People

Principal Investigator

Eric M. Vogel, eric.vogel@mse.gatech.edu
Georgia Institute of Technology
Professor of Materials Science and Engineering
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Ph. D. – North Carolina State University
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Postdoctoral Researchers

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Georgia Institute of Technology
Ph.D – Electrical and Computer Engineering from Georgia Institute of Technology
M. E. – Electrical and Electronic Engineering from Imperial College London
Starting 2018 – Assistant Professor in Electrical and Computer Engineering at NC State

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Georgia Institute of Technology
Ph.D. – Physics from University of Georgia
M.S. – Physics from University of Massachusetts, Dartmouth

Graduate Students

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Ph.D. – Georgia Institute of Technology
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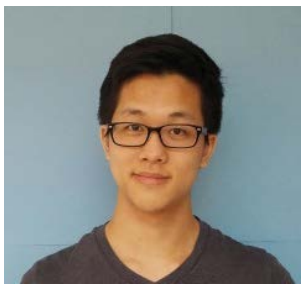

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M.S. – University of Florida
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Undergraduate Students

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Alumni

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Ph.D: Georgia Institute of Technology, 2017

Dr. Phillip Campbell
Ph.D: Georgia Institute of Technology, 2017

Brian Beatty
M.S.: Georgia Institute of Technology, 2017

Dr. Corey Joiner
Ph.D: Georgia Institute of Technology, 2016

Noah Ellis
M.S.: Georgia Institute of Technology, 2016

Dr. Alexey Tarasov
Post-doc: Georgia Institute of Technology, 2013-2015

Robert Taylor
Undergraduate Researcher: 2014-2015

Mohammed Nur
SRC Summer Student: 2015

Filipe Viana Ferreira
Summer Undergraduate Researcher: 2015

Jake Smith
SRC Summer Student: 2015

Michael Statt
NNIN REU Student: 2015

Joseph Palughi

Undergraduate Researcher: 2014-2015

Aundre Abner
Project ENGAGES Student: 2014-2015

Erin Flynn
Undergraduate Researcher: 2014-2015

Janine Feirer
Undergaduate Researcher: 2013-2014

Chris Smyth
Undergraduate Researcher: 2012-2014

Dr. Zohreh Razavi Hesabi
Post-doc: Georgia Institute of Technology, 2011-2013

Dr. Bhaswar Chakrabarti
Ph.D: University of Texas at Dallas, 2013

Dr. Tania Roy
Post-doc: Georgia Institute of Technology, 2011-2013

Giovini King
Summer Undergraduate Research Experience: Georgia Institute of Technology, 2013

Dr. Rohit Galatage
Ph. D: University of Texas at Dallas, 2013

Carmen Deng
Undergraduate Researcher: Georgia Institute of Technology, 2013

Michael Falk
Undergraduate Researcher: Georgia Institute of Technology, 2013

Dr. Anand Subramaniam
Ph. D: University of Texas at Dallas, 2012

Katherine Copenhaver
Summer Undergraduate Research Fellowship: Georgia Institute of Technology, 2013

Gazi Mahmud
M.S.: University of Texas at Dallas, 2012

Dr. Archana Venugopal
Ph.D: University of Texas at Dallas, 2012

Prof. Kurtis Cantley
Ph.D: University of Texas at Dallas, 2011

Dr. Jack Chan
Post-doc: University of Texas at Dallas, 2010-2011

Mingyue Zhao
M.S.: The University of Texas at Dallas, 2011

Dr. Nikki Fernandes
Ph. D: University of Texas at Dallas, 2011

Dr. Arif Sonnet
Ph. D: University of Texas at Dallas, 2010

Prof. Chris Hinkle
Post-doc: University of Texas at Dallas, 2006-2009

Naqi Jivani
M. S.: University of Texas at Dallas, 2009

Shreyasee Dey
M. S.: University of Texas at Dallas, 2008

Ram Pratiwadi
M. S.: University of Texas at Dallas, 2008

David Rico
Undergraduate Researcher: University of Texas at Dallas, 2008

Prof. Qiliang Li
Post-doc: National Institute of Standards and Technology, 2005-2006

Prof. Sang-mo Koo
Post-doc: National Institute of Standards and Technology, 2004-2005

Dr. Da-wei Heh
Ph.D: University of Maryland with PhD research performed at NIST, 2005

Dr. Jin-ping Han
Post-doc: National Institute of Standards and Technology, 2003-2004

Dr. Jin-won Park
Post-doc: National Institute of Standards and Technology, 2002-2003

Eric M. Vogel
Professor, Georgia Institute of Technology
School of Materials Science and Engineering
Curriculum Vita

I. EARNED DEGREES

- Ph. D. in Electrical Engineering (Minor in Physics), August 1998, North Carolina State University, Thesis: "The Use of Rapid Thermal Chemical Vapor Deposited Oxynitrides for Advanced Gate Dielectrics"
- M. S. in Electrical Engineering, May 1996, North Carolina State University
- B. S. in Electrical Engineering, May 1994, Pennsylvania State University, Honors Thesis: "Monitoring of Silicon Surface Cleaning in Microelectronic Fabrication Using Surface Charge Analysis"

II. EMPLOYMENT HISTORY

Georgia Institute of Technology, Atlanta, GA (08/2011-present)

- Professor, School of Materials Science and Engineering (08/2011-present)
- Adjunct Professor, School of Electrical and Computer Engineering (07/2013-present)
- Deputy Director, Institute for Electronics and Nanotechnology (09/2014-present)
- Associate Director for Shared Resources, Institute for Materials (09/2012-present)

The University of Texas at Dallas, Richardson, TX (08/2006-08/2011)

- Associate Professor, Dept. of Materials Science and Engineering, Dept. of Electrical Engineering
- Associate Director of the Texas Analog Center of Excellence (10/2010-08/2011)

National Institute of Standards and Technology, Gaithersburg, MD (06/1998-05/2006)

- Leader of the CMOS and Novel Devices Group (10/2001–05/2006)
  Managed PhD staff, engineers, technicians, and post-docs. Responsible for technical output, performance, solvency, personnel, and planning.
- Director of the NIST Nanofab (02/2003 – 01/2006)
  Created facility vision, developed operating policies, obtained operating funds, and directed start-up activities including procuriement and installation of ~$30M of new nanofabrication equipment. The Nanofab opened to NIST researchers in 2006 and in May 2007 became a national nanofabrication user facility for the NIST Center for Nanoscale Science and Technology.
- Member of the Technical Staff (06/1998 – 05/2006)
  Performed research related to micro- and nano-electronic materials, devices and characterization.

III. HONORS AND AWARDS

A. International or National Awards

- Senior Member of the Institute of Electrical and Electronics Engineers

B. Institute or School Awards

- U.S. Dept. of Commerce Silver Medal, "For developing a vision, strategy, fit-up, fabrication processes, policies, protocols, and a safety program for the NIST AML Nanofab," 2006, National Institute of Standards and Technology
- 2006 NIST Electronics and Electrical Engineering Laboratory Best Authorship Award
- 2005 NIST Electronics and Electrical Engineering Laboratory Safety Award
- 2002 Appointed Chair of NIST Research Advisory Committee which reported to NIST Director
- 1995-1998 Department of Education, Graduate Assistance in Areas of National Need fellowship
- 1994 North Carolina State University School of Engineering Dean's fellowship

IV. RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

**Asterisk indicates work done at Georgia Tech. Names of advisees in bold.*

A. PUBLISHED BOOKS, BOOK CHAPTERS, AND EDITED VOLUMES

A1. Books

No data

A2. Refereed Book Chapters

1. ***Kurtis Cantley, Anand Subramaniam,** and Eric Vogel, "Spike Timing-Dependent Synaptic Plasticity Using Memristors and Nano-Crystalline Silicon TFT Memories," in *Nanoelectronic Device Applications Handbook,* ed. James E. Morris & Krzysztof Iniewski, CRC Press (Taylor & Francis Group), 335-345 (2013).
2. M. Milojevic, **C. L. Hinkle,** E. M. Vogel and R. M.Wallace, "Interfacial Chemistry of oxides on III-V Compound Semiconductors," in *Fundamentals of Compound Semiconductor MOSFETs*, ed. P. Ye and S. Oktyabrsky, Springer, 131-172 (2010).
3. Eric M. Vogel, "Technology and Metrology of New Electronic Materials and Devices," in *Nanoscience and Technology: A Collection of Reviews from Nature Journals,* ed. Peter Rodgers, Nature Publishing Group, 166-173 (2009).
4. C. R. Cleavelin, L. Columbo, H. Niimi, S. Pas, and E. M. Vogel, "Oxidation and Gate Dielectrics in *Handbook of Semiconductor Manufacturing Technology, 2nd edition,* ed. Y. Nishi and R. Doering, Taylor and Francis Group, 9:1-37 (2007).
5. E. M. Vogel, and V. Misra, "MOS Device Characterization," in *Handbook of Silicon Semiconductor Metrology*, ed. A. C. Diebold, Marcel-Dekker, 59-96 (2001).
6. C. R. Cleavelin, S. Pas, E. M. Vogel, and J. J. Wortman, "Oxidation," in *Handbook of Semiconductor Manufacturing Technology*, ed. Y. Nishi and R. Doering, CRC Press, 163-185 (2000).

A3. Edited Volumes

1. *"2D Layered Transition-Metal Dichalcogenides," ed. Eric M. Vogel and Joshua A. Robinson, MRS Bulletin, Vol. 40, Issue 7, 2015.

2. *"Materials for End-of-Roadmap Devices in Logic, Power and Memory," ed. Eric M. Vogel, MRS Proceedings, vol. 1691, 2014.

