. Beresford, *Semicond. Sci. Technol.* **18**, 973 (2003).
59. Influence of Growth Flux and Surface Superaturation on InGaAs/GaAs Strain Relaxation, C. Lynch, E. Chason, R. Beresford, and S.K. Hong, *Appl. Phys. Lett.* **84**, 1085 (2004).
60. Real-Time Stress Evolution during Growth of $\text{In}_x\text{Al}_{1-x}\text{As}/\text{GaAs}$ Metamorphic Buffer Layers, C. Lynch, R. Beresford, and E. Chason, *J. Vac. Sci. Technol. B* **22**, 1539 (2004).
61. Full-Zone *kp* Method of Band Structure Calculation for Wurtzite Semiconductors, R. Beresford, *J. Appl. Phys.* **95**, 6216 (2004).

62. A Growth Pathway for Highly Ordered Quantum Dot Arrays, J. Liang, H. Luo, R. Beresford, and J.M. Xu, *Appl. Phys. Lett.* **85**, 5974 (2004).
63. Competition Between Tensile and Compressive Stress Mechanisms during Volmer-Weber Growth of Aluminum Nitride Films, B.W. Sheldon, A. Rajamani, A. Bhandari, E. Chason, S.K. Hong, and R. Beresford, *J. Appl. Phys.* **98**, 043509 (2005).
64. Enhanced Strain Relaxation Rate of InGaAs by Adatom-Assisted Dislocation Kink Nucleation, C. Lynch, E. Chason, and R. Beresford, *J. Vac. Sci. Technol. B* **23**, 1166 (2005).
65. Response to "Comment on 'A growth pathway for highly ordered quantum dot arrays' " [*Appl. Phys. Lett.* **86**, 206101 (2005)] , R. Beresford and J. M. Xu, *Appl. Phys. Lett.* **86**, 206102 (2005).
66. Limits of Strain Relaxation in InGaAs/GaAs Probed in Real Time by In Situ Wafer Curvature Measurement, C. Lynch, E. Chason, R. Beresford, L.B. Freund, K. Tetz, and K.W. Schwarz, *J. Appl. Phys.* **98**, 073532 (2005).
67. Carbon Nanotube Gated Lateral Resonant Tunneling Field-Effect Transistors, D.P. Wang, B.R. Perkins, A.J. Yin, A. Zaslavsky, J.M. Xu, R. Beresford, and G. L. Snider, *Appl. Phys. Lett.* **87**, 152102 (2005).
68. The Fabrication and Characterization of Amorphous Indium Zinc Oxide (In₂O₃–10 wt% ZnO) Based Thin Film Transistors, R. Beresford, D. Paine, B. Yaglioglu, and H. Yeom, *MRS Proceedings* **905**, 19 (2005).
69. Growth of Highly Ordered Relaxed InAs/GaAs Quantum Dots on Non-lithographically Patterned Substrates by Molecular Beam Epitaxy, W. Guo, R.S. Guico, R. Beresford, and J.M. Xu, *J. Crystal Growth* **287**, 509 (2006).
70. Mobile Dislocation Density and Strain Relaxation Rate Evolution During In_xGa_{1-x}As/GaAs Heteroepitaxy, C. Lynch, E. Chason, and R. Beresford, *J. Appl. Phys.* **100**, 013525 (2006).
71. Microfluidic Three-Electrode Cell Array for Low-Current Electrochemical Detection, N. Triroj, M.A. Lapierre-Devlin, S.O. Kelley, and R. Beresford, *IEEE Sensors Journal* **6**, 1395 (2006).
72. High-Mobility Amorphous In₂O₃–10 wt % ZnO Thin Film Transistors, B. Yaglioglu, H. Y. Yeom, R. Beresford, and D. C. Paine, *Appl. Phys. Lett.* **89**, 062103 (2006).
73. Conserved Flux in Interband Tunneling, R. Beresford, *Solid State Electronics* **51**, 136 (2007).

