

## **Christopher Hinkle**

Associate Professor

Department of Materials Science and Engineering

Affiliated appointments: Physics, Electrical Engineering

University of Texas at Dallas

Richardson, TX 75080

[clh066000@gmail.com](mailto:clh066000@gmail.com), [chris.hinkle@utdallas.edu](mailto:chris.hinkle@utdallas.edu)

<http://www.utd.edu/~clh066000/>

Phone: 919-264-2944

## **Education**

<u>Degree</u>	<u>Year</u>	<u>University</u>	<u>Field</u>
Ph.D.	2005	North Carolina State University	Physics
B.S.	1999	North Carolina State University	Physics

## **Professional Experience**

Associate Professor, *The University of Texas at Dallas, Materials Science and Engineering*, **09/15-present**

Assistant Professor, *The University of Texas at Dallas, Materials Science and Engineering*, **09/09-8/15**

Post-Doctoral Researcher, *The University of Texas at Dallas, Dept. of Electrical Engineering*, **11/06-08/09**

## **Professional Memberships**

Materials Research Society

American Physical Society

American Vacuum Society

Institute of Electrical and Electronics Engineers

The Minerals, Metals and Materials Society

## **Awards**

2015 Junior Faculty Research Award, UT-Dallas Jonsson School of Engineering

## **Student Advisee Awards**

- 1) 2017 Best Student Presentation, SWAN Center Annual Review, Adam Barton, Ph.D. advisee
- 2) 2017 Best Student Presentation, SWAN Center Annual Review, Ruoyu Yue, Ph.D. advisee
- 3) 2016 SISC Ed Nicollian Award for Best Student Presentation, Chris Smyth, Ph.D. advisee
- 4) 2016 Best Presentation, LEAST Center Annual Review, Lee Walsh, Post-Doctoral advisee
- 5) 2015 Best Student Presentation, SWAN Center Annual Review, Ruoyu Yue, Ph.D. advisee
- 6) 2014 SISC Ed Nicollian Award for Best Student Presentation, Adam Barton, Ph.D. advisee
- 7) 2014 Best Student Presentation, SWAN Center Annual Review, Adam Barton, Ph.D. advisee

**Publications (Peer Reviewed Journals)**

Total Citations (as of January 2018):

**3555 -- Impact "h-factor" = 33 (Google Scholar)**

**2721 -- Impact "h-factor" = 29 (Scopus)**

84. A. Khosravi, R. Addou, C. M. Smyth, R. Yue, C. R. Cormier, J. Kim, C. L. Hinkle, R. M. Wallace, "Covalent Nitrogen Doping in MBE and Bulk WSe<sub>2</sub>," APL Materials **6**, 026603 (2018).

83. L. A. Walsh and C. L. Hinkle, "van der Waals Epitaxy: 2D Materials and Topological Insulators," invited review, Applied Materials Today **9**, 504 (2017).

82. L. A. Walsh, C. M. Smyth, A. T. Barton, Q. Wang, Z. Che, R. Yue, J. Kim, M. J. Kim, R. M. Wallace, C. L. Hinkle, "Interface Chemistry of Contact Metals and Ferromagnets on the Topological Insulator Bi<sub>2</sub>Se<sub>3</sub>," Journal of Physical Chemistry C **121**, 23551 (2017).

81. R. Yue, Y. Nie, L. A. Walsh, R. Addou, C. Liang, N. Lu, A. T. Barton, H. Zhu, Z. Che, D. Barrera, L. Cheng, P. Cha, Y. J. Chabal, J. W. P. Hsu, J. Kim, M. Kim, L. Colombo, R. M. Wallace, K. Cho, C. L. Hinkle, "Nucleation and Growth of WSe<sub>2</sub>: Enabling Large Grain Transition Metal Dichalcogenides," 2D Materials **4**, 045019 (2017).

80. L. A. Walsh, R. Yue, Q. Wang, A. T. Barton, R. Addou, C. M. Smyth, H. Zhu, J. Kim, L. Colombo, M. J. Kim, R. M. Wallace, C. L. Hinkle, "WTe<sub>2</sub> thin films grown by beam-interrupted molecular beam epitaxy," 2D Materials **4**, 025044 (2017).

79. Y. Nie, A. T. Barton, R. Addou, Y. Zheng, L. A. Walsh, S. M. Eichfeld, R. Yue, C. Cormier, C. Zhang, Q. Wang, C. Liang, J. A. Robinson, M. Kim, W. Vandenberghe, L. Colombo, P-R. Cha, R. M. Wallace, C. L. Hinkle, K. Cho, "Multilayer island growth in layered chalcogenides: morphology, mechanism, and management," submitted to ACS Nano (2017).

78. H. Dong, C. Gong, R. Addou, S. McDonnell, A. Azcatl, X. Qin, W. Wang, W-H. Wang, C. L. Hinkle, R. M. Wallace, "Schottky barrier height of Pd/MoS<sub>2</sub> contact by large area photoemission spectroscopy," ACS Applied Materials & Interfaces **9**, 38977 (2017).

77. R. A. Chapman, R. A. Rodriguez-Davila, W. G. Vandenberghe, C. L. Hinkle, I. Mejia, A. Chatterjee, M. Quevedo-Lopez, "Quantum Confinement and Interface States in ZnO Nanocrystalline Thin Film Transistors," submitted to IEEE Transactions on Electron Devices (2017).

76. C. D. Young, P. Bolshakov, P. Zhao, C. Smyth, A. Khosravi, P. K. Hurley, C. L. Hinkle, R. M. Wallace, "Investigation of Critical Interfaces in Few-Layer MoS<sub>2</sub> Field Effect Transistors with High-k Dielectrics," ECS Transactions **80**, 219 (2017).

75. C. Smyth, R. Addou, S. McDonnell, C. L. Hinkle, R. M. Wallace, "WSe<sub>2</sub> Contact Metal Interface Chemistry and Band Alignment Under High Vacuum and Ultra High Vacuum Deposition Conditions," 2D Materials **4**, 025084 (2017).