B. Refereed Publications and Submitted Articles

Google Scholar: *h-index = 40, Total Citations > 5800*

B1. Published and Accepted Journal Articles

1. P. M. Campbell, A. Tarasov, C. A Joiner, MW. J. Ready, E. M. Vogel, "Band structure effects on resonant tunneling in III-V quantum wells versus two-dimensional vertical heterostructures," *Journal of Applied Physics* **119**, 024503276 (2016).
2. A. Tarasov, D. W. Gray, M.-Y. Tsai, N. Shields, A. Montrose, N. Creedon, P. Lovera, A. O'Riordan, M. H. Mooney, E. M. Vogel, *Biosensors and Bioelectronics* **79**, 669-678 (2016)
3. P. M. Campbell, A. Tarasov, C. A Joiner, M.-Y. Tsai, G. Pavlidis, S. Graham, W. J. Ready, E. M. Vogel, "Field-effect transistors based on wafer-scale, highly uniform few-layer p-type WSe_2," *Nanoscale* **8**, 2268-2276 (2016).
4. ***A. Tarasov**, **M.-Y. Tsai, E. Flynn, C. Joiner, R. Taylor,** and E. M. Vogel, "Gold-coated graphene field-effect transistors for quantitative analysis of protein-antibody interactions," *2D Materials* **2**, 044008 (2015).
5. *A. Abdelhafiz, A. Vitale, **C. Joiner**, E. M. Vogel, and F. M. Alamgir "Layer-by-Layer Evolution of Structure, Strain, and Activity for the Oxygen Evolution Reaction in Graphene-Templated Pt Monolayers," *ACS Applied Materials and Interfaces* **7**, 6180-6188 (2015).
6. ***M.-Y. Tsai, A. Tarasov, Z. R. Hesabi**, H. Taghinejad, **P. M. Campbell, C. Joiner**, A. Adibi, and E. M. Vogel, "Flexible MoS_2 field-effect transistors for gate-tunable piezoresistive strain sensors," *ACS Applied Materials and Interfaces* **7**, 12850-12855 (2015).
7. ***A. Tarasov,** S. Zhang, **M.-Y. Tsai, P. M. Campbell,** S. Graham, S. Barlow, S. R. Marder, and E. M. Vogel*, "*Controlled Doping of Large-Area Trilayer MoS_2 with Molecular Reductants and Oxidants," *Advanced Materials* **27**, 1175–1181 (2015).
8. ***P. Campbell, A. Tarasov, C. Joiner,** W. J. Ready, and E. M. Vogel, "Enhanced Resonant Tunneling in Symmetric 2D Semiconductor Vertical Heterostructure Transistors," *ACS Nano* **9**, 5000-5008 (2015).
9. ***A. Tarasov, P. M. Campbell, M. Y. Tsai, Z. R. Hesabi, J. Feirer,** S. Graham, W. J. Ready, and E. M. Vogel, "Highly uniform trilayer molybdenum disulfide for wafer-scale device fabrication," *Advanced Functional Materials* **24**, 6389-6400 (2014).
10. ***T. Roy,** L. Liu, S. De La Barrera, **B. Chakrabarti, Z. R. Hesabi, C. A. Joiner**, R. M. Feenstra, G. Gu, and E. M. Vogel, "Tunneling characteristics in chemical vapor deposited graphene-hexagonal boron nitride-graphene junctions," *Applied Physics Letters,* **104** 123506 (2014).
11. ***C. A. Joiner, T. Roy, Z. R. Hesabi, B. Chakrabarti,** and E. M. Vogel, "Cleaning graphene with a titanium sacrificial layer," *Applied Physics Letters* **104** 223109 (2014).
12. ***R. V. Galatage**, D. M. Zhernokletov, H. Dong, B. Brennan, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "Accumulation capacitance frequency dispersion of III-V metal-insulator- semiconductor devices due to disorder induced gap states," *Journal of Applied Physics* **116** 014504 (2014).
13. ***B. Chakrabarti, T. Roy,** and E. M. Vogel, "Nonlinear switching with ultralow reset power in graphene-insulator- graphene forming-free resistive memories," *IEEE Electron Device Letters* **35** 750-752 (2014)

14. B. Brennan, **R. V. Galatage,** K. Thomas, E. Pelucchi, P. K. Hurley, J. Kim, C. L. Hinkle, E. M. Vogel, and R. M. Wallace, "Chemical and electrical characterization of the HfO_2/InAlAs interface," *Journal of Applied Physics* **114**, 104103 (2013).
15. ***A. Subramaniam, K. D. Cantley,** R. A. Chapman, H. J. Stiegler, and E. M. Vogel, "Low-temperature Fabrication of Spiking Soma Circuits using Nanocrystalline-silicon TFTs," *IEEE Transactions on Neural Networks and Learning Systems* **24**, 1466 - 1472 (2013).
16. ***B. Chakrabarti, R. V. Galatage** and Eric M. Vogel, "Multilevel switching in forming-free resistive memory devices with atomic layer deposited $HfTiO_x$ nanolaminate," *IEEE Electron Device Letters* **34**, 867-869 (2013).
17. ***T. Roy, Z. Razavi Hesabi, C. A. Joiner,** A. Fujimoto and E. M. Vogel, "Barrier Engineering for Double Layer CVD Graphene Tunnel FETs," *Microelectronics Engineering* **109**, 117-119 (2013).
18. ***B. Chakrabarti** and E. M. Vogel, "Effect of Ti doping and annealing on multi-level forming-free resistive random access memories with atomic layer deposited $HfTiO_x$ nanolaminate," *Microelectronics Engineering* **109**, 193-196 (2013).
19. ***A. Subramaniam, K. D. Cantley,** and E. M. Vogel, "Logic Gates and Ring Oscillators based on Ambipolar Nanocrystalline-silicon TFTs," *Active and Passive Electronic Components* **2013**, 525017 (2013).
20. ***A. Subramaniam, K. D. Cantley,** G. Bersuker, D. Gilmer, and E. M. Vogel, "Spike-timing-dependent Plasticity using Biologically Realistic Action Potentials and Low-temperature Materials," *IEEE Transactions on Nanotechnology* **12**, 450 – 459 (2013).
21. ***R. V. Galatage,** H. Dong, D. M. Zhernokletov, B. Brennan, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "Electrical and chemical characteristics of Al_2O_3/InP metal-oxide-semiconductor capacitors," *Applied Physics Letters* **102**, 132903 (2013).
22. A. M. Thron, T. J. Pennycook, **J. Chan,** W. Luo, A. Jain, D. Riley, J. Blatchford, J. Shaw, E. M. Vogel, C. L. Hinkle, K. van Benthem, "Formation of pre-silicide layers below $Ni_{1-x}Pt_xSi$/Si interfaces," *Acta Materialia* **61**, 2481-2488 (2013).
23. ***J. Chan,** M. Balakchiev, A. M. Thron, R. A. Chapman, D. Riley, S. C. Song, A. Jain, J. Blatchford, J. B. Shaw, K. van Benthem, E. M. Vogel, C. L. Hinkle, "PtSi dominated Schottky barrier heights of Ni(Pt)Si contacts due to Pt segregation," *Applied Physics Letters* **102**, 123507 (2013).
24. *W. Peng, O. Seitz, R. A. Chapman, E. M. Vogel, and Y. J. Chabal, "Probing the intrinsic electrical properties of thin organic layers/semiconductor interfaces using an atomic-layer-deposited Al_2O_3 protective layer," *Applied Physics Letters* **101**, 051605 (2012)
25. ***A. Venugopal,** L. Colombo, and E. M. Vogel, "Issues with Characterizing Transport Properties of Graphene Field Effect Transistors," *Solid State Communications* **152,** 1311–1316 (2012).
26. **C. L. Hinkle, R. V. Galatage,** R. A. Chapman, E. M. Vogel, H. N. Alshareef, C. Freeman, M. Christensen, E. Wimmer, H. Niimi, A. Li-Fatou, J. B. Shaw, J. J. Chambers, "Gate-last TiN/HfO_2 band edge effective work functions using low-temperature anneals and selective cladding to control interface composition," *Applied Physics Letters* **100**, 153501 (2012).
27. ***J. Chan, A. Venugopal,** A. Pirkle, S. McDonnell, D. Hinojos, C. W. Magnuson, R. S. Ruoff, L. Colombo, R. M. Wallace, and E. M. Vogel, "Reducing Extrinsic Performance-Limiting Factors in Graphene Grown by Chemical Vapor Deposition," *ACS Nano* **6**, 3224-3229 (2012).
28. ***A. Subramaniam, K. D. Cantley,** H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Submicron Ambipolar Nanocrystalline Silicon Thin-Film Transistors and Inverters," *IEEE Transactions on Electron Devices* **59**, 359-366 (2012).

29. ***P. G. Fernandes,** R. A. Chapman, O. Seitz, H. J. Stiegler, H. C. Wen, Y. J. Chabal, and E. M. Vogel, "Effect of Back-Gate Biasing on Floating Electrolytes in Silicon-on-Insulator-Based Nanoribbon Sensors," *IEEE Electron Device Letters* **33**, 447-449 (2012).
30. ***P. G. Fernandes,** H. J. Stiegler, B. Obradovic, R. A. Chapman, H.-C. Wen and E. M. Vogel, "SPICE Macromodel of Silicon-on-Insulator-Field-Effect-Transistor-Based Biological Sensors," *Sensors and Actuators B* **161**, 163-170 (2012).
31. **K. D. Cantley, A. Subramaniam,** H. J. Stiegler, R. A. Chapman, and E. M. Vogel, "Hebbian Learning in Spiking Neural Networks with Nano-Crystalline Silicon TFTs and Memristive Synapses," *IEEE Transactions on Nanotechnology* **10**, 1066-1073 (2011).
32. **J. Chan,** N. Y. Martinez, J. J. D. Fitzgerald, A. V. Walker, R. A. Chapman, D. Riley, A. Jain, C. L. Hinkle, and E. M. Vogel, "Extraction of Correct SBH of Sulfur Implanted NiSi/n-Si Junctions: Junction Doping Rather than SBH Lowering," *Applied Physics Letters* **99**, 012114 (2011).
33. **B. Chakrabarti,** H. S. Kang, B. Brennan, T. J. Park, **K. D. Cantley,** A. Pirkle, S. McDonnell, J. Kim, R. M. Wallace, and E. M. Vogel, "Investigation of tunneling current in SiO_2/HfO_2 gate stacks for flash memory applications," *IEEE Transactions on Electron Devices* **58**, 4188-4195 (2011).
34. **R. V. Galatage,** H. Dong, D. M. Zhernokletov, B. Brennan, **C. L. Hinkle,** R. M. Wallace, and E. M. Vogel, "Effect of post deposition anneal on the characteristics of HfO_2/InP metal-oxide-semiconductor capacitors," *Applied Physics Letters* **99**, 172901 (2011).
35. O. Seitz, **P. G. Fernandes, G. Mahmud,** H. –C. Wen, H. J. Stiegler, R. A. Chapman, E. M. Vogel, Y. J. Chabal, "One-step Selective Chemistry for Sensor devices," *Langmiur* **27**, 7337-7340 (2011).
36. A. Pirkle, **J. Chan, A. Venugopal**, D. Hinojos, C. W. Magnuson, S. McDonnell, L. Colombo, E. M. Vogel, R. S. Ruoff, and R. M. Wallace, "The effect of chemical residues on the physical and electrical properties of chemical vapor deposited graphene transferred to SiO_2," *Applied Physics Letters* **99**, 122108 (2011).
37. **C. L Hinkle,** E. M Vogel, P. Ye, and R. M Wallace, "Interfacial Chemistry of Oxides on $In_xGa_{1-x}As$ and implications for MOSFET applications," *Current Opinion in Solid State & Materials Science* **15**, 188-207 (2011).
38. **A. M. Sonnet, R. V. Galatage,** P. K. Hurley, E. Pelucchi, K. Thomas, A. Gocalinska, J. Huang, N. Goel, G. Bersuker, W. P. Kirk, C. L. Hinkle, and E. M. Vogel, "Remote phonon and surface roughness limited universal electron mobility of $In_{0.53}Ga_{0.47}As$ surface channel MOSFETs," *Microelectronic Engineering* **88**, 1083-1086 (2011).
39. W. Wang, **C. L. Hinkle,** E. M.Vogel, K. Cho and R. M.Wallace, "Is interfacial chemistry correlated to gap states for high-k/III-V interfaces?," *Microelectronic Engineering* **88**, 1061-1065 (2011).
40. R. A. Chapman, **P. G. Fernandes,** O. Seitz, H. J. Stiegler, H.-C. Wen, Y. J. Chabal, and E. M. Vogel, "Comparison of Methods to Bias Fully Depleted SOI-Based MOSFET Nanoribbon pH Sensors," *IEEE Transactions on Electron Devices* **58**, 1752-1660 (2011).
41. **A. Venugopal, J. Chan,** X. Li, C. W. Magnuson, W. P. Kirk, L. Colombo, R. S. Ruoff, and E. M. Vogel, "Effective mobility of single-layer graphene transistors as a function of channel dimensions," *Journal of Applied Physics* **109**, 104511 (2011).
42. **A. M. Sonnet, R. V. Galatage,** P. K. Hurley, E. Pelucchi, K. K. Thomas, A. Gocalinska, J. Huang, N. Goel, G. Bersuker, W. P. Kirk, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "On the calculation of effective electric field in $In_{0.53}Ga_{0.47}As$ surface channel metal-oxide-semiconductor field-effect-transistors," *Applied Physics Letters* **98**, 193501 (2011).
43. X. Li, C. W. Magnuson, **A. Venugopal,** R. M. Tromp, J. B. Hannon, E. M. Vogel, L. Colombo, and R. S. Ruoff, "Large-Area Graphene Single Crystals Grown by Low-Pressure Chemical Vapor Deposition of Methane on Copper," *Journal of the American Chemical Society* **133**, 2816-2819 (2011).