74. Characterization of Metamorphic $\text{In}_x\text{Al}_{1-x}\text{As}/\text{GaAs}$ Buffer Layers Using Reciprocal Space Mapping, D. Lee, M.S. Park, Z. Tang, H. Luo, R. Beresford, and C.R. Wie, *J. Appl. Phys.* **101**, 063523 (2007).
75. Kinetic Monte Carlo Simulation of InAs Quantum Dot Growth on Nonlithographically Patterned Substrates, W. Guo, R. S. Guico, J. M. Xu, and R. Beresford, *J. Vac. Sci. Technol. B* **25**, 1072 (2007).
76. Fabrication and Optical Characterization of Highly Ordered InAs/GaAs Quantum Dots on Nonlithographically Patterned Substrates, R.S. Guico, M. Tzolov, W. Guo, S.G. Cloutier, R. Beresford, and J. Xu, *J. Vac. Sci. Technol. B* **25**, 1093 (2007).
77. Geometry- and Size-Dependence of Electrical Properties of Metal Contacts on Semiconducting Nanowires, H. Park, R. Beresford, S. Hong, and J. Xu, *J. Appl. Phys.* **108**, 094308 (2010).
78. Microfluidic Chip-Based Nanoelectrode Array as Miniaturized Biochemical Sensing Platform for Prostate-Specific Antigen Detection, N. Triroj, P. Jaroenapibal, H. Shi, J.I. Yeh and R. Beresford, *Biosensors and Bioelectronics* **26**, 2927 (2011).
79. Effects of Electrical Contacts on the Photoconductive Gain of Nanowire Photodetectors, H. Park, J. H. Kim, R. Beresford, and J. Xu, *Appl. Phys. Lett.* **99**, 143110 (2011).
80. Evaluation of Metal-Nanowire Electrical Contacts by Measuring Contact End Resistance, H. Park, R. Beresford, R. Ha, H.-J. Choi, H. Shin, and J. Xu, *Nanotechnology* **23**, 245201 (2012).
81. Gas-Assisted Focused Ion Beam Fabrication of Gold Nanoelectrode Arrays in Electron-Beam Evaporated Alumina Films for Biosensing Applications, N. Triroj, P. Jaroenapibal, and R. Beresford, *14th International Meeting on Chemical Sensors* (2012). doi:10.5162/IMCS2012/1.2.4.
82. Growth of AlN/SiC/AlN quantum wells on Si(111) by molecular beam epitaxy, Y. Cheng and R. Beresford, *Appl. Phys. Lett.* **100**, 232112 (2012).
83. Epitaxial Silicon Dots Self-Assembled on Aluminum Nitride / Si(111), Y. Cheng and R. Beresford, *Nano Lett.* **13**, 614 (2013).

g. Invited lectures

Texas Instruments, November 1989

Rockwell International Science Center, December 1989

IBM T.J. Watson Research Center, December 1989

Phillips Laboratories, December 1989

Brown University, February 1990

Boston University, March 1990

Conference on Crystal Growth and Epitaxy, June 1995

Lawrence Berkeley Laboratory, June 1995

Xerox Palo Alto Research Center, June 1995

University of California at Santa Barbara, June 1995

Hughes Electronics Research Laboratories, June 1995

Massachusetts Institute of Technology, November 1995

Purdue University, January 1996

Polytechnic University of Madrid, November 1996

Future Trends in Microelectronics Workshop, Les Embiez, France, June 1998

U.S. Army Research Laboratory, February 2000

International Symposium on Compound Semiconductors, August 2003

State University of New York, Buffalo, October 2003

Brown University, Showcase of Nanomedicine, June 2006

Brown University, Sarah Doyle Women's Center "Cliff Notes," March 2007

Nanoelectronics Research Initiative Annual Review, October 2009

National Science Foundation, Division of Materials Research, January 2013

SPIE Optics + Photonics, August 2013

h. Papers read

International Conference on Narrow-Gap Semiconductors, June 1989

Device Research Conference, June 1989

International Electron Devices Meeting, December 1989

Scottish Universities Summer School in Physics, August 1991

New England MBE Workshop, May 1993

North American Molecular-Beam Epitaxy Conference, September 1993

Workshop on Compound Semiconductor Materials and Devices, February 1994

Connecticut Microelectronics and Optoelectronics Symposium, March 1994

Materials Research Society Spring Meeting, April 1994

Device Research Conference, June 1994
International Conference on Molecular Beam Epitaxy, August 1994
North American Conference on Molecular Beam Epitaxy, October 1994
Workshop on Wide Bandgap Nitrides, October 1994
Materials Research Society Fall Meeting, November 1994

Connecticut Microelectronics and Optoelectronics Symposium, March 1995
European Workshop on Molecular Beam Epitaxy, March 1995
Electronic Materials Conference, June 1995
International Conference on Modulated Semiconductor Structures, July 1995
Workshop on III-V Nitrides, September 1995
North American Conference on Molecular Beam Epitaxy, September 1995
Materials Research Society Fall Meeting, November 1995

New England MBE Workshop, May 1996
Materials Research Society Fall Meeting, November 1996

North American Conference on Molecular Beam Epitaxy, October 1997

North American Conference on Molecular Beam Epitaxy, October 1999
Materials Research Society Fall Meeting, November 1999