74. S. R. M. Anwar, W. G. Vandenberghe, G. Bersuker, D. Veksler, G. Verzellesi, L. Morassi, R. V. Galatage, S. Jha, C. Buie, A. T. Barton, E. M. Vogel, C. L. Hinkle, "Comprehensive Capacitance-Voltage Simulation and Extraction Tool Including Quantum Effects for High-k on  $\text{Si}_x\text{Ge}_{1-x}$  and  $\text{In}_x\text{Ga}_{1-x}\text{As}$ : Part I - Model Description and Validation," *IEEE Transactions on Electron Devices* **64**, 3786 (2017).
73. S. R. M. Anwar, W. G. Vandenberghe, G. Bersuker, D. Veksler, G. Verzellesi, L. Morassi, R. V. Galatage, S. Jha, C. Buie, A. T. Barton, E. M. Vogel, C. L. Hinkle, "Comprehensive Capacitance-Voltage Simulation and Extraction Tool Including Quantum Effects for High-k on  $\text{Si}_x\text{Ge}_{1-x}$  and  $\text{In}_x\text{Ga}_{1-x}\text{As}$ : Part II - Fits and Extraction from Experimental Data," *IEEE Transactions on Electron Devices* **64**, 3794 (2017).
72. L. A. Walsh, S. Mohammed, S. C. Sapat, Y. J. Chabal, A. V. Malko, C. L. Hinkle, "Oxide-Related Defects in Quantum Dot Containing Si-Rich Silicon Nitride Films," *Thin Solid Films* **636**, 267 (2017).
71. P. Zhao, A. Azcatl, Y. Gomeniuk, P. Bolshakov-Barrett, M. Schmidt, S. McDonnell, C. L. Hinkle, P. K. Hurley, R. M. Wallace, C. D. Young, "Probing Interface Defects in Top-Gated  $\text{MoS}_2$  Transistors with Impedance Spectroscopy," *ACS Applied Materials & Interfaces* **9**, 24348 (2017).
70. P. Zhao, A. Azcatl, P. Bolshakov-Barrett, J. Moon, C. L. Hinkle, P. K. Hurley, R. M. Wallace, C. D. Young, "Effects of annealing on top-gated  $\text{MoS}_2$  transistors with  $\text{HfO}_2$  dielectric," *Journal of Vacuum Science & Technology B* **35**, 01A118 (2017). 70. " $\text{MoS}_2$ -titanium contact interface reactions," S. McDonnell, C. Smyth, C. L. Hinkle, R. M. Wallace, *ACS Applied Materials & Interfaces* **8**, 8289 (2016).
69. C. M. Smyth, R. Addou, S. McDonnell, C. L. Hinkle, R. M. Wallace, "Contact Metal- $\text{MoS}_2$  Interfacial Reactions and Potential Implications on  $\text{MoS}_2$ -Based Device Performance," *Journal of Physical Chemistry C* **120**, 14719 (2016).
68. A. Azcatl, X. Qin, A. Prakash, C. Zhang, L. Cheng, Q. Wang, N. Lu, M. J. Kim, J. Kim, K. Cho, R. Addou, C. L. Hinkle, J. Appenzeller, R. M. Wallace, "Covalent nitrogen doping and compressive strain in  $\text{MoS}_2$  by remote  $\text{N}_2$  plasma exposure" *Nano Letters* **16**, 5437 (2016).
67. C. D. Young, P. Zhao, P. Bolshakov-Barrett, A. Azcatl, P. K. Hurley, Y. Y. Gomeniuk, M. Schmidt, C. L. Hinkle, R. M. Wallace, "Evaluation of Few-Layer  $\text{MoS}_2$  Transistors with a Top Gate and  $\text{HfO}_2$  Dielectric," *ECS Transactions* **75**, 153 (2016).
66. R. Yue, A. Barton, S. McDonnell, R. Addou, N. Lu, A. Azcatl, H. Zhu, L. Pena, J. Wang, L. Chen, X. Peng, J. W. P. Hsu, J. Kim, M. Kim, L. Colombo, R. M. Wallace, and C. L. Hinkle, " $\text{HfSe}_2$  Thin Films: 2D Transition Metal Dichalcogenides Grown by Molecular Beam Epitaxy," *ACS Nano* **9**, 474 (2015).
65. R. Addou, S. McDonnell, D. Barrera, Z. Guo, A. Azcatl, J. Wang, H. Zhu, C. L. Hinkle, M. Quevedo, H. N. Alshareef, L. Colombo, J. W. P. Hsu, R. M. Wallace, "Impurities and electronic property variations of natural  $\text{MoS}_2$  crystal surfaces," *ACS Nano* **9**, 9124 (2015).
64. A. T. Barton, R. Yue, S. Anwar, H. Zhu, X. Peng, S. McDonnell, N. Lu, R. Addou, L. Colombo, M. J. Kim, R. M. Wallace, and C. L. Hinkle, "Transition metal dichalcogenide and hexagonal boron nitride heterostructures grown by molecular beam epitaxy," *Microelectronic Engineering* **147**, 306 (2015).

63. P. Zhao, P. B. Vyas, S. McDonnell, P. Bolshakov-Barrett, A. Azcatl, C. L. Hinkle, P. K. Hurley, R. M. Wallace, C. D. Young, "Electrical characterization of top-gated molybdenum disulfide metal-oxide-semiconductor capacitors with high-k dielectrics," *Microelectronic Engineering* **147**, 151 (2015).
62. S. McDonnell, R. Addou, C. Buie, R. M. Wallace, and C. L. Hinkle, "Defect Dominated Doping and Contact Resistance in MoS<sub>2</sub>," *ACS Nano* **8**, 2880 (2014).
61. 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).
60. H. Dong, W. Cabrera, X. Qin, B. Brennan, D. Zhernokletov, C. L. Hinkle, J. Kim, Y. J. Chabal, and R. M. Wallace, "Silicon interfacial passivation layer chemistry for high-k/InP interfaces," *ACS Applied Materials and Interfaces* **6**, 7340 (2014).
59. S. Mohammed, M. T. Nimmo, A. V. Malko, and C. L. Hinkle, "Chemical bonding and defect states of LPCVD grown silicon-rich Si<sub>3</sub>N<sub>4</sub> for quantum dot applications," *Journal of Vacuum Science and Technology A* **32**, 021507 (2014).
58. R. C. Longo, S. K. C., K. Cho, K. Roodenko, Y. J. Chabal, A. K. Sra, D. E. Arreaga-Salas, and C. L. Hinkle, "Safer high-performance electrodes, solid electrolytes, and interface reactions for lithium-ion batteries," *Material Matters* **8**, 4 (2013).
57. S. McDonnell, B. Brennan, A. Azcatl, N. Lu, H. Dong, C. Buie, J. Kim, C. L. Hinkle, M. J. Kim, and R. M. Wallace, "HfO<sub>2</sub> on MoS<sub>2</sub> by Atomic Layer Deposition: Adsorption Mechanisms and Thickness Scalability," *ACS Nano* **7**, 10354 (2013).
56. H. Dong, S. K. C., X. Qin, B. Brennan, S. McDonnell, D. Zhernokletov, C. L. Hinkle, J. Kim, K. Cho, and R. M. Wallace, "In situ study of the role of substrate temperature during atomic layer deposition of HfO<sub>2</sub> on InP," *Journal of Applied Physics* **114**, 154105 (2013).
55. H. Dong, B. Brennan, X. Qin, D. M. Zhernokletov, C. L. Hinkle, J. Kim, and R. M. Wallace, "In situ study of atomic layer deposition Al<sub>2</sub>O<sub>3</sub> on GaP (100)," *Applied Physics Letters* **103**, 121604 (2013).
54. 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<sub>2</sub>/InAlAs interface," *Journal of Applied Physics* **114**, 104103 (2013).
53. W. Cabrera, H. Dong, B. Brennan, E. O'Connor, P. Carolan, R. Galatage, S. Monaghan, I. Povey, P. K. Hurley, C. L. Hinkle, Y. Chabal, R. M. Wallace, "Atomic layer deposition of HfO<sub>2</sub> on III-V semiconductors- An interfacial chemistry perspective," *Technical Proceedings of the 2013 NSTI Nanotechnology Conference and Expo* **2**, 1 (2013).
52. H. Dong, W. Cabrera, R. V. Galatage, Santosh KC, B. Brennan, X. Qin, S. McDonnell, D. Zhernokletov, C. L. Hinkle, K. Cho, Y. J. Chabal, and R. M. Wallace, "Indium diffusion through high-k dielectrics in high-k/InP stacks," *Applied Physics Letters* **103**, 061601 (2013).