44. O. Seitz, **P. G. Fernandes,** R. Tian, N. Karnik, H.-C. Wen, H. Stiegler, R. A. Chapman, E. M. Vogel and Y. J. Chabal, "Control and stability of self-assembled monolayers under biosensing conditions," *Journal of Materials Chemistry* **21**, 4384-4392 (2011).
45. C. Gong, G. Lee, B. Shan, E. M. Vogel, R. M. Wallace, and K. Cho, "First-principles study of metal–graphene interfaces," *Journal of Applied Physics* **108**, 123711 (2010).
46. X. Li, C. W. Magnuson, **A. Venugopal**, J. An, J. W. Suk, B. Han, M. Borysiak, W. Cai, A. Velamakanni, Y. Zhu, L. Fu, E. M. Vogel, E. Voelkl, L. Colombo, and R. S. Ruoff, "Graphene Films with Large Domain Size by a Two-Step Chemical Vapor Deposition Process," *NanoLetters* **10**, 4328-4334 (2010).
47. **K. D. Cantley, A. Subramaniam,** R. R. Pratiwadi, H. Carlo Floresca, J. Wang, H. Stiegler, R A. Chapman, M. J. Kim, and E. M. Vogel, "Hydrogenated Amorphous Silicon Nanowire Transistors with Schottky Barrier Source/Drain Junctions," *Applied Physics Letters* **97**, 143509 (2010).
48. **P. G. Fernandes,** O. Seitz, R. A. Chapman, H. J. Stiegler, H.-C. Wen, Y. J. Chabal, and E. M. Vogel, "Effect of mobile ions on ultrathin silicon-on-insulator-based sensors," *Applied Physics Letters* **97**, 034103 (2010). ***Selected for the August 2, 2010 issue of Virtual Journal of Nanoscale Science & Technology***
49. **A. M. Sonnet, C. L. Hinkle, D. Heh,** G. Bersuker, and E. M. Vogel, "Impact of Semiconductor and Interface State Capacitance on Metal/High-k/GaAs Capacitance-Voltage Characteristics," *IEEE Transactions on Electron Devices* **57**, 2599 (2010).
50. B. Lee, G. Mordi, M. J. Kim, Y. J. Chabal, E. M. Vogel, R. M. Wallace, K. J. Cho, L. Colombo, and J. Kim, "Characteristics of high-k Al_2O_3 dielectric using ozone-based atomic layer deposition for dual-gated graphene devices," *Applied Physics Letters* **97**, 043107 (2010).
51. **C. L. Hinkle, R. V. Galatage,** R. A. Chapman, E. M. Vogel, H. N. Alshareef, C. Freeman, E. Wimmer, H. Niimi, A. Li-Fatou, J. B. Shaw, and J. J. Chambers, "Interfacial oxygen and nitrogen induced dipole formation and vacancy passivation for increased effective work functions in TiN/HfO_2 gate stacks," *Applied Physics Letters* **96**, 103502 (2010).
52. **A. Venugopal,** L. Colombo, and E. M. Vogel, "Contact Resistance in Few and Multilayer Graphene Devices," *Applied Physics Letters* **96**, 013512 (2010).
53. **C. L. Hinkle,** M. Milojevic, E. M. Vogel, and R. M. Wallace, "The significance of core-level electron binding energies on the proper analysis of InGaAs interfacial bonding," *Applied Physics Letters* **95**, 151905 (2009).
54. **C. L. Hinkle,** M. Milojevic, E. M. Vogel, and R. M. Wallace, "Surface passivation and implications on high mobility channel performance," *Microelectronic Engineering* **86**, 1544-1549 (2009).
55. D. Wheeler, L.-E. Wernersson, L. Froberg, C. Thelander, A. Mikkelsen, K.-J. Weststrate, **A. Sonnet,** E. M. Vogel, and A. Seabaugh, "Deposition of HfO_2 on InAs by atomic-layer deposition," *Microelectronic Engineering* **86**, 1561-1563 (2009).
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37. M. Milojevic, **A. M. Sonnet, C. L. Hinkle,** H. C. Kim, E. M. Vogel, J. Kim, and R. M. Wallace, "In-situ Studies of Atomic Layer Deposition Studies on High-Mobility Channel Materials," in *ECS Transactions* **25**, 115 (2009).
38. B. Lee, G. Mordi, T. Park, K. J. Cho, E. M. Vogel, M. J. Kim, L. Colombo, R. M. Wallace, and J. Kim, "Atomic-layer-deposited Al_2O_3 as gate dielectrics for graphene-based devices," in *ECS Transactions* **19**, 225 (2009).

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41. W. Hu, F. Yoon, S. Regonda, **P. Fernandes,** E. M. Vogel, F. Buyukserin, X.-M. Zhao, and J. Gao, **"**Lithographically defined Si nanowire field effect transistors for biochemical sensing," in *Proceedings of the IEEE Conference on Nanotechnology,* 507-508 (2008)
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45. C. D. Young, S. Nadkarni, **D. Heh,** H. R. Harris, R. Choi, J. J. Peterson, J. H. Sim, S. A. Krishnan, J. Barnett, E. Vogel, B.H. Lee, P. Zeitzoff, G. A. Brown, and G. Bersuker, "Detection of trap generation in high-kappa gate stacks," in *IEEE Integrated Reliability Workshop Final Report*, 79-83 (2005).
46. C. A. Richter, C. A. Hacker, L. J. Richter, O. A. Kirillov, and E. M. Vogel, "Interface characterization of molecular-monolayer/SiO_2 based molecular junctions," in *Proceedings of the IEEE International Semiconductor Device Research Symposium*, 234-235 (2005).
47. S. M. Koo, **Q. Li,** M. D. Edelstein, C. A. Richter, and E. M. Vogel, "Silicon nanowire field effect transistor test structures fabricated by top-down approaches," in *Proceedings of the IEEE International Semiconductor Device Research Symposium*, 171-172 (2005).
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49. **D. Heh,** E. M. Vogel, and J. B. Bernstein, "New Insights into Threshold Voltage Shifts for Ultrathin Gate Oxides," in *IEEE Integrated Reliability Workshop Final Report,* 99-101 (2004).
50. N. V. Nguyen, J. E. Maslar, J.-Y. Kim, J.-P. Han, J.-W. Park, D. Chandler-Horowitz , and E. M. Vogel, "Characterization of Structural Quality of Bonded Silicon-on-Insulator Wafers by Spectroscopic Ellipsometry and Raman Spectroscopy," in *MRS Symp. Proc., High-Mobility Group-IV Materials and Devices*, 127-132 (2004).
51. J.-P. Han, E. M. Vogel, E. P. Gusev, C. D'Emic, C. A. Richter, D. Heh, and J. Suehle, "Energy Distribution of Interface Traps in High-k Gated MOSFETs," in *Digest of Technical Papers - Symposium on VLSI Technology*, 161-162 (2003).
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53. **D. Heh,** J. B. Bernstein, and E. M. Vogel, "Defect Generation in Ultra-thin Oxide Over Large Fluence Ranges," in *IEEE Integrated Reliability Workshop Final Report*, 9-13 (2002).

54. B. Wang, J. S. Suehle, J. F. Conley, Jr., E. M. Vogel, C. E. Weintraub, A. H. Johnston, and J. B. Bernstein, "Latent Reliability Degradation of Ultra-Thin Oxides After Heavy Ion and γ –ray Irradiation," in *IEEE Integrated Reliability Workshop Final Report*, 16-19 (2001).
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57. A. Shanware, J. P. Shiely, H. Z. Massoud, E. Vogel, K. Henson, A. Srivastava, C. Osburn, J. R. Hauser, and J. J. Wortman, "Extraction of the Gate Oxide Thickness of N- and P-Channel MOSFETs Below 20 Å from the Substrate Current Resulting from Valence-Band Electron Tunneling," in *Technical Digest - International Electron Device Meeting*, 815-819 (1999).
58. R. A. Allen, E. M. Vogel, L. W. Linholm, and M. W. Cresswell, "Sheet and Line Resistance of Patterned SOI Surface Film CD Reference Materials as a Function of Substrate Bias," in *IEEE International Conference on Microelectronic Test Structures*, 51-55 (1999).
59. A. Srivastava, H. H. Heinisch, E. Vogel, C. Parker, C. M. Osburn, N. A. Masnari, J. J. Wortman, and J. R. Hauser, "Evaluation of 2.0 nm Grown and Deposited Dielectrics in 0.1 μm PMOSFETs," in *Materials Research Society Symposium Proceedings* **525**, 163-170 (1998).

B3. Other Refereed Material

1. *Eric M. Vogel and Joshua A. Robinson, "Two-dimensional layered transition-metal dichalcogenides for versatile properties and applications," *MRS Bulletin* **40**, 558-563 (2015).