North American Conference on Molecular Beam Epitaxy, October 2000

North American Conference on Molecular Beam Epitaxy, October 2001

International Conference on Molecular Beam Epitaxy, September 2002

IEEE Nano, August 2003
North American Conference on Molecular Beam Epitaxy, September 2003
Materials Research Society Fall Meeting, November 2003

Gordon Research Conference — Nanostructure Fabrication, July 2004
North American Conference on Molecular Beam Epitaxy, October 2004
Materials Research Society Fall Meeting, November 2004

Materials Research Society Spring Meeting, March 2005
American Conference on Crystal Growth and Epitaxy, July 2005
Materials Research Society Fall Meeting, November 2005

Gordon Research Conference — MEMS Technology and Biomedical Applications,
June 2006
North American Conference on Molecular Beam Epitaxy, October 2006

International Conference on Crystal Growth, August 2007
North American Conference on Molecular Beam Epitaxy, September 2007

NSF Grantees Conference, Nanoscale Interdisciplinary Research Teams, December 2007

Northeast Bioengineering Conference, April 2008

Lawrence Symposium on Epitaxy, February 2012

6. Research grants

a. Current grants

b. Completed grants

NSF Research Equipment Grant, “Electron Beam Lithography” (1992), PI, \$40,000.

NSF, “Ultrafast Spectroscopy of Nanostructures” (1992-93), co-PI portion \$51,840.

NSF Academic Infrastructures Program, “Renovation and Enhancement of the Microelectronics Facility” (1992–94), PI, \$320,872.

NSF Research Equipment Grant, “Epitaxial Regrowth” (1995), co-PI, total award \$125,000.

Texas Instruments Research Contract, “Group III Arsenide/Nitride Alloys” (1995–96), PI, \$122,373.

NSF MRSEC “Micro- and Nano-Mechanics of Materials” (1996–2001), co-PI, total award \$5,376,000.

NSF MRSEC, “Micro- and Nano-Mechanics of Electronic and Structural Materials” (2000–2005), co-PI, total award \$7,100,000.

AFOSR MURI, “Direct Nanoscale Conversion of Biomolecular Signals into Electronic Information” (2003–2008), co-PI, total award \$5,609,969

NSF, “NER: Nanoscale Sensing and Control of Biological Processes” (2006–2007), \$128,300.

NSF “Conference: Nanoscale Science and Engineering (NSE) Grantees Conference 2008; Arlington, Virginia; 3-5 December 2008,” \$53,884.

NSF MRSEC, “Micro- and Nano-Mechanics of Electronic and Structural Materials” (2005–2011), co-PI, total award \$9,360,000.

NSF MRI: “Acquisition of a Dual Focused Ion/electron Beam (FIB) imaging and Nanofabrication Tool” (2008–2011) co-PI, total award \$810,000.

OVPR Seed Funds, “Silicon and Silicon Carbide Quantum Dots for Nanoelectronics” (2013-2014), \$15,000.

NRI Supplement / NSF MRSEC, “Direct Write Synthesis of Graphene Devices” (2009–2014), total award \$400,000.

7. Service

(i) to the University

Engineering Progress Review Committee, 1990-1995, 1997-98
 Departmental Liaison to Sciences Library, 1991-92
 IEEE Student Chapter Faculty Advisor, 1991-1996
 Freshman / Sophomore Advisor, 1992-93, 1994-1996, 1997-98, 1999-2001, 2002-03,
 2004-2010, 2014-2018
 Electrical Engineering Concentration Advisor, 1992-1997, 2007-2010
 Tau Beta Pi Faculty Advisor, 1991-1996
 Laboratory Safety Committee, 1995-2000
 Engineering Laboratory Safety Subcommittee, 1997-2000
 Advisory Committee on Summer Studies, 1995-1998
 Faculty Assistant to the Dean of the Faculty, 1997
 College Curriculum Council, 1998-2001, 2008-2009
 Vice-Chair, College Curriculum Council, 2009-2010
 Director of Undergraduate Programs in Engineering, 1998-2001
 Electrical Sciences Representative to Engineering Executive Committee, 1998-2001
 Division of Engineering ABET Coordinator, 2001-2003
 Division of Engineering Affirmative Action Representative, 2004-2007
 Special Assistant to the Dean of the Faculty, 2008-09
 Conflict of Interest Review Board, 2009-2013
 Co-Chair, Standing Committee on the Academic Code, 2009-2010
 Interim Associate Dean of the Faculty, 2009-2010
 Associate Provost, 2009-2013, 2019
 Brown Engineering Alumni Medal Nominations Committee, 2010-2013
 Research Advisory Board, 2011-2013
 Reimagining the Brown Campus and Community Strategic Planning Committee,
 2012-2013
 Sustainability Strategic Planning Committee, 2012-2013
 Information Technology Advisory Board, 2014-2019 (Chair, 2017-2019)
 Senior Associate Dean for Academic Programs, School of Engineering, 2014-2019
 Engineering Executive Committee, 2014-2019
 Biomedical Engineering Executive Committee, 2015-2016
 Animal Care Facility Strategic Planning Committee, 2016-2017
 Research Associate Deans for Office of Vice President for Research, 2016-2019
 Ad Hoc Engineering Curriculum Committee, 2016
 NEASC Faculty Committee, 2016
 Search Committee, Vice President for Facilities Management, 2018
 Physical Sciences Shops and Stocks Working Group (Chair), 2018