51. X. Qin, B. Brennan, H. Dong, J. Kim, C. L. Hinkle, and R. M. Wallace, "*In situ* atomic layer deposition study of HfO<sub>2</sub> growth on NH<sub>4</sub>OH and atomic hydrogen treated Al<sub>0.25</sub>Ga<sub>0.75</sub>N," *Journal of Applied Physics* **113**, 244102 (2013).
50. H. Dong, B. Brennan, D. Zhernokletov, J. Kim, C. L. Hinkle, and R. M. Wallace, "In situ Study of HfO<sub>2</sub> Atomic Layer Deposition on InP (100)," *Applied Physics Letters* **102**, 171602 (2013).
49. 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).
48. 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<sub>2</sub>O<sub>3</sub>/InP metal-oxide-semiconductor capacitors," *Applied Physics Letters* **102**, 132903 (2013).
47. A. M. Thron, T. J. Pennycook, J. Chan, W. Luo, A. Jain, D. Riley, J. Blatchford, J. B. Shaw, K. van Benthem, E. M. Vogel, C. L. Hinkle, K. van Benthem, "Formation of pre-silicide layers below Ni<sub>1-x</sub>Pt<sub>x</sub>Si/Si interfaces," *Acta Materialia* **61**, 2481 (2013).
46. B. Brennan, S. McDonnell, D. Zhernokletov, H. Dong, C. L. Hinkle, J. Kim, and R. M. Wallace, "In-situ studies of III-V surfaces and high-k atomic layer deposition," *Solid State Phenomena* **195**, 90 (2013).
45. 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, and J. J. Chambers, "Gate-Last TiN/HfO<sub>2</sub> Band Edge Effective Work Functions Using Low-Temperature Anneals and Selective Cladding to Control Interface Composition," *Applied Physics Letters* **100**, 153501 (2012).
44. D. E. Arreaga-Salas, A. K. Sra, E. Roodenko, Y. J. Chabal, and C. L. Hinkle, "Progression of Solid Electrolyte Interphase Formation on Hydrogenated Amorphous Silicon Anodes for Lithium-Ion Batteries," *Journal of Physical Chemistry C* **116**, 9072 (2012).
43. C. L. Hinkle, J. Chan, F. J. Mendez-Lopez, R. A. Chapman, E. M. Vogel, D. Riley, A. Jain, S. C. Song, K. Y. Lim, J. Blatchford, J. B. Shaw, "Reduced NiPtSi Schottky barriers by controlling interface composition and new materials incorporation," *Conference Proceedings of the 12th International Workshop on Junction Technology* (2012).
42. S. McDonnell, H. Dong, J. Hawkins, B. Brennan, M. Milojevic, F. S. Aguirre-Tostado, D. M. Zhernokletov, C. L. Hinkle, J. Kim, and R. M. Wallace, "Interfacial oxide re-growth in thin film metal oxide III-V semiconductor systems," *Applied Physics Letters* **100**, 141606 (2012).
41. B. Brennan, D. M. Zhernokletov, H. Dong, C. L. Hinkle, J. Kim, and R. M. Wallace, "In-situ Surface Pre-Treatment Study of GaAs and In<sub>0.53</sub>Ga<sub>0.47</sub>As," *Applied Physics Letters* **100**, 151603 (2012).
40. 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<sub>2</sub>/InP metal-oxide-semiconductor capacitors," *Applied Physics Letters* **99**, 172901 (2011).

39. C. L. Hinkle, E. M. Vogel, P. D. Ye, and R. M. Wallace, "Interfacial Chemistry of Oxides on  $\text{In}_x\text{Ga}_{1-x}\text{As}$  and Implications for MOSFET Applications," *Current Opinion in Solid State & Materials Science* **15**, 188 (2011).
38. M. Milojevic, R. Contreras-Guerrero, E. O'Connor, B. Brennan, P. K. Hurley, J. Kim, C. L. Hinkle, and R. M. Wallace, "In-Situ XPS characterization of  $\text{Ga}_2\text{O}$  passivation of  $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$  prior to ALD high-k dielectric deposition," *Applied Physics Letters* **99**, 042904 (2011).
37. 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 Schottky Barrier Height of Sulfur Implanted NiSi/n-Si Junctions: Junction Doping Rather than Barrier Height Lowering," *Applied Physics Letters* **99**, 012114 (2011).
36. 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  $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$  surface channel metal-oxide-semiconductor field-effect transistors," *Applied Physics Letters* **98**, 193591 (2011).
35. 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 (2011).
34. 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  $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$  surface channel MOSFETs," *Microelectronic Engineering* **88**, 1083 (2011).
33. B. Brennan, M. Milojevic, C. L. Hinkle, F. S. Aguirre-Tostado, G. Hughes, and R. M. Wallace, "Optimisation of the ammonium sulphide  $(\text{NH}_4)_2\text{S}$  passivation process on  $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$ ," *Applied Surface Science* **257** 4082–4090 (2011).
32. 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).
31. 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/ $\text{HfO}_2$  gate stacks," *Applied Physics Letters* **96**, 103502 (2010).
30. 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).
29. C. L. Hinkle, M. Milojevic, B. Brennan, A. M. Sonnet, F. S. Aguirre-Tostado, G. J. Hughes, E. M. Vogel, and R. M. Wallace, "Detection of Ga suboxides and their impact on III-V passivation and Fermi-level pinning," *Applied Physics Letters* **94**, 162101 (2009).
28. 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 (2009).