B4. Submitted Journal Articles (with date of submission).

C. Other Publications and Creative Products

No data.

D. Presentations Without Proceedings

D1. Keynote Addresses and Plenary Lectures

1. E. M. Vogel, "Electrical Characterization of Advanced MOS Devices," Tutorial at IEEE Workshop on Microelectronics and Electron Devices, Boise, ID, April 2-4, 2009.
2. E. M. Vogel, "Electrical and Reliability Characterization of Advanced MOS Devices," Tutorial organized by Semyzen, Singapore, July 23-24, 2007.
3. E. M. Vogel, "Ultra-thin Gate Oxide Reliability: Past and Present Trends in Characterization, Physical Modeling, and Assessment," Tutorial at IEEE Integrated Reliability Workshop, Lake Tahoe, CA, Oct. 15, 2001.
4. J. S. Suehle and E. M. Vogel, "Thin Gate Oxide Reliability," Tutorial at International Reliability Physics Symposium, Apr. 10, 2000.
5. E. M. Vogel, "Panel presentation on 'Is technology scaling limited by oxide reliability?'," International Reliability Physics Symposium, Apr. 13, 2000.

D2. Invited Conference and Workshop Presentations

1. Eric M. Vogel, "Symmetric 2D Vertical Heterostructures," MRS Fall Meeting, Boston, MA, November 30, 2015.
2. Eric M. Vogel, "A Perspective on Next Generation Electronics for the Internet of Things," Technical Association of the Pulp and Paper Industry - International Research Management Committee Meeting, Atlanta, GA, December 10, 2015.
3. *Eric M. Vogel, "Symmetric 2D Vertical Heterostructure Devices: Simulation and Experiment," 2D Materials Workshop, Orlando, FL, August 22, 2015.
4. *Eric M. Vogel, "Challenges with Field Effect Transistor Chemical and Biological Sensors," Army Research Office Compound Semiconductors for Biosensors Workshop, College Park, MD, March 11, 2015.
5. *****Eric M. Vogel, "A Perspective on Next Generation Electronics," GT Manufacturing Institute Industry Partners Symposium, Atlanta, GA, October 31, 2014.
6. *****Eric M. Vogel, Meisha Shofner and **Brian Beatty**, "Paper and Cellulosic Materials as Flexible Substrates for 2D Electronic Materials," 2014 Lignocellulosics Symposium, Atlanta, GA, October 2, 2014.
7. *****Eric M. Vogel, "Fabrication and Characterization of Large-area Graphene-Insulator-Graphene Heterostructures," 4th International Symposium on Graphene Devices, Bellevue, WA, September 23, 2014.
8. *****Eric M. Vogel, "Fabrication and Characterization of Large-area Graphene-Insulator-Graphene Heterostructures," International Conference on Superlattices, Nanostructures and Nanodevices," Savannah, GA, August 4, 2014.
9. *****Eric M. Vogel, "Disorder-Induced Gap States at the High-k/III-V Interface," MRS Spring Meeting, San Francisco, CA, April, 2014.
10. *****Eric M. Vogel "Disorder-Induced Gap States in III-V MOS Devices," American Vacuum Society Meeting, Long Beach, CA, October 30, 2013.
11. *****Eric M. Vogel, "Disorder-Induced Gap States in III-V MOS Devices," IEEE Nanotechnology Materials and Devices Conference, Tainan, Taiwan, October 8, 2013.
12. *****Eric M. Vogel, "Prospects for Beyond CMOS: Neuromorphic Circuits and Nanoribbon Biosensors" SEMINA 2013, Hermosillo, Senora, Mexico, September 19, 2013.
13. *Eric M. Vogel, "Nanocrystalline Silicon Thin Film Transistors for Neuromorphic Applications," 4th International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors, Villard de Lans, France, July 11, 2013.
14. *****Eric M. Vogel, "Fabrication, Characterization, and Modeling of Silicon-on-Insulator Field-Effect-Transistor Nanoribbon Biosensors," Biosensors and Bioelectronics, Chicago, IL, June 18, 2013.
15. *****Eric M. Vogel, "Issues with Characterization of Graphene Field Effect Transistors," 2013 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics (FCMN), National Institute of Standards and Technology, Gaithersburg, MD, March 28, 2013.
16. *****Eric M. Vogel, "Low-Temperature Materials for a Neuromorphic Architecture," 2013 TMS Annual Meeting & Exhibition, San Antonio, TX, March 4, 2013.
17. *****E. M. Vogel, "Nanoscale Devices and Materials for a Neuromorphic Architecture," CMOS Emerging Technology, Vancouver, British Columbia, July, 2012.
18. *E. M. Vogel, "Remote phonon and surface roughness limited universal electron mobility of $In_{0.53}Ga_{0.47}As$ surface channel MOSFETs," China Semiconductor, 2012.
19. *E. M. Vogel, "Integration, Models, and Circuits for Silicon-based Chemical/Biological Sensors," SRC/NSF/SFI Forum on Integrated Sensors, Kildaire, Ireland, March 22-23, 2012.

20. *E. M. Vogel, "A Comprehensive Electro-Physical Model for the Interface of Atomic Layer Deposited High-k Gate Dielectrics on InGaAs," International Gate Stack Technology Symposium, October, 2011, NY.
21. E. M. Vogel, "Remote phonon and surface roughness limited universal electron mobility of $In_{0.53}Ga_{0.47}As$ surface channel MOSFETs," Fall American Vacuum Society Symposium, Nashville, TN, Oct. 2011.
22. E. M. Vogel, "Impact of surface preparations and substrate doping on the transport properties of $In_xGa_{1-x}As$ metal-oxide-semiconductor field effect transistors," International Union of Materials Research Societies – International Conference on Electronic Materials, Seoul, Korea, August 22-27, 2010.
23. E. M. Vogel, "Properties of Metal Contacts on Graphene," Recent Advances in Graphene and Related Materials, Singapore, August 1-6, 2010.
24. E. M. Vogel, "Neuromorphic Electronics Using Nanoscale Non-crystalline Silicon Devices," Nanotech Conference and Expo, Anaheim, CA, June 23, 2010.
25. **C. L. Hinkle,** M. Milojevic, A. M. Sonnet, E. M. Vogel, R. M. Wallace, "III-V MOS Device Performance Enhancement by Detection and Control of Individual Surface Oxidation States," 56th International Symposium of the AVS, San Jose, CA, November 9-11, 2009.
26. **A. M. Sonnet, R. V. Galatage, M. N. Jivani,** E. O'Connor, P. K. Hurley, M. Milojevic, N. Goel, P. Kirsch, J. Huang, R. A. Chapman, C. L. Hinkle, R. M. Wallace and E. M. Vogel, "Impact of surface preparations on the transport characteristics of InGaAs metal-oxide-semiconductor field effect transistors (MOSFETs)," 6th International Symposium on Advanced Gate Stack Technology, San Francisco, CA, August 23-26, 2009.
27. J. J. Chambers, H. Niimi, A. Li-Fatou, J. Shaw, **C. L. Hinkle**, H. N. Alshareef, R. A. Chapman, **R. V. Galat age**, E. M. Vogel, C. Freeman, and E. Wimmer, "Metal gate electrode impurity engineering for contro l of effective work function," 6th International Symposium on Advanced Gate Stack Technology, San Francisco, CA, August 23-26, 2009.
28. **C. L. Hinkle**, M. Milojevic, E. M.Vogel and R. M.Wallace, "Surface passivation and implications on hig h mobility channel performance," INFOS 2009- 16th Biennial International Conference on Insulating Films on Semiconductors, Cambridge University, UK, June 28 – July 1, 2009.
29. E. M. Vogel, S. Y. Park, M. J. Kim, Y. J. Chabal, R. M. Wallace, J. Kim, and K. J .Cho, "Materials Science of Graphene for Novel Device Applications," Nanoelectronics Research Initiative e-Workshop, July 28, 2009, Gaithersburg, MD.
30. E. M. Vogel**, C. L. Hinkle, A. Sonnet,** F. S. Aguirre-Tostado, M. Milojevic, K. J. Choi, H. C. Kim, J. G. Wang, H. C. Floresca, J. Kim, M. J. Kim, and R.M. Wallace, "Electrical and Physical Properties of High-k Gate Dielectrics on III-V Semiconductors," American Vacuum Society Meeting, 2008.
31. Eric M. Vogel, **A. Sonnet, C. L. Hinkle,** F. S. Aguirre-Tostado, M. Milojevic, J. Kim, and R.M. Wallace, "Electrical and Physical Properties of GaAs MOS Devices with Al_2O_3/a-Si Gate Dielectric Stacks," 5th International Symposium on Advanced Gate Stack Technology, 2008.
32. W. Hu, E. M. Vogel, J. Gao, and B. Sumer, "Biosensing Using Semiconductor Technologies" IEEE-Dallas Chapter of Engineering in Medicine and Biology Society (EMBS), Feb. 19, 2007.
33. E. M. Vogel, "Metrology for Emerging Devices and Materials," American Materials Failure Analysis (AMFA) Workshop, Phoenix, AZ, April 20, 2007.
34. E. M. Vogel, "Metrology for Beyond CMOS: Emerging Devices and Materials," 53rd American Vacuum Society International Symposium, Nano-Manufacturing Topical Conference, San Francisco, CA, Nov. 12-16, 2006.