(ii) to the profession

Member, American Physical Society, 1990
 Proceedings Editor, 15th North American Conference on Molecular-Beam Epitaxy,
 1996
 Reviewer, *J. Appl. Phys.*, *J. Vac. Sci. Technol. B*, *Mater. Res. Soc.*, *Appl. Phys. Lett.*,
Electron Device Lett., *J. Crystal Growth*, *Solid State Electronics*, *J. Phys. Chem.*
 Organizer, 1996 New England MBE Workshop
 NSF Review Panel, Research Equipment Grants, 1997

NSF Review Panel, Electronic and Photonic Devices and Technology, 2006, 2007
NSF Undergraduate Faculty Enhancement Program, 2000
Chair, 20th North American Conference on Molecular Beam Epitaxy, 2001
Advisory Board, North American Conference on Molecular Beam Epitaxy, 2001–2010
Program Committee, International MBE Conference, 2002, 2008
Program Committee, North American Conference on Molecular Beam Epitaxy, 2003
NSF Workshop, Control and System Integration of Micro- and Nano-Scale Systems, 2004
Session Organizer, American Conference on Crystal Growth and Epitaxy, 2005
Program Sub-Committee Chair (MBE Fundamentals), 15th International Conference on Molecular-Beam Epitaxy, 2008
Proceedings co-Editor, 15th International Conference on Molecular-Beam Epitaxy, 2008
Academic Conference Organizer, NSF Nanoscale Science and Engineering Grantees Conference, 2008

(iii) to the community

Nayatt Elementary School Strategic Planning Committee, 1996
Science Advisor to the East Bay Educational Collaborative, 1996-2000
RI Diabetes 100K Bike-a-Thon, 1998
MRSEC Teacher Training Institute, 2001, 2005
MRSEC Research Experience for Teachers, 2004
Providence Tree Tally volunteer, 2005
Rhode Island Blood Center donor, 2006-2012

8. Honors and awards

Tau Beta Pi (1978)
Sheffield Fellowship (Yale University, 1980–81)
Office of Naval Research Fellowship (Columbia University, 1987–90)
Sigma Xi (1991)
BBV Foundation Chair (Visiting Professor, Polytechnic University of Madrid, 1996)
Institute of Electrical and Electronics Engineers, Senior Member (2002)

9. Teaching

Ph.D. Theses Supervised

1. Kevin Scott Stevens, *Growth of Group-III Nitrides by Plasma-Assisted MBE*, May 1998.
2. Akira Ohtani, *Growth and Evaluation of GaN on Si(111) Substrates using Electron Cyclotron Resonance Plasma-Assisted Molecular Beam Epitaxy*, May 1999.

3. Napat Triroj, *Design of Nanostructured Micro-cyclic Voltammetry Arrays for Microfluidics-Based Biosensing*, May 2008.
4. Wei Guo, *Growth of Highly Ordered InAs/GaAs and InGaAs/GaAs Quantum Dots on Nano-patterned Substrates by MBE*, May 2008.
5. Yana Cheng, *Epitaxial Growth of SiC/AlN and Si Quantum Dot Heterostructures by Molecular Beam Epitaxy*, May 2014.