27. C. L. Hinkle, A. M. Sonnet, R. A. Chapman, and E. M. Vogel, "Extraction of the Effective Mobility of  $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$  MOSFETs", IEEE Electron Device Letters **30**, 316 (2009).
26. M. Milojevic, C. L. Hinkle, F. S. Aguirre-Tostado, H. C. Kim, E. M. Vogel, J. Kim, and R. M. Wallace, "Half-cycle atomic layer deposition reaction studies of  $\text{Al}_2\text{O}_3$  on  $(\text{NH}_4)_2\text{S}$  passivated GaAs(100) surfaces", Applied Physics Letters **93**, 252905 (2008).
25. M. Milojevic, F. S. Aguirre-Tostado, C. L. Hinkle, H. C. Kim, E. M. Vogel, J. Kim, and R. M. Wallace, "Half-cycle atomic layer deposition reaction studies of  $\text{Al}_2\text{O}_3$  on  $\text{In}_{0.2}\text{Ga}_{0.8}\text{As}$ (100) surfaces", Applied Physics Letters **93**, 202902 (2008).
24. 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", Applied Physics Letters **93**, 113506 (2008).
23. A. M. Sonnet, C. L. Hinkle, M. N. Jivani, R. A. Chapman, G. P. Pollack, R. M. Wallace, and E. M. Vogel, "Performance enhancement of n-channel inversion type  $\text{In}_x\text{Ga}_{1-x}\text{As}$  metal-oxide-semiconductor field effect transistor using ex situ deposited thin amorphous silicon layer", Applied Physics Letters **93**, 122109 (2008).
22. F. S. Aguirre-Tostado, M. Milojevic, K. J. Choi, H. C. Kim, C. L. Hinkle, E. M. Vogel, J. Kim, T. Yang, Y. Xuan, P. D. Ye, and R. M. Wallace, "S passivation of GaAs and band bending reduction upon atomic layer deposition of  $\text{HfO}_2/\text{Al}_2\text{O}_3$  nanolaminates", Applied Physics Letters **93**, 061907 (2008).
21. C. L. Hinkle, A. M. Sonnet, E. M. Vogel, S. McDonnell, G. J. Hughes, M. Milojevic, B. Lee, F. S. Aguirre-Tostado, K. J. Choi, H. C. Kim, J. Kim, and R. M. Wallace. "GaAs interfacial self-cleaning by atomic layer deposition.", Applied Physics Letters **92**, 071901 (2008).
20. F. S. Aguirre-Tostado, M. Milojevic, C. L. Hinkle, E. M. Vogel, R. M. Wallace, S. McDonnell, and G. J. Hughes. "Indium stability on InGaAs during atomic H surface cleaning.", Applied Physics Letters **92**, 171906 (2008).
19. Y. M. Strzhemechny, M. Bataiev, S. P. Tumakha, S. H. Goss, C. L. Hinkle, C. C. Fulton, G. Lucovsky, and L. J. Brillson. "Low energy electron-excited nanoscale luminescence spectroscopy studies of intrinsic defects in  $\text{HfO}_2$  and  $\text{SiO}_2\text{-HfO}_2\text{-SiO}_2\text{-Si}$  stacks.", Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures **26**, 232 (2008).
18. C. L. Hinkle, A. M. Sonnet, E. M. Vogel, S. McDonnell, G. J. Hughes, M. Milojevic, B. Lee, F. S. Aguirre-Tostado, K. J. Choi, J. Kim, and R. M. Wallace. "Frequency dispersion reduction and bond conversion on n-type GaAs by *in situ* surface oxide removal and passivation." Applied Physics Letters **91**, 163512 (2007).
17. G. Lucovsky, C.L. Hinkle, C.C. Fulton, N.A. Stoute, H. Seo, and J. Luning. "Intrinsic nanocrystalline grain-boundary and oxygen atom vacancy defects in  $\text{ZrO}_2$  and  $\text{HfO}_2$ ," Radiation Physics and Chemistry **75**, 11 (2006).

16. C.L. Hinkle, C. Fulton, R.J. Nemanich and G. Lucovsky, "Enhanced tunneling in stacked gate dielectrics with ultra-thin HfO<sub>2</sub> (ZrO<sub>2</sub>) layers sandwiched between thicker SiO<sub>2</sub> layers.", *Applied Surface Science* **234**, 240 (2004).
15. G. Lucovsky, G.B. Rayner, D. Kang, C.L. Hinkle, and J.G. Hong, "A spectroscopic phase separation study distinguishing between chemical with different degrees of crystallinity in Zr(Hf) silicate alloys", *Applied Surface Science* **234**, 429 (2004).
14. C.L. Hinkle, C. Fulton, R.J. Nemanich and G. Lucovsky, "Enhanced tunneling in stacked gate dielectrics with ultra-thin HfO<sub>2</sub> (ZrO<sub>2</sub>) layers sandwiched between thicker SiO<sub>2</sub> layers.", *Surface Science* **566**, 1185 (2004).
13. G. Lucovsky, G.B. Rayner, D. Kang, C.L. Hinkle, J.G. Hong, "A spectroscopic phase separation study distinguishing between chemical with different degrees of crystallinity in Zr(Hf) silicate alloys", *Surface Science* **566**, 772 (2004).
12. D. Niu, R.W. Ashcraft, C. Hinkle, G.N. Parsons, "Effect of N-2 plasma on yttrium oxide and yttrium-oxynitride dielectrics", *J. of Vacuum Science and Technology A* **22**, 445 (2004).
11. G. V. Soares, K. P. Bastos, R. P. Pezzi, L. Miotti, C. Driemeier, I. J. R. Baumvol, C. Hinkle and G. Lucovsky, "Nitrogen bonding, stability, and transport in AlON films on Si", *Applied Physics Letters* **84**, 4992 (2004).
10. L.F. Edge, D.G. Schlom, R.T. Brewer, Y.J. Chabal, J.R. Williams, S.A. Chambers, C. Hinkle, G. Lucovsky, Y. Yang, S. Stemmer, M. Copel, B. Hollander, J. Schubert, "Suppression of subcutaneous oxidation during the deposition of amorphous lanthanum aluminate on silicon", *Applied Physics Letters* **84**, 4629 (2004).
9. C. L. Hinkle, C. Fulton, R.J. Nemanich and G. Lucovsky, " A novel approach for determining the effective tunneling mass of electrons in HfO<sub>2</sub> and other high-K alternative gate dielectrics for advanced CMOS devices ", *Microelectronic Engineering* **72**, 257 (2004).
8. G.B. Rayner, D. Kang, C.L. Hinkle, J.G. Hong, G. Lucovsky, "Chemical phase separation in Zr silicate alloys: a spectroscopic study distinguishing between chemical phase separation with different degree of micro- and nano-crystallinity", *Microelectronic Engineering* **72**, 304 (2004).
7. C. Hinkle and Gerry Lucovsky, "Remote plasma-assisted nitridation (RPN): applications to Zr and Hf silicate alloys and Al<sub>2</sub>O<sub>3</sub>", *Applied Surface Science* **216**, 124 (2003).
6. K. P. Bastos, R. P. Pezzi, L. Miotti, G. V. Soares, C. Driemeier, J. Morais, I. J. R. Baumvol, C. Hinkle and G. Lucovsky, "Thermal stability of plasma-nitrided aluminum oxide films on Si." *Applied Physics Letters* **84**, 97 (2004).
5. R. S. Johnson, C. Hinkle, J. G. Hong and G. Lucovsky, "Electron trapping in non-crystalline RPECVD Hf-Aluminates for gate dielectric applications.", *J. of Vacuum Science and Technology B* **20**,1126 (2002).
4. R. S. Johnson, C. Hinkle, J. G. Hong, and G. Lucovsky, "Electron trapping in non-crystalline Ta- and Hf-Aluminates for gate dielectric applications in aggressively scaled silicon devices.", *Solid State Electronics* **46**, 1799 (2002).