35. E. M. Vogel, "Technology and Metrology for Beyond CMOS," SEMATECH-SRC Topical Research Conference on Reliability, Austin, TX, Oct. 23, 2006.
36. E. M. Vogel, "Metrology for new microelectronic materials," American Physical Society Spring Meeting, Baltimore, MD, March 14, 2006.
37. E. M. Vogel, "Electrical Characterization of MOS Devices with Advanced Gate Stacks," Tutorial at MIGAS International School on Advanced Microelectronics, Physical and Electrical Characterization of Materials and Devices for Silicon Nanoelectronics, Grenoble, France, June 11-17, 2005.
38. M. Green and E. M. Vogel, "Method for Measuring the Barrier Height at the High-k/Metal Electrode Interface, and Combinatorial Determination of Optimal Metal Gate Electrodes," SEMATECH Advanced Gate Stack Engineering Working Group Biannual Meeting, Austin, TX, Feb. 14, 2005.
39. E. M. Vogel and **D. Heh**, "Depth Profiles of Electrically Active Defects in High-k Gate Stacks Using Charge Pumping," SEMATECH Advanced Gate Stack Engineering Working Group Biannual Meeting, Austin, TX, Feb. 15, 2005.
40. Eric M. Vogel, "Characterization Needs for Emerging Research Materials and Devices," ITRS Emerging Research Materials Workshop, San Francisco, CA, July 11, 2004.
41. Curt A. Richter and Eric Vogel, "Computational Needs for Emerging Materials: An Experimental Metrologist's Viewpoint," ITRS Materials Modeling for Emerging Research Materials Workshop, Austin, TX, June 7, 2004.
42. E. M. Vogel, "A Perspective on the Future of Electronics," Nano 2004, Baltimore, MD, Nov. 12, 2004.
43. E. M. Vogel, "Issues with Electrical and Reliability Characterization of Advanced Gate Dielectrics," 5th Topical Research Conference on Reliability, Austin, TX, Oct. 28, 2002.
44. E. M. Vogel, "Issues with Electrical and Reliability Characterization of Advanced Gate Dielectrics," 12th Workshop on Dielectrics in Microelectronics, Grenoble, France, Nov. 20, 2002.
45. E. M. Vogel and D. Blackburn, "NIST Response to ITRS and Beyond," SRC Metrology Needs for Emerging Technologies Workshop, Raleigh, NC, May 3, 2002.
46. E. M. Vogel, "Characterization, Physical Modeling, and Assessment of Gate Oxide Reliability," Tutorial at IEEE International Reliability Physics Symposium, Dallas, TX, April 7, 2002.
47. E. M. Vogel, "Degradation and breakdown of ultra-thin silicon dioxide by electron and hole injection," IEEE Microelectronics Reliability and Qualification Workshop, Glendale, CA, Dec. 11, 2001.
48. E. M. Vogel, "Issues with the Electrical Characterization and Reliability of MOS Devices With Advanced Gate Dielectrics," Materials Research Society Workshop on Dielectric Science & New Functionality in Device Physics for Crystalline Oxides on Semiconductors (COS), Chattanooga, TN, September 11, 2001.
49. E. M. Vogel, M. D. Edelstein, and J. S. Suehle, "Reliability of Ultra-thin Silicon Dioxide Under Substrate Hot-electron, Substrate Hot-hole, and Tunneling Stress," 12th Insulating Films on Semiconductors Conference, Udine, Italy, June 20-23, 2001.
50. E. M. Vogel, M. D. Edelstein, C. A. Richter, N. V. Nguyen, I. Levin, D. L. Kaiser, H. Wu, and J. Bernstein, "Issues in High-κ Gate Dielectrics for Future MOS Devices," IEEE Microelectronics Reliability and Qualification Workshop, Glendale, CA, Oct. 31, 2000.
51. E. M. Vogel, "High-κ Gate Dielectric Reliability – Issues in Characterization, Physical Modeling, and Assessment," Materials Research Society High-κ Gate Dielectric Workshop, New Orleans, LA, June 1-2, 2000.
52. E. M. Vogel, and J. J. Wortman, "Properties of N- and P-Channel MOSFETs with Ultrathin RTCVD Oxynitride Gate Dielectrics," Electrochemical Society Spring Meeting, Seattle, Washington, May 2-7, 1999.

D3. Conference and Workshop Presentations

1. S. Zhang, A. Tarasov, M.-Y. Tsai, R. Dasari, S. Graham, E. M. Vogel, S. Barlow, S. R. Marder, "Controlled Doping of Two-Dimensional (2D) Materials with Molecular Reductants and Oxidants," MRS Fall Meeting, Boston, MA, December 1, 2015.
2. ***P. Campbell, A. Tarasov, C. Joiner**, W. J. Ready, and E. M. Vogel "Resonant Tunneling Characteristics of 2D versus 3D Devices," SRC TECHCON, Austin, TX, September 22, 2015.
3. ***J. Smith, P. Campbell, A. Tarasov, C. Joiner**, W. J. Ready, and E. M. Vogel, "Influence of Material Properties on Tunneling Devices," SRC TECHCON, Austin, TX, September 22, 2015.
4. ***P. Campbell, A. Tarasov, M.-Y. Tsai, Z. Hesabi, J. Feirer,** S. Graham, W.J. Ready, and E. M. Vogel "Interfacial Effects on MoS_2 Device Performance," TMS Annual Meeting, Orlando, FL, March 15, 2015.
5. ***C. Joiner, P. Campbell,** and E. M. Vogel, "Impact of the Direct Growth of MoS_2 on Graphene for Tunneling Applications," Physics and Chemistry of Surfaces and interfaces 42nd conference, Salt Lake City, Utah, January 21, 2015.
6. ***P. Campbell, A. Tarasov, M.-Y. Tsai, Z. Hesabi, J. Feirer**, S. Graham, W. J. Ready, and E. M. Vogel "Highly Uniform, Large Area MoS2 for Device Applications," Graphene and Beyond Workshop, State College, PA, April 1, 2014
7. ***S. de la Barrera, **T. Roy,** R. Feenstra, and E. Vogel, "Sources of disorder in double-gated graphene-insulator-graphene tunneling devices," American Physical Society Meeting, Denver, Co, March 5, 2014.
8. **R. V. Galatage**, D. M. Zhernokletov, H. Dong, B. Brennan, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "An investigation into the origin of anomalous frequency dispersion in accumulation capacitance of MOS devices on III-V substrates" AVS International Symposium and Exhibition, Tampa, FL, October 30, 2012.
9. ***R. V. Galatage**, H. Dong, D. M. Zhernokletov, B. Brennan, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "Thermal stability of InP/high-k interface" TECHCON 2012, Austin, TX, September 10, 2012.
10. ***A. Subramaniam, K. D. Cantley,** R. A. Chapman, **B. Chakrabarti,** and E. M. Vogel, "Ambipolar Nano-crystalline-silicon TFTs with Submicron Dimensions and Reduced Threshold Voltage Shift," 1st Conference of the Texas Chapter of the American Vacuum Society (AVS), Richardson, TX, June 2012.
11. ***A. Subramaniam, K. D. Cantley,** and E. M. Vogel, "Low-Temperature Processed Materials for Neuromorphic Circuits," 4th International Conference on Smart Materials, Structures, and Systems, Montecatini, Italy, June 10-14, 2012.
12. ***G. A. Mahmud,** O. Seitz, R. Chapman, H. Stiegler, E. Vogel, and Y. Chabal, "A Comparative Study of Aminosilanes for the Application of Reproducible, Ultralow Detection of Biomolecules," 221st Electrochemical Society Meeting, Seattle, WA, May 7, 2012.
13. **J. Chan,** A. Pirkle, A. Venugopal, D. Hinojos, C. Magnuson, S. McDonnell, L. Colombo, R.S. Ruoff, R.M. Wallace, E.M. Vogel, "Improving performance of CVD graphene field effect transistors by reducing water trapped at the graphene/substrate interface," Fall American Vacuum Society Symposium, Nashville, TN, Oct. 2011.
14. **A. Venugopal,** W.P. Kirk, L. Colombo, and E. M. Vogel, "Charge Transport Studies in graphene devices; a focus on mobility behavior," American Physical Society March Meeting, Dallas, TX, 2011.
15. **A. M. Sonnet,** R. V. Galatage, M. Milojevic, R. A. Chapman, **C. L. Hinkle,** R. M. Wallace and E. M. Vogel, "A study of the impact of surface preparations on the transport characteristics of $In_xGa_{1-x}As$ (x=0.53, 0.65) metal-oxide-semiconductor field effect transistors," TECHCON, Austin, TX, 2010.

16. **A. Venugopal,** X. Li, C. Magnuson, B. Han, W. P. Kirk, L. Colombo, R. S. Ruoff and E. M. Vogel, "Transport Properties of Graphene Grown on Cu by Chemical Vapor Deposition," TECHCON, Austin, TX, 2010.
17. **A. M. Sonnet, C. L. Hinkle** and E. M. Vogel, "Interfacial Layer Defect Response of Metal/High-k/GaAs C-V Characteristics," IEEE Semiconductor Interface Specialists Conference, San Diego, CA, 2010.
18. **A. Venugopal,** X. Li, C. Magnuson, B. Han, W. P. Kirk, L. Colombo, R. S. Ruoff and E. M. Vogel, "Comparative Study of the Effective and Hall Mobility of Graphene," MRS Fall Meeting, Boston, MA, 2010
19. **P. G. Fernandes,** O. Seitz, R. A. Chapman, H. J. Stiegler, H.-C. Wen, Y. J. Chabal, and E. M. Vogel, "SOIFET-based Nanoribbon Sensors for Ultra-low Biomolecule Detection," MRS Fall 2010 Meeting, Boston, MA, 2010
20. O. Seitz, **P. G. Fernandes,** H.–C. Wen, H. J. Stiegler, R. A. Chapman, E. M. Vogel, Y. J. Chabal, "Optimization of Biosensors using Selective Chemistry," AVS 57th International Symposium, Albuquerque, NM, Oct. 17, 2010
21. D. Wheeler, L.-E. Wernersson, L. Froberg, C. Thelander, A. Mikkelsen, K.-J. Weststrate **A. Sonnet**, E. M. Vogel, and A. Seabaugh, "Deposition of HfO_2 on InAs by atomic-layer deposition," INFOS 2009- 16 th Biennial International Conference on Insulating Films on Semiconductors, Cambridge University, UK, June 28 – July 1, 2009
22. B. Lee, G. Mordi, Y.J. Chabal , K.J. Cho, M. J. Kim, E. M. Vogel, R.M. Wallace, L. Colombo, and J. Kim, " High-k dielectric deposition using ALD (atomic layer deposition) for graphene based nanoelectronics, " 9th international Conference on Atomic Layer Deposition, Monterey, CA, July 19-22, 2009.
23. **A. Venugopal,** A. Pirkle, R. M. Wallace, L. Colombo and E. M. Vogel, "Contact Resistance and Transport Studies on Few layer Graphene Stacks," TECHCON, Austin, TX, 2009.
24. K. D. Cantley and E. M. Vogel, "Fabrication and SPICE Modeling of Hydrogenated Amorphous Silicon Nanowire Transistors for Artificial Neural Systems," The Fifth International Nanotechnology Conference on Communication and Cooperation (INC5), Los Angeles, CA, May 2009.
25. B. Lee, Y. J. Chabal , K. J. Cho, M. J. Kim, E. M. Vogel, R. M. Wallace, L. Colombo, J. Kim, "High-k dielectric deposition using ALD (atomic layer deposition) for graphene field-effect transistor," International Symposium on Advanced Gate Stack Technology, San Francisco, California, USA, August 23-26, 2009.
26. **C.L. Hinkle,** M. Milojevic, B. Brennan, G.J. Hughes, **A.M. Sonnet,** F.S. Aguirre-Tostado, E.M. Vogel, and R.M. Wallace, "Determining the presence of Ga suboxides and their impact on III-V passivation and Fermi-level pinning," Physics and Chemistry of Semiconductor Interfaces, Santa Barbara, CA, January 11-15, 2009.
27. **Ramapriyan Pratiwadi, Kurtis D. Cantley,** and Eric M. Vogel, "Nano-scale Amorphous Silicon Materials and Devices for a Neuro-inspired Architecture," Mat. Res. Soc. Spring Meeting, Symposium B. San Francisco, CA, March, 2008.
28. M. Milojevic, B. Brennan, F. S. Aguirre-Tostado, **C. Hinkle,** H. C. Kim, B. Lee, G. Hughes, E. M. Vogel, J. Kim, and R. M. Wallace, "In-situ XPS investigation of the "clean-up" effect through half-cycle ALD reactions on III-V substrates," IEEE Semiconductor Interface Specialists Conference, 2008.
29. **A. M. Sonnet, C. L. Hinkle, M. N. Jivani,** J. Kim, R. A. Chapman, R. M. Wallace and E. M. Vogel, "Performance Enhancement of n-Channel Invertion Type $In_xGa_{1-x}As$ MOSFET by Effective Surface Passivation Using Ex-Situ Deposited Thin Amorphous Si Layer," IEEE Semiconductor Interface Specialists Conference, 2008.