Other Ph.D. Thesis Committees

1. Christine Broadbridge, *Oxidation of Si_{1-x}Ge_x Alloys at Atmospheric and Elevated Pressure* (Prof. David Paine), May 1994.
2. Mengpang Chen, *Highly Overcoupled Optical Fiber Fused Tapered Couplers and Their Applications* (Prof. Ted Morse), May 1995.
3. Clea Ow Yang, *Crystallization Kinetics of Amorphous Tin-Doped Indium Oxide Thin Films* (Prof. David Paine), May 1998.
4. Yoon-Kyu Song, *Wide Bandgap Semiconductor Quantum Well Light Emitters* (Prof. Arto Nurmikko), May 1999.
5. Juan Hernandez-Cordero, *Polarization Effects in Optical Fiber Lasers and Applications to Gas Sensing* (Prof. Ted Morse), May 1999.
6. Mohamed Abdouye Diagne, *Resonant Cavity Vertical Light Emitting in Nitride Heterostructures* (Prof. Arto Nurmikko), May 2001.
7. Eric Chen, *Microstructural Evaluation of Heteroepitaxial III-V Semiconductor Thin Films* (Prof. David Paine), May 2002.
8. Michael J. Escuti, *Structured Liquid Crystal / Polymer Composites as Photonic Crystal Switches and LCD Innovations* (Prof. Greg Crawford), May 2003.
9. Hope Chik, *Zinc Oxide Nanorods* (Prof. Jimmy Xu), May 2004.
10. Candace Lynch, *In Situ Studies of Strain Relaxation During III-V Semiconductor Heteroepitaxy* (Prof. Eric Chason), May 2005.
11. Jianyu Liang, *Non-lithographic Fabrication of Superlattices for Nanometric Electro-Magnetic-Optic Applications* (Prof. Jimmy Xu), May 2005.

12. Brian Robert Perkins, *Hot Carrier Transport in Short Diodes and Nanotubes* (Prof. Alexander Zaslavsky), May 2005.
13. Cagri Aydin, *Silicon Based Tunneling Devices Combined with Silicon-on-Insulator for Ultra-Large-Scale-Integration* (Prof. Alexander Zaslavsky), May 2005.
14. Teng-Fang Kuo, *Infrared Detection and Electron Transport Characteristics of a Carbon Nanotubes / Si Heterodimensional Heterostructure* (Prof. Jimmy Xu), May 2008.
15. Chao Wang, *Size and Shape Controlled Synthesis of Platinum Based Nanoparticles and Their Catalysis for Oxidation Reduction Reaction in Fuel Cells* (Prof. Shouheng Sun), May 2009.
16. Dimitrios Kazazis, *Ultra thin Ge/High-K Dielectric Structures for End-of-Roadmap devices and other Applications* (Prof. Alexander Zaslavsky), May 2009.
17. Hongsik Park, *Contact Limiting Effects of Nanowire Devices* (Prof. Jimmy Xu), May 2011.

Sc.M. Theses Supervised

1. Miguel Angel Sánchez García, *Molecular Beam Epitaxy Growth Diagnostics and Control via Reflection High Energy Electron Diffraction*, May 1993.
2. Maria Guadalupe Mendoza-Diaz, *Synthesis of Group III-AsN Alloys by Plasma-Assisted Molecular Beam Epitaxy with Electron Cyclotron Resonance Activated Nitrogen*, May 1996.
3. Kevin Stevens, *Modulation Field Effect Transistor (MODFET) Test Site Design and Fabrication for Device Characterization*, May 1997.

Other Sc.M. Graduates: Morgan John Kinniburgh, Jingjiang Yin.

Undergraduate Projects Supervised (prior to 2015)

Valerie Fowler, Pete Carpenter, Ben Dodge, Scott Johnston, Lili Kudo, Dan Goldwater, Matt Silvia, Sam Blackman, David Goldberg, Jaya Kanajan, Kevin Tetz, Emily Nelson, Shelley Vanderweil, James Hayward, Joniqua Howard, Kom Promsuttikul, Landon Haywood, Rob Broesler, Newton Ikhariale, David Meisner, Michael Mak, Ryan Mott, Andres Jaramillo, David Perlmutter, Francisco Velez, Jordan Chesin, Aaron Rosenberg, Aaron Swander

Recent Teaching

- 2016-2017 ENGN0510 (124) Electricity and Magnetism
 ENGN1970 S11 (58; administrative review only) Independent Study
 ENGN1971 S11 (44; administrative review only) Independent Study
- 2017-2018 ENGN0510 (104) Electricity and Magnetism
 ENGN1970 S11 (47; administrative review only) Independent Study
 ENGN1971 S11 (49; administrative review only) Independent Study
- 2018-2019 ENGN1630 (29) Digital Electronics System Design
 ENGN1970 S11 (12) Departmental Independent Study: Design @ Brown
 ENGN1970 S11 (36; administrative review only) Independent Study
 ENGN1931A (9) Photovoltaics Engineering
 ENGN1971 S11 (33; administrative review only) Independent Study
- 2019-2020 ENGN0510 (93) Electricity and Magnetism
 ENGN1970 S11 (34; administrative review only) Independent Study
 ENGN1970 S11 (2) Solar District Cup design competition
 ENGN1971 S11 (52; administrative review only) Independent Study