3. Christopher L. Hinkle and John M. Blondin, "Hydrodynamic instabilities in young supernova remnants", AIP Conf. Proc. **565**, 81 (2001).
2. B. J. Hinds, F. Wang, D. M. Wolfe, C. L. Hinkle, and G. Lucovsky, "Investigation of postoxidation thermal treatments of Si/SiO<sub>2</sub> interface in relationship to the kinetics of amorphous Si suboxide decomposition", J.Vac.Sci.Technol. B **16**, 2171 (1998).
1. B. J. Hinds, F. Wang, D. M. Wolfe, C. L. Hinkle and G. Lucovsky, "Study of SiO<sub>x</sub> decomposition kinetics and formation of Si nanocrystals in an SiO<sub>x</sub> matrix.", J. of Non-Crystalline Solids **230**, 507 (1998).

**Publications (Peer Reviewed Conference Proceedings)**

10. "III-V/High-k Defects: DIGS vs. Border Traps,"  
C. L. Hinkle, R. V. Galatage, H. Dong, S. R. M. Anwar, B. Brennan, R. M. Wallace, and E. M. Vogel,  
*ECS Transactions* **53**, 161 (2013).
9. "Effect of ALD Oxidant and Channel Doping on Positive Bias Stress Characteristics of Surface Channel In<sub>0.53</sub>Ga<sub>0.47</sub>As nMOSFETs,"  
C. D. Young, R. J. W. Hill, K. Matthews, W.-E. Wang, C. Hinkle, R. M. Wallace, W.-Y. Loh, C. Hobbs, P. D. Kirsch, and R. Jammy,  
*2013 International Symposium on VLSI Technology, Systems, and Applications*, 978 (2013).
8. "Band-Edge Effective Work Functions by Controlling HfO<sub>2</sub>/TiN Interfacial Composition for Gate-Last CMOS,"  
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. J. Chambers, and J. B. Shaw,  
*Electrochemical Society Transactions* **35**, 285 (2011).
7. "High-k Oxide Growth on III-V Surfaces: Chemical Bonding and MOSFET Performance"  
C. L. Hinkle, B. Brennan, S. McDonnell, M. Milojevic, A. M. Sonnet, D. Zhernokletov, R. V. Galatage, E. M. Vogel, and R. M. Wallace,  
*Electrochemical Society Transactions* **35**, 403 (2011).
6. "Dipole Controlled Metal Gate with Hybrid Low Resistivity Cladding for Gate-Last CMOS with Low V<sub>t</sub>,"  
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  
*Digest of Technical Papers - Symposium on VLSI Technology* (2010).
5. "Electrical and Physical Properties of High-k Gate Dielectrics on In<sub>x</sub>Ga<sub>1-x</sub>As,"  
E. Vogel, A. Sonnet, R. Galatage, M. Milojevic, C. Hinkle, and R. M. Wallace  
*Electrochemical Society Transactions* **28**, 209-219 (2010).
4. "Surface studies of III-V materials: Oxidation control and device implications,"  
C. L. Hinkle, M. Milojevic, A. M. Sonnet, H. C. Kim, J. Kim, E. M. Vogel, and R. M. Wallace  
*Electrochemical Society Transactions* **19**, 387 (2009).

3. "Interfacial engineering of InGaAs/high-k metal-oxide-semiconductor field-effect-transistors (MOSFETs),"

A. M. Sonnet, R. V. Galatage, M. N. Jivani, M. Milojevic, R. A. Chapman, C. L. Hinkle, R. M. Wallace, and E. M. Vogel

*IEEE Integrated Reliability Workshop Final Report*, 46-49 (2009).

2. "In-situ Studies of Atomic Layer Deposition Studies on High-Mobility Channel Materials,"

M. Milojevic, A. M. Sonnet, C. L. Hinkle, H. C. Kim, E. M. Vogel, J. Kim, and R. M. Wallace

*Atomic Layer Deposition Applications 5*

*Electrochemical Society Transactions* **25** (4), 115 (2009).

1. "Characterization of electrically active interfacial defects in high- $\kappa$  gate dielectrics,"

E. M. Vogel, A. M. Sonnet, and C. L. Hinkle

*Electrochemical Society Transactions* **11**, 393 (2007).

### **Book Chapters**

3. "Molecular beam epitaxy of Transition Metal Dichalcogenides," L. A. Walsh, R. Addou, R. M. Wallace, and C. L. Hinkle, *Molecular Beam Epitaxy: From Research to Mass Production*, Second Edition, M. Henini Editor, (2018) Elsevier.

2. "Physico-chemical characterization of MoS<sub>2</sub>/metal and MoS<sub>2</sub>/oxide interfaces," S. McDonnell, R. Addou, C. L. Hinkle, and R. M. Wallace, in *2D Materials for Nanoelectronics*, M. Houssa, A. Dimoulas, and A. Molle Editors, (2015) Taylor and Francis.

1. "Interfacial Chemistry of oxides on III-V Compound Semiconductors," M. Milojevic, C. L. Hinkle, E.M. Vogel and R. M. Wallace, in *Fundamentals of Compound Semiconductor MOSFETs*, P. Ye and S. Oktyabrsky Editors, (2010) Springer.

### **Invited Presentations**

37. "TMD and Topological Insulator Heterostructures,"

C. L. Hinkle

Materials Research Society Spring Meeting, Phoenix, Arizona 2018.