30. **C. L. Hinkle, A. M. Sonnet,** E. M. Vogel, M. Milojevic, F. S. Aguirre-Tostado, J. Kim, R. M. Wallace, B. Brennan, and G. J. Hughes, "Surface states, interface traps, and Fermi level pinning correlation to the interface oxidation states of Ga," IEEE Semiconductor Interface Specialists Conference, 2008.
31. B. Lee, S.Y. Park, H.Y. Kim, K.J. Cho, E.M. Vogel, M.J. Kim, R.M. Wallace, and J. Kim, "Conformal Dielectric Layers Deposited by ALD (Atomic Layer Deposition) for Graphene-based Nanoelectronics," AVS 55th International Symposium, October 21, 2008, Boston, MA, USA.
32. J. Kim, H.C. Kim, B. Lee, A. Hande, E.M. Vogel, M.J. Kim, and R.M. Wallace, "ALD of High-k Gate Dielectrics on Si and Alternative Substrates," AVS 55th International Symposium, October 21, 2008, Boston, MA, USA
33. J. Kim, B. Brennan, F. S. Aguirre-Tostado, C. Hinkel, H. C. Kim, B. Lee, G. Hughes, E. Vogel and R. M. Wallace, "In-situ XPS study of ALD Al2O3 deposition on InxGa1-xAs," 5th International Symposium on Advanced Gate Stack Technology (ISAGST), September 28- October 1, 2008, Lakeway Resort & Spa – Austin, TX, USA
34. A Pirkle**, A. Venugopal,** E.Vogel and R. Wallace, "Physical and Electrical Characterization of Metal Contacts on Graphite,", 5th International Symposium on Advanced Gate Stack Technology (ISAGST), September 28- October 1, 2008, Lakeway Resort & Spa – Austin, TX, USA
35. BK Lee, S-Y Park, H-C Kim, K. Cho, E. Vogel, M. Kim, R. Wallace, and J Kim, "Al_2O_3 Gate Dielectric Layer Deposited by ALD (Atomic Layer Deposition) For Graphene-based Nanoelectronics," 5th International Symposium on Advanced Gate Stack Technology (ISAGST), September 28- October 1, 2008, Lakeway Resort & Spa – Austin, TX, USA
36. **C. L. Hinkle, A. M. Sonnet,** M. Milojevic, F. S. Aguirre-Tostado, H. C. Kim, J. Kim, R. M. Wallace, and E. M. Vogel, "Comparison of n-type and p-type GaAs oxide growth and its effects on frequency dispersion characteristics," Workshop on Dielectrics in Microelectronics, 23rd - 25th June 2008, Bad Saarow (Berlin)
37. M. Milojevic, F. S. Aguirre-Tostado, **C. L. Hinkle,** B. Lee, S. J. McDonnell, K. J. Choi, H. C. Kim, **A. M. Sonnet,** G. J. Hughes, E. M. Vogel, J. Kim and R. M. Wallace, "High-κ dielectrics for CMOS beyond 22nm," 15th Workshop on Dielectrics in Microelectronics, WoDiM, 23rd - 25th June 2008, Bad Saarow (Berlin)
38. M. Milojevic, **C. L.Hinkle,** F.S. Aguirre-Tostado, B. Lee, S. J. McDonnell, K. J. Choi, H. C. Kim, A. M. Sonnet, G. J. Hughes, E. M. Vogel, J. Kim, R. M. Wallace, "In-situ ALD Studies of high-k dielectric/high mobility interfaces," E-MRS Spring Meeting, May 27, 2008, Strausbourg, FRANCE
39. F. S. Aguirre-Tostado, M. Milojevic, S. McDonnell, R. Contreras-Guerrero, **C. L. Hinkle**, K. J. Choi, J. Kim, E. M. Vogel, A. Herrera-Gomez, R. M. Wallace, T. Yang, Y. Xuan and P.D. Ye, "Study of surface preparation for high-k dielectrics on GaAs," IEEE Semiconductor Interface Specialists Conference, 2007.
40. **C. L. Hinkle, A. M. Sonnet**, E. M. Vogel, S. McDonnell, M. Milojevic, B. Lee, F. S. Aguirre-Tostado, K. J. Choi, J. Kim and R. M. Wallace, "GaAs MOS Frequency Dispersion Reduction by Surface Oxide Removal and Passivation," IEEE Semiconductor Interface Specialists Conference, 2007.
41. **C. L. Hinkle**, M. Milojevic, S. McDonnell, F. S. Aguirre-Tostado, **A. M. Sonnet**, R. M. Wallace, and E. M. Vogel, "GaAs Surface Modification by Arsenic Oxide Removal and Bond Conversion," 4th International Symposium on Advanced Gate Stack Technology, Dallas, TX, Sept. 27, 2007.
42. **Q. Li, S.-M. Koo**, C. A. Richter, M. D. Edelstein, J. J. Kopanski, J. S. Suehle, and E. M. Vogel, "Precise Manipulation and Alignment of Single Nanowires for Device Fabrication," 2006 IEEE Silicon Nanoelectronics Workshop, Honolulu, HI, June 11-12, 2006.

43. **S.-M. Koo,** C. A. Richter, **Q. Li,** M. D. Edelstein, and E. M. Vogel, "Schottky-contact silicon nanowire field effect transistor test structures," 2006 IEEE Silicon Nanoelectronics Workshop, Honolulu, HI, June 11-12, 2006.
44. S.-E. Park, N. V. Nguyen, J. J. Kopanski, J. S. Suehle, and E. M. Vogel, "Comparison of scanning capacitance microscopy and scanning Kelvin probe microscopy in determining two-dimensional doping profiles of Si homostructures," Ultra Shallow Junction Conference, Daytona Beach, FL, 2005.
45. S.-E. Park, St. Jeliazkov, J. J. Kopanski, J. Suehle, E. Vogel, A. Davydov, and H.-K. Shin, "Electrical Characterization of MOS structures and Wide Bandgap Semiconductors by Scanning Kelvin Probe Microscopy," MRS Spring Meeting, San Francisco, CA, 2005.
46. **J.-P. Han, S. M. Koo,** E. M. Vogel, E. P. Gusev, C. D'Emic, C. A. Richter, and J. S. Suehle, "Reverse Short Channel Effects in High-k Gated nMOSFETs," 13th Workshop on Dielectrics in Microelectronics, Kinsale, Ireland, June 28, 2004.
47. N. V. Nguyen, J. E. Maslar, J.-Y. Kim, J.-P. Han, J.-W. Park, D. Chandler-Horowitz , and E. M. Vogel, "Characterization of Structural Quality of Bonded Silicon-on-Insulator Wafers by Spectroscopic Ellipsometry and Raman Spectroscopy," Materials Research Society Meeting, 2004.
48. **Jin-Ping Han, S.M. Koo**, C. A. Richter and Eric Vogel, "Influence of Buffer Layer Thickness on the Ferroelectric Memory window of $SrBi_2Ta_2O_9$/SiN/Si Structure," 16th international Symposium on Integrated Ferroelectrics (ISIF'04), Gyeongju, Korea, April 5-8, 2004.
49. **J. Park**, C. A. Richter, J. Y. Kim, N. V. Nguyen, J. E. Bonevich, and E. M. Vogel, "Characterization of ultrathin amorphous silicon and correlation with crystalline evolution after thermal annealing," MRS Spring Meeting, 2003.
50. **D. Heh**, E. M. Vogel, and J. Bernstein, "Relevance of injected hot holes on the breakdown of ultra-thin silicon-dioxide metal-semiconductor devices," American Physical Society Spring Meeting, Indianapolis, IN, March 21, 2002.
51. E. M. Vogel, **D. Heh**, B. Wang, C. E. Weintraub, J. S. Suehle, M. D. Edelstein, and J. B. Bernstein, "Interaction of Electrons with Defects Created by Hot Holes in Ultra-thin Silicon Dioxide," 32nd IEEE Semiconductor Interface Specialists Conference, Washington D.C., Nov. 29, 2001.
52. C. A. Richter, E. M. Vogel, A. M. Hodge, and A. R. Hefner, "Differences between Quantum-Mechanical Capacitance-Voltage Simulators," International Conference on Simulation of Semiconductor Processes and Devices, Athens, Greece, Sept. 5-7, 2001.
53. J. S. Suehle, E. M. Vogel, M. D. Edelstein, C. A. Richter, N. V. Nguyen, I. Levin, and D. L. Kaiser, H. Wu, and J. Bernstein, "Challenges of High-κ Gate Dielectrics for Future MOS Devices," 6th International Symposium on Plasma and Process-Induced Damage, Monterey, CA, May 13-15, 2001.
54. E. M. Vogel and J. S. Suehle, "Degradation and Breakdown of Ultra-thin Silicon Dioxide Induced by Substrate Hot Hole Injection," 31st IEEE Semiconductor Interface Specialists Conference, San Diego, CA, Dec. 7-9, 2000.
55. J. S. Suehle, T. Myers, M. Edelstein, E. M. Vogel, and J. F. Conley, Jr., "The Effects of Ionizing Radiation on Wear-out and Reliability of Thin Gate Oxides," IEEE Microelectronics Reliability and Qualification Workshop, Glendale, CA, Oct. 31, 2000.
56. E. M. Vogel, J. S. Suehle, M. D. Edelstein, B. Wang, Y. Chen, and J. B. Bernstein, "Degradation of Ultra-thin SiO_2 Under Combined Substrate Hot Electron and Tunneling Stress," 30th IEEE Semiconductor Interface Specialists Conference, Charleston, SC, December 2-4, 1999.
57. J. E. Guyer, W. F. Tseng, W. R Thurber, E. M. Vogel, D. A. Gajewski, and J. G. Pellegrino, "*In Situ* Diffuse Reflectance Spectroscopy for Measurement and Control of III-V Molecular Beam Epitaxy," Materials Research Society Fall Meeting, Boston, MA, Nov. 29 - Dec. 3, 1999.

58. A. Shanware, H. Z. Massoud, E. Vogel, K. Henson, J. R. Hauser, and J. J. Wortman, "MOSFET Substrate Currents due to Valence-Band Tunneling in 15-35 Å," 29th IEEE Semiconductor Interface Specialists Conference, San Diego, CA, December 3-5, 1998.
59. E. M. Vogel, C. E. Weintraub, and J. J. Wortman, "Properties of n-Channel and p-Channel MOSFETs with Ultrathin Gate Dielectrics," SRC TECHCON '98, Las Vegas, NV, September 9-11, 1998.
60. A. Srivastava, H. H. Heinisch, E. Vogel, C. Parker, C. M. Osburn, N. A. Masnari, J. J. Wortman, and J. R. Hauser, "Evaluation of 2.0 nm Grown and Deposited Dielectrics in 0.1 μm PMOSFETs," Materials Research Society Meeting, 1998.
61. E. M. Vogel, J. J. Wortman, and J. R. Hauser, "The Use of RTCVD Oxynitrides in Ultra-thin Gate Dielectric Stacks," 28th IEEE Semiconductor Interface Specialists Conference, Charleston, SC, December 4-6, 1997.
62. E. M. Vogel, W. K. Henson, P. K. McLarty, J. J. Wortman, and J. R. Hauser, "Stacked RTCVD Oxide and Oxynitride Films for Ultrathin Gate Dielectrics," 27th IEEE Semiconductor Interface Specialists Conference, San Diego, CA, December 5-7, 1996.
63. E. M. Vogel, W. L. Hill, V. Misra, P. K. McLarty, J. J. Wortman, J. R. Hauser, P. Morfouli, G. Ghibaudo, and T. Ouisse, "A self-consistent physical explanation for the mobility behavior of n-channel and p-channel MOSFETs with oxynitride gate dielectrics formed by low pressure rapid thermal chemical vapor deposition," 26th IEEE Semiconductor Interface Specialists Conference, Charleston, SC, December 7-9, 1995.
64. P. Morfouli, G. Ghibaudo, E. M. Vogel, W. L. Hill, V. M. Misra, P. K. McLarty, and J. J. Wortman, "Electrical and Reliability Properties of Thin Silicon Oxynitride Dielectrics Formed by Low Pressure Rapid Thermal Chemical Vapor Deposition," 7th ESPRIT Workshop on Dielectrics in Microelectronics, Crete, Greece, November, 1995.
65. P. Morfouli, G. Ghibaudo, T. Ouisse, E. M. Vogel, W. L. Hill, V. Misra, P. McLarty, J. J. Wortman, "Noise Analysis of MOSFET's with Ultra Thin Silicon Oxynitride Films Prepared by Low Pressure Rapid Thermal Chemical Vapor Deposition (LPRTCVD)," 25th European Solid State Device Research Conference, Hague, Netherlands, September 25-27, 1995.

D4. Invited Seminar Presentations

1. *E. M. Vogel, "Graphene and 2D Materials: Synthesis, Characterization and Applications," Intel Labs, Hillsboro, OR, June 8, 2015.
2. *E. M. Vogel, "Integration and Characterization of Graphene-Insulator-Graphene Junctions," Air Force Research Lab, Dayton, OH, November 21, 2013.
3. *E. M. Vogel, "Low-Temperature Processed Materials for Neuromorphic Circuits," Georgia Tech Center for Organic Photonics and Electronics, 2012.
4. *E. M. Vogel, "Potential Technologies for Beyond Silicon Transistors: Graphene-based Devices & Silicon-based Biosensors," Kansas State University, 2012.
5. *E. M. Vogel, "Issues with Characterizing Transport Properties of Single Layer Graphene Field Effect Transistors", University of Georgia, Athens, GA, 2012.
6. E. M. Vogel, "Silicon Nanoribbons for Chemical and Biological Sensor FETs," Army Research Labs, 10/26/2010, Adelphi, MD.
7. E. M. Vogel, "Mobility of $In_{0.53}Ga_{0.47}As$ Surface Channel MOSFETs with High-k Gate Dielectrics," SEMATECH, 9/23/2010, Albany, NY.
8. E. M. Vogel, "From "Moore's Law" to "More Than Moore": Electronic Materials and Devices at UTD," Texas Instruments, Dallas, TX, May, 2009.

9. E. M. Vogel, "Electrical and Physical Properties of High-k Gate Dielectrics on III-V Semiconductors," IBM TJ Watson Research Center, Physical Sciences Seminar, Oct. 24, 2008.
10. E. M. Vogel and W. Hu, "Initiatives in Nanometrology," Texas Instruments, Dallas, TX, Jan. 8, 2007.
11. E. M. Vogel, "Challenges of Electrical Measurements of Advanced Gate Dielectrics in MOS Devices," Applied Materials, Feb. 9, 2004.
12. E. M. Vogel, "Reliability of Ultra-thin Silicon Dioxide for Future MOS Devices," Penn State University, Dept. of Engineering Science, Oct. 4, 2000.
13. E. M. Vogel, "Reliability of Ultrathin Oxides for MOS Devices," North Carolina State University, Dept. of Electrical and Computer Engineering, Apr. 22, 1999.
14. Eric M. Vogel, "Capacitance and Conductance Characterization of MOS Capacitors with Tunneling Gate Dielectrics," SEMATECH Gate Stack Engineering Working Group Meeting, Raleigh, NC, November 11, 1999.
15. E. M. Vogel, "Electrical Characterization and Reliability of MOS Devices with Tunneling Gate Dielectrics," IBM, Yorktown Heights, NY, October 14, 1999.
16. E. M. Vogel, "Alternate Dielectric Technology and Metrology," University of Delaware, Dept. of Electrical and Computer Engineering, July 13, 1999.

F. Other Scholarly and Creative Accomplishments

No data

G. Societal And Policy Impacts

- May, 2015. The Georgia Tech Horizons magazine highlighted my group's work on the AgriSense biosensor project.
- October 14, 2013. The Irish Times announces the creation of the U.S.-Ireland-Northern Ireland AgriSense project.

H. Other Professional Activities

No data.

V. Teaching

A. Courses Taught

Semester, Year	Course Number	Course Title	# of Students
Spring, 2016	MSE 2001	Introduction to Materials Sci.	122
Spring, 2016	MSE 3021	Materials Laboratory I	
Fall, 2015	MSE 3015	Electronic, Optical and Magnetic Properties of Matls.	37
Spring, 2015	MSE 3015	Electronic, Optical and Magnetic Properties of Matls.	53
Fall, 2014	MSE 3015	Electronic, Optical and Magnetic Properties of Matls.	30
Spring, 2014	MSE 2001	Introduction to Materials Sci.	112
Spring, 2014	MSE 8801	MSE Graduate Seminar	106
Fall, 2013	MSE 2001	Introduction to Materials Sci.	84

Fall, 2013	MSE 8801	MSE Graduate Seminar	102
Spring 2013	MSE 8803C	Critical Analysis	37
Spring, 2013	MSE 8801	MSE Graduate Seminar	87
Fall, 2012	MSE 2001	Introduction to Materials Sci.	80
Fall, 2012	MSE 8801	MSE Graduate Seminar	81
Spring, 2012	MSE 8801	MSE Graduate Seminar	59
Fall, 2011	MSE 2001	Introduction to Materials Sci.	72

B. INDIVIDUAL STUDENT GUIDANCE

B1. Ph.D. Students

B.1.a. Graduated

University of Texas at Dallas

1. Bhaswar Chakrabati, Ph. D. 5/2014, "High-k Dielectrics for Memory Devices," currently post-doc at University of California – Santa Barbara
2. Rohit Galatage, Ph. D. 08/2013, "Fabrication and Characterization of Buried Channel III-V MOSFETs and the Barrier/High-k Interface." Currently at Global Foundries.
3. Anand Subramanian, Ph. D, 12/2012, "Compact Electronic Soma and Synapse Circuits Fabricated Using a Low Temperature Approach." Currently at Intel.
4. Archana Venugopal, Ph. D, 05/2012, "Effect of Contacts, Graphene Type and Underlying Substrate on the Transport Properties of Graphene." Currently at Texas Instruments.
5. Kurtis Cantley, Ph. D., 12/2011, "Artificial Neural Systems Using Memristive Synapses and Nano-crystalline Silicon Thin-Film Transistors." Currently Assistant Professor at Boise State Univesity
6. Poornika Fernandes, Ph. D., 05/2011, "Fabrication and Characterization of Silicon-On-Insulator Field-Effect-Transistor-Based Nanoribbon Sensors." Currently at Texas Instruments.
7. Arif Sonnet, Ph. D., 12/2010, "Fabrication and Characterization of III-V Metal-Oxide-Semiconductor Field Effect Transistors." Currently at Texas Instruments.

NIST

8. Dawei Heh, Ph. D, 5/2005, Univ. of Maryland, Performed entire PhD research under my advisement at NIST, "Characterization of Electrically Active Defects in Advanced Gate Dielectrics." Currently at Taiwan National Nano Device Laboratories.