36. "Nucleation and Growth of WSe<sub>2</sub>: Enabling Large Grain Transition Metal Dichalcogenides,"

C. L. Hinkle

Third 2D Electronic Materials Symposium - 21st American Conference on Crystal Growth and Epitaxy, Santa Fe, New Mexico 2017.

35. "Back-End-of-Line Compatible WSe<sub>2</sub> FETs Grown by MBE on ALD Oxides,"

C. L. Hinkle

US-EU 2D Workshop, Arlington, VA 2017.

34. " Back-End-of-Line Compatible Transition Metal Dichalcogenides and Topological Insulators Grown by van der Waals Epitaxy,"

C. L. Hinkle

## Christopher L. Hinkle

Boise State University, Boise, Idaho 2017.

33. "van der Waals Epitaxy of TMDs and Topological Insulators,"

C. L. Hinkle

146th Annual TMS Meeting & Exhibition, San Diego, California 2017.

32. "van der Waals heterostructures grown by MBE,"

C. L. Hinkle

APS March Meeting, Baltimore, Maryland 2016.

31. "TMDs and Heterostructures grown by MBE,"

C. L. Hinkle

Lund University, Lund, Sweden 2016.

30. "Transition Metal Dichalcogenide (TMD) growth by MBE and their interfaces with other materials,"

C. L. Hinkle

19<sup>th</sup> Workshop on Dielectrics in Microelectronics, Catania, Italy 2016.

29. "van der Waals Epitaxy for New 2D Materials Based Low-power Logic and Memory,"

C. L. Hinkle

IEEE Nanotechnology Materials and Devices Conference, Anchorage, Alaska 2015

28. "Transition Metal Dichalcogenide Heterostructures Grown by MBE,"

C. L. Hinkle

Functional 2D Materials, 24th International Materials Research Congress, Cancun, Mexico 2015.

27. "Transition Metal Dichalcogenides Grown by MBE: Heterostructures for Nano- and Opto-Electronic Applications,"

C. L. Hinkle

Functional 2D Materials, IEEE Photonics Society 2015 Summer Topical Meetings, Nassau, Bahamas 2015.

26. "2D Materials Growth and Prospects,"

L. Colombo, S. Banerjee, R. M. Wallace, and C. L. Hinkle

45<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2014.

25. "Defects in MoS<sub>2</sub> and other TMDs: Impact on Device Performance and Variability,"

C. L. Hinkle

IEEE International Integrated Reliability Workshop, Lake Tahoe, California 2014.

24. "Transition Metal Dichalcogenide Growth and Characterization for Low-power Electronics and Energy Storage,"

C. L. Hinkle

Army Research Laboratory 2D Science and Technology Applications: International Technical Exchange, Adelphi, Maryland 2014.

23. "Chemical Synthesis, Computational Modeling, and Surface Reactions of Silicon Nanotube Anodes and Silicate Cathodes for Lithium Ion Batteries,"

C. L. Hinkle, A. K. Sra, D. E. Arreaga, R. Longo, K. Roodenko, Y. J. Chabal, K. J. Cho

Christopher L. Hinkle

APS March Meeting, Denver, Colorado 2014.

22. "Silicon-Based Electrodes for Li-ion Batteries: Spectroscopic Analysis for Improved Performance,"  
C. L. Hinkle, A. K. Sra, J. Rossi, R. Longo, K. J. Cho  
TMS Annual Meeting, San Diego, California 2014.

21. "III-V/High-k Defects: DIGS vs. Border Traps,"  
C. L. Hinkle, R. V. Galatage, D. M. Zhernokletov, H. Dong, S. R. M. Anwar, B. Brennan, R. M. Wallace, and  
E. M. Vogel  
223rd Electrochemical Society Meeting, Toronto, Canada 2013.

20. "Chemical Synthesis, Computational Modeling, and Surface Reactions of Silicon Nanotube Anodes  
and Silicate Cathodes for Lithium Ion Batteries,"  
C. L. Hinkle, A. K. Sra, D. E. Arreaga-Salas, J. Rossi, R. Longo, K. Roodenko, K. J. Cho, and Y. J. Chabal  
TMS Annual Meeting, San Antonio, Texas 2013.

19. "Chemical Analysis of High-k/III-V Interfaces and Device Impact,"  
C. L. Hinkle  
9th International Symposium on Advanced Gate Stack Technology, Saratoga Springs, New York October  
2012.

18. "Reduced NiPtSi Schottky barriers by controlling interface composition and new materials  
incorporation,"  
C. L. Hinkle, J. Chan, E. M. Vogel, A. M. Thron, K. van Benthem, R. A. Chapman, D. Riley, S. C. Song, A.  
Jain, J. Blatchford, and J. Shaw  
12th International Workshop on Junction Technology, Shanghai, China June 2012.

17. "In-situ studies of III-V surfaces and high-k atomic layer deposition,"  
B. Brennan, S. McDonnell, D. Zhernokletov, H. Dong, C. L. Hinkle, J. Kim, R. M. Wallace  
Ultra Clean Processing of Semiconductor Surfaces XI, Ghent, Belgium, September 2012.

16. "Interface Chemical States and MOSFET Performance of High-k/III-V Devices,"  
C. L. Hinkle, M. Milojevic, B. Brennan, A. M. Sonnet, R. V. Galatage, W. Wang, K. J. Cho, E. M. Vogel, and  
R. M. Wallace,  
5th International Workshop on High-k Dielectrics on High Carrier Mobility Semiconductors, Hsinchu,  
Taiwan 2011.

15. "Band-edge Effective Work Functions by Controlling HfO<sub>2</sub>/TiN Interfacial Composition for Gate-Last  
CMOS,"  
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,  
219th Electrochemical Society Meeting (ECS), Montreal, Quebec 2011.

14. "High-k Oxide Growth on III-V Semiconductors: Chemical Bonding and MOSFET Performance,"  
C. L. Hinkle, M. Milojevic, B. Brennan, S. McDonnell, A. Sonnet, D. M. Zhernokletov, R. V. Galatage, E.  
M. Vogel, and R. M. Wallace,  
219th Electrochemical Society Meeting (ECS), Montreal, Quebec 2011.

13. "Interface studies of high-k oxides on III-V semiconductors,"  
C. L. Hinkle, M. Milojevic, B. Brennan, W. Wang, A. Sonnet, R. V. Galatage, K. J. Cho, E. M. Vogel, and R. M. Wallace,  
2011 MRS Spring Meeting, San Francisco, CA 2011.
12. "Remote Phonon and Surface Roughness Limited Universal Electron Mobility of  $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$  Surface Channel MOSFETs,"  
E. M. Vogel, A. M. Sonnet, R. V. Galatage, P. K. Hurley, E. Pelucchi, K. Thomas, A. Gocalinska, J. Huang, N. Goel, G. Bersuker, W. P. Kirk, and C. L. Hinkle  
58<sup>th</sup> AVS International Symposium, Nashville, TN, November 2011.
11. "In-situ Studies of High-k Oxide Growth on III-V Semiconductors,"  
C. L. Hinkle, M. Milojevic, B. Brennan, S. McDonnell, A. Sonnet, D. M. Zhernokletov, R. V. Galatage, E. M. Vogel, and R. M. Wallace  
41<sup>st</sup> Semiconductor Interface Specialists Conference,  
San Diego, CA 2010.
10. "Electrical and Physical Properties of High-k Gate Dielectrics on  $\text{In}_x\text{Ga}_{1-x}\text{As}$ ,"  
E. Vogel, A. Sonnet, R. Galatage, M. Milojevic, C. Hinkle, and R. M. Wallace  
217<sup>th</sup> Electrochemical Society Meeting,  
Vancouver, Canada 2010.
9. "III-V MOS Device Performance Enhancement by Detection and Control of Individual Surface Oxidation States,"  
C.L. Hinkle, M. Milojevic, A.M. Sonnet, E.M. Vogel, R.M. Wallace  
56<sup>th</sup> International Symposium of the AVS,  
San Jose, CA, USA 2009.
8. "Interfacial engineering of InGaAs/high-k metal-oxide-semiconductor field-effect-transistors (MOSFETs),"  
A. M. Sonnet, R. V. Galatage, M. N. Jivani, M. Milojevic, R. A. Chapman, C. L. Hinkle, R. M. Wallace, and E. M. Vogel  
IEEE Integrated Reliability Workshop,  
South Lake Tahoe, CA, USA 2009.
7. "Metal gate electrode impurity engineering for control of effective work function,"  
J. J. Chambers, H. Niimi, A. Li-Fatou, J. Shaw, C. L. Hinkle, H. N. Alshareef, R. A. Chapman, R. V. Galatage, E. M. Vogel, C. Freeman, and E. Wimmer  
6<sup>th</sup> International Symposium on Advanced Gate Stack Technology,  
San Francisco, CA, USA 2009.
6. "Impact of surface preparations on the transport characteristics of InGaAs metal-oxide-semiconductor field effect transistors (MOSFETs),"  
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  
6<sup>th</sup> International Symposium on Advanced Gate Stack Technology,  
San Francisco, CA, USA 2009.

5. "Surface passivation and implications on high mobility channel performance,"  
C.L.Hinkle, M.Milojevic, E.M.Vogel and R.M.Wallace  
INFOS 2009- 16th Biennial International Conference on Insulating Films on  
Semiconductors,  
Cambridge University, UK 2009.
4. "Surface studies of III-V materials: oxidation control and device implications,"  
C. L. Hinkle, M. Milojevic, A. M. Sonnet, H. C. Kim, J. Kim, E. M. Vogel, and  
R. M. Wallace  
*Graphene and Emerging Materials for Post-CMOS Applications*  
215<sup>th</sup> Electrochemical Society Meeting  
San Francisco, CA, USA 2009.
3. "High- $\kappa$  dielectrics for CMOS beyond 22nm," 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  
15th Workshop on Dielectrics in Microelectronics, WoDiM 2008  
Bad Saarow (Berlin), Germany 2008.
2. "Electrical and Physical Properties of GaAs MOS Devices with Al<sub>2</sub>O<sub>3</sub>/a-Si Gate Dielectric Stacks,"  
E. Vogel, A. Sonnet, C. L. Hinkle, F. S. Aguirre-Tostado, M. Milojevic, J. Kim, and R.M. Wallace  
5th International Symposium on Advanced Gate Stack Technology (ISAGST)  
Lakeway Resort & Spa, Austin, Texas 2008.
1. "Characterization of electrically active interfacial defects in high- $\kappa$  gate dielectrics,"  
E. M. Vogel, A. M. Sonnet, and C. L. Hinkle  
211<sup>th</sup> Electrochemical Society Meeting  
Chicago, Illinois 2007.

### **Contributed Presentations**

76. "High Hole Mobility, Back-End-of-Line Compatible WSe<sub>2</sub> FETs Grown by MBE on ALD Oxides,"  
R. Yue, P. Paletti, Y. Nie, L. A. Walsh, L. Liu, M. A. Heidarlou, R. Addou, C. Smyth, A. T. Barton, J. Kim, L.  
Colombo, R. M. Wallace, K. Cho, A. Seabaugh, C.L. Hinkle,  
48<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2017.
75. "Effects of Growth and Processing Conditions on Contacts to MoSe<sub>2</sub> and MoTe<sub>2</sub>,"  
C. M. Smyth, R. Addou, S. McDonnell, M. J. Mleczko, E. Pop, C. L. Hinkle, R. M. Wallace,  
48<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2017.
74. "Border Traps and Interface Traps in High- $\kappa$ /MoS<sub>2</sub> Gate Stacks by C-V Analysis,"  
P. Zhao, A. Azcatl, A. Khosravi, P. Bolshakov, P.K. Hurley, R.M. Wallace, C.L. Hinkle, C. D. Young  
48<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2017.
73. "True Dual-Gate MoS<sub>2</sub> FETs with sub-10 nm Top-Gate High- $\kappa$  Dielectrics,"  
P. Bolshakov, A. Khosravi, P. Zhao, A. Azcatl, G. Mirabelli, P.K. Hurley, C.L. Hinkle, R.M. Wallace, C. Young  
48<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2017.

72. "Molecular beam epitaxy growth of tellurium thin films on highly oriented pyrolytic graphite,"  
G. Zhou, R. Yue, S. Honari, R. Addou, C. Smyth, C. Cormier, L. Cheng, J. Kim, R. M. Wallace, C. L. Hinkle  
33rd North American Conference on Molecular Beam Epitaxy (NAMBE 2017), Galveston, Texas 2017.
71. "Effects of Processing Conditions on Metal-TMD Interface Chemistry and Band Alignment,"  
C. M. Smyth, R. Addou, L. A. Walsh, S. McDonnell, J. Kim, C. L. Hinkle, R. M. Wallace,  
59th Electronic Materials Conference (EMC), Notre Dame, Indiana 2017.
70. "Contacts on WSe<sub>2</sub>: Interface Chemistry and Band Alignments,"  
C. Smyth, R. M. Wallace, and C. L. Hinkle,  
47<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2016.  
**Won the Nicollian Award for best student presentation.**
69. "Large Grain WSe<sub>2</sub> and WTe<sub>2</sub> Growth by MBE,"  
L. A. Walsh, R. Yue, C. L. Hinkle  
47<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2016.
68. "MBE Growth of WTe<sub>2</sub> for Novel Electronic and Topologically Protected Devices,"  
L. A. Walsh, R. Yue, A. Barton, R. M. Wallace, and C. L. Hinkle,  
63rd AVS International Symposium, Nashville, Tennessee 2016.
67. "MBE Growth of Hexagonal Boron Nitride for use in Novel Electronic Devices,"  
L. A. Walsh, A. Barton, and C. L. Hinkle,  
63rd AVS International Symposium, Nashville, Tennessee 2016.
66. "Nucleation and Grain Control for Improved Growth of WSe<sub>2</sub> and WTe<sub>2</sub> based van der Waals  
Heterostructures,"  
R. Yue, L. A. Walsh, C. L. Hinkle  
2016 North American Molecular Beam Epitaxy Conference, Saratoga Springs, New York 2016.
65. "van der Waals Epitaxy of WSe<sub>2</sub> Based Heterostructures: A Study of Controlled Nucleation and Grain  
Morphology,"  
R. Yue, L. A. Walsh, C. L. Hinkle  
76<sup>th</sup> Physical Electronics Conference, Fayetteville, Arkansas 2016.
64. "Contacts on WSe<sub>2</sub>: Interface Chemistry and Band Alignments,"  
C. Smyth, R. M. Wallace, and C. L. Hinkle,  
AVS Texas Chapter Conference, Richardson, Texas 2016.
63. "A Study of the Controlled Nucleation and Grain Morphology of WSe<sub>2</sub> Grown by Molecular Beam  
Epitaxy,"  
R. Yue, A. T. Barton, L. A. Walsh, and C. L. Hinkle,  
AVS Texas Chapter Conference, Richardson, Texas 2016.
62. "A Comprehensive CV Simulation and Extraction Tool for Advanced MOS Device Analysis with  
Alternative Channels (SiGe and InGaAs),"  
S. Anwar, W. Vandenberghe, C. L. Hinkle,  
AVS Texas Chapter Conference, Richardson, Texas 2016.

61. A. T. Barton, R. Yue, L. A. Walsh, H. Zhu, L. Cheng, N. Lu, R. Addou, S. McDonnell, J. W. P. Hsu, J. Kim, M. J. Kim, L. Colombo, R. M. Wallace, and C. L. Hinkle, "MBE growth of layered 2D semiconductor heterostructures: Transition metal dichalcogenides and topological insulators," 46<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, Arlington, VA 2015.

60. H. Dong, C. Gong, R. Addou, S. McDonnell, X. Qin, W. Wang, C. L. Hinkle, R. M. Wallace, "Schottky barrier height measurement for Pd metal on MoS<sub>2</sub> bulk by in situ XPS," 46<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, Arlington, VA 2015.

59. C. Smyth, S. McDonnell, R. Addou, H. Zhu, C. L. Hinkle, R. M. Wallace, "Reactivity and Wettability of PVD Metals on 2D Transition Metal Dichalcogenides," 62<sup>nd</sup> AVS International Symposium, San Jose, California 2015.

58. A. Azcatl, X. Qin, Q. Wang, N. Lu, M. J. Kim, C. L. Hinkle, R. M. Wallace, "Molybdenum Nitride Formation by N<sub>2</sub> Plasma Exposure on Molybdenum Disulfide: In-situ Surface Study," 62<sup>nd</sup> AVS International Symposium, San Jose, California 2015.

57. L. A. Walsh, R. Yue, A. T. Barton, H. Zhu, L. Cheng, N. Lu, R. Addou, J. Hsu, S. McDonnell, J. Kim, M. J. Kim, L. Colombo, R. M. Wallace, C. L. Hinkle, "van der Waals Epitaxy for Novel Low-power Electronics" 31st North American Molecular Beam Epitaxy Conference, Mayan Riviera, Mexico 2015.

56. C. L. Hinkle, A. T. Barton, R. Yue, S. Anwar, H. Zhu, J. Wang, L. Cheng, N. Lu, R. Addou, S. McDonnell, J. Kim, J. W. P. Hsu, M. J. Kim, R. M. Wallace, L. Colombo, "Transition metal dichalcogenide and hexagonal boron nitride heterostructures grown by molecular beam epitaxy," INFOS 2015, Udine, Italy 2015.

55. P. Zhao, P. B. Vyas, S. McDonnell, P. Bolshakov-Barrett, A. Azcatl, C. Hinkle, R. M. Wallace, and C. D. Young, "Electrical Characterization of Top-Gated Molybdenum Disulfide Metal-Oxide-Semiconductor Capacitors with High-k Dielectrics," INFOS 2015, Udine, Italy 2015.

54. R. Yue, A. T. Barton, H. Zhu, N. Lu, L. Cheng, R. Addou, S. J. McDonnell, L. Colombo, J. Kim, M. J. Kim, R. M. Wallace, and C. L. Hinkle, "WSe<sub>2</sub> and WTe<sub>2</sub> Transition Metal Dichalcogenides Grown by Molecular Beam Epitaxy," 2015 MRS Spring Meeting, San Francisco, CA 2015.

53. A. T. Barton, S. Anwar, H. Zhu, L. Cheng, S. J. McDonnell, R. Addou, N. Lu, L. Colombo, M. J. Kim, J. Kim, R. M. Wallace, and C. L. Hinkle, "Hexagonal Boron Nitride (h-BN) Grown by MBE on Graphene and Transition Metal Dichalcogenides," 2015 MRS Spring Meeting, San Francisco, CA 2015.

52. A. Barton, R. Yue, S. McDonnell, R. Addou, A. Azcatl, H. Zhu, L. Ning, X. Peng, L. Colombo, J. Kim, M. Kim, R. M. Wallace, and C. L. Hinkle, "HfSe<sub>2</sub> Thin Films: 2D Transition Metal Dichalcogenides Grown by MBE," 45<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2014.

**Won the Nicollian Award for best student presentation.**

51. P. B. Vyas, S. McDonnell, P. Bolshakov-Barrett, A. Azcatl, C. L. Hinkle, R. M. Wallace, and C. D. Young, "Simple Test Structure for the Electrical Characterization of MoS<sub>2</sub> Interface Functionalization with High-k Dielectrics," 45<sup>th</sup> IEEE Semiconductor Interface Specialists Conference, San Diego, California 2014.



50. R. Yue, A. Barton, X. Peng, N. Lu, R. Addou, S. McDonnell, L. Chen, J. Kim, L. Colombo, M. Kim, R. M. Wallace, and C. L. Hinkle, "HfSe<sub>2</sub> Thin