B.1.b. In Process

Georgia Institute of Technology

1. Katie Townsend, 1/2016-present
2. Chris Perini, 08/2014 - present, passed QE, "Heterostructures of 2D Materials"
3. Corey Joiner, 09/2011 – present, PhD expected May 2016, "Synthesis and Characterization of Graphene for Heterostructures"
4. Meng-Yen Tsai, 08/2013 - present, passed QE, "Materials Challenges of Flexible Biosensors"
5. Philip Campbell (co-advised with Dr. Jud Ready), 06/2013 – present, passed QE, "Heterostructures of 2D Materials"
6. Brian Beatty (co-advised with Prof. Meisha Shofner), 08/2013 – present, passed QE, "2D Materials for Electronics on Paper"

B2. M.S. Students

B2.a. Graduated with M.S. Thesis

University of Texas at Dallas

1. Shreyasee Dey, M. S., 12/2008,"Impact of Strain on the Electronic Properties of III-V Surface Channel Transistors" Currently at Texas Instruments
2. Ram Pratiwadi, M. S., 08/2008, "Low Temperature Materials for Neuromorphic Devices"

B2.b. In Process with M.S. Thesis

Georgia Institute of Technology

1. Noah Ellis, 05/2012 (BS/MS program), M. S. expected May 2015, "Impact of Nanoscale Dimensions on Resistive Change Memory"

B2.c. Graduated M.S. Non-thesis

University of Texas at Dallas

1. Gazi Mahmud, M. S., 08/2012.
2. Naqi Jivani, M. S., 08/2009.

B3. Undergraduate Students

Georgia Institute of Technology

1. Robert Taylor, 10/2014-present
2. Mohammed Nur, 06/2015-08/2015
3. Filipe Viana Ferreira, 06/2015-08/2015
4. Jake Smith, 06/2015-08/2015
5. Michael Statt, 06/2015-08/2015
6. Joseph Palughi, 06/2014-05/2015
7. Aundre Abner (HS student), 05/14-05/15
8. Erin Flynn, 01/2014-05/2015
9. Janine Feirer, 01/2013-05/2014
10. Chris Smyth, 01/2012-12/2014
11. Giovini King, 05/2013-08/2013
12. Carmen Deng, 01/2013-05/2013
13. Michael Falk, 01/2013-05/2013
14. Katherine Copenhaver, 06/2012-08/2012

University of Texas at Dallas

15. Naqi Jivani, 01/2007-08/2008, University of Texas at Dallas
16. David Rico, 05/2008-08/2008, University of Texas at Dallas

B4. Service on thesis or dissertation committees

B4.a. Internal

Student	University	Advisor	Dates
Adam Vitale	Georgia Tech – PhD MSE	Faisal Alamgir	2015-present
Ben Rainwater	Georgia Tech – PhD MSE	Meilin Liu	2014-present
Kesong Hu	Georgia Tech – PhD MSE	Vladimir Tsukruk	2013-present
Partha Chakraborty	Georgia Tech – PhD EE	John Cressler	2014-2015
Jin-Jyh Su	Georgia Tech – PhD EE	Oliver Brand	2014
Zac Lochner	Georgia Tech – PhD EE	Russell Dupuis	2014

Md. Satter	Georgia Tech – PhD EE	Russell Dupuis	2014

B4.b. External

Student	University	Advisor	Dates
Ricky Southwick	Boise State University – PhD EE	Bill Knowlton	2010

B5. Mentorship of postdoctoral fellows or visiting scholars

Georgia Institute of Technology

1. Yasunori Kutsuma, 06/15-08/15. Visiting PhD student from Kwansei Gakuin University.
2. Prof. Akira Fujimoto (part-time visiting Professor - Osaka Institute of Tech.), 08/2011 - present
3. Alexey Tarasov, 08/2013 – 9/2015. Currently at Bosch.
4. Zohreh Razavi, 10/2011 – 8/2014. Currently at Applied Materials.
5. Tania Roy, 11/2011 – 8/2014. Currently at University of California – Berkeley.

University of Texas at Dallas

6. Jack Chan, 09/2010 – 10/2011, Currently at Micron.
7. Chris Hinkle, 2006-2009, Currently Assoc. Prof. at UT-Dallas
8. Harvey Stiegler, 2008-2010
9. Richard Chapman, 2008-2010

NIST

10. Qiliang Li, 2005-2006. Currently Assoc. Prof. at George Mason University
11. Sang-mo Koo, 2004-2005. Currently Assoc. Prof. at Kwangwoon University
12. Jin-ping Han, 2003-2004. Currently at Infineon
13. Jin-won Park, 2002-2003, Currently at Samsung

C. OTHER TEACHING ACTIVITIES

No data

VI. SERVICE

A. PROFESSIONAL CONTRIBUTIONS

A1. Society Offices, Activities, and Membership

Senior Member of IEEE
Member of Materials Research Society
Member of American Physical Society

A2. Organization and Chairmanship of Technical Sessions, Workshops and Conferences

1. 2014 Session Chair, Materials Research Society Symposium
2. 2014 Session Chair, Electrochemical Society Meeting
3. 2014 Session Chair, International Conference on Superlattices, Nanostructures, and Nanodevices
4. *2013 Program Committee,* Characterization, Reliability and Yield section of the International Electron Devices Meeting
5. *2012 AVS Program Chair,* Electrical Testing and Defects a the III-V/High-k Interface

6. *2009 Arrangements Chair,* TxACE Analog Challenges for Biomedical Circuits Workshop
7. *2009 Member,* IEEE Integrated Reliability Workshop Program Committee
8. *2008 Chair*, High-k Program Committee, 2008 IEEE International Reliability Physics Symposium
9. 2007 *Co-organizer*, FIAP Focus Session on Emerging Research Devices and Materials for the Microelectronics Industry, 2007 American Physical Society Spring Meeting
10. 2007 Member, High-k Program Committee, 2007 IEEE International Reliability Physics Symposium
11. 2006 Member, Program Committee, 2006 Workshop on Dielectrics in Microelectronics
12. *2006 Ex-Officio Chair*, Semiconductor Interface Specialists Conference
13. 2005 *General Chair*, Semiconductor Interface Specialists Conference
14. *2004 Technical Chair*, Semiconductor Interface Specialists Conference
15. 2003 Member, Dielectrics Program Committee, IEEE International Reliability Physics Symposium
16. *2003 Arrangements Chair*, Semiconductor Interface Specialists Conference
17. 2002 Member, Dielectrics Program Committee, IEEE International Reliability Physics Symposium
18. 2002 Member, Technical Program Committee, Semiconductor Interface Specialists Conference
19. 2002 Member, Technical Program Committee, IEEE Integrated Reliability Workshop
20. 2001 *Co-Chair*, Dielectrics Program Committee, IEEE International Reliability Physics Symposium
21. 2001 Member, Technical Program Committee, Semiconductor Interface Specialists Conference
22. 2001 Member, Technical Program Committee, IEEE Integrated Reliability Workshop
23. 2000 Member, Technical Program Committee, 2000 Semiconductor Interface Specialists Conference
24. *2000 Co-organizer*, 2000 MRS Workshop on High-κ Gate Dielectrics

A3. Technical Journal or Conference Referee Activities

- Regular reviewer for a variety of journals and conferences including IEEE, Journal of Applied Physics, Applied Physics Letters, ACS Nano, Nano Letters, International Electron Devices Meeting

A4. Proposal Panels and Reviews

- January 2015, NSF DMR proposal panel
- September 2013, Reviewed proposals for Fondazione Cariplo
- January 2012, NSF ECCS proposal panel
- April 2012, Reviewed proposal for Israel Science Foundation
- January 2011, NSF DMR proposal panel

B. Public and Community Service

No data

C. Institute Contributions

C1. Institute Committee Service

University of Texas at Dallas

- University Safety Committee, 2009-2010

C2. College Committee Service

University of Texas at Dallas

- Co-Chair, Nano Committee of COE Industry Advisory Board, 2007-2008

C3. School Committee Service

Georgia Institute of Technology

2015

- Chair, MSE Strategic Planning Committee
- Member, MSE RPT Committee
- Member, MSE Graduate Committee
- Member, MSE Industry Committee
- MSE Undergraduate Advisor
- Faculty Mentor for Prof. Mark Losego

2014

- Chair, MSE Strategic Planning Committee
- Member, MSE RPT Committee
- Member, MSE Graduate Committee
- Member, MSE Industry Committee
- MSE Undergraduate Advisor

2013

- Chair, MSE Strategic Planning Committee
- Chair, MSE Seminar Committee
- Chair, MSE Pritchett Lecture Committee
- Member, MSE Graduate Committee
- Member, MSE Industry Committee
- MSE Undergraduate Advisor

2012

- Chair, MSE Strategic Planning Committee
- Chair, MSE Seminar Committee
- Chair, MSE Pritchett Lecture Committee
- Member, MSE Graduate Committee
- Member, MSE Faculty Search Committee
- Member, MSE Industry Committee

University of Texas at Dallas

- Member, EE TxACE Academic Search, 2010 (2 new faculty hires)
- Member, MSEN Personnel Affairs Committee, 2009-2010
- Member, MSEN Curriculum Committee, 2009-2010
- Member, MSEN Graduate Admissions Committee, 2009-2010
- Member, MSEN Graduate Exams Committee, 2009-2010
- Chair, MSEN Public Relations Committee, 2009-2010
- Chair, MSEN Academic Search #7090, 2008-2009 (~300 applications and 2 new faculty hires)
- Manager of the shared-access Advanced Electrical Characterization Laboratory, 2007-2011
- Chair, Solid-state and Microsystems Faculty Concentration in Electrical Engineering, 2008-2009

- Member, EE undergraduate curriculum committee, 2006-2008
- Member, MSEN admissions committee, 2008
- Member, EJS Research Strategic Planning Committee, 2008
- Member, EJS Graduate Strategic Planning Committee, 2008
- Member, EJS Undergraduate Strategic Planning Committee, 2008
- *Coordinator*, New Nanotechnology Minor, 2008

C4. Program Development: Research

- Georgia Tech Institute for Materials, Associate Director for Shared Resources (2012-present)
    - Responsible for development and operation of a Shared Resources network for materials research instrumentation.
    - In collaboration with IEN, developed the Materials Characterization Facility that combines the 12 staff and equipment within the Marcus Microscopy suite, the former Center for Nanostructure Characterization and the XRD facility under one unified umbrella with transparent and common operations and user fees.

- Georgia Tech Institute for Electronics and Nanotechnology, Deputy Director (2014-present)
    - Work closely with the IEN Executive Director in executing in the IEN mission of connecting GT faculty, industry sponsors, and government agencies; accelerating the transfer of technologies from lab to commercialization; and transforming IEN into a global nexus in electronics and nanotechnology.
    - Bridge IEN with IMat and materials related faculty on campus.

ABOUT | EDUCATION & AWARDS | RESEARCH INTERESTS

Eric Vogel

Deputy Director of the Institute for Electronics and Nanotechnology (IEN)
Associate Director for Shared Resources of the Institute for Materials (IMat)

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Eric M. Vogel is currently Professor of Materials Science and Engineering, Deputy Director of the Institute for Electronics and Nanotechnology, and Associate Director for Shared Resources of the Institute for Materials. Prior to joining GT in August 2011, he was Associate Professor of Materials Science and Engineering and Electrical Engineering at the University of Texas at Dallas (UTD) where he was also Associate Director of the Texas Analog Center of Excellence and led UTD's portion of the Southwest Academy for Nanoelectronics.

Prior to joining UTD in August of 2006, he was leader of the CMOS and Novel Devices Group and founded the Nanofab at the National Institute of Standards and Technology. He received the Ph. D. degree in 1998 in electrical engineering from North Carolina State University and the B. S. degree in 1994 in electrical engineering from Penn State University.

Dr. Vogel's research interests relate to materials and devices for future electronics. He has authored over 200 refereed publications and given over 90 invited talks.

Research Areas:
Ceramics Nanostructures

Research Activity:
Characterization Processing, Fabrication, & Manufacturing Synthesis

Research Challenges:
Transportation Energy Health & Human Welfare Infrastructure Security Electronics and Communications

Research Keywords:
2D materials electronic materials and devices nanotechnology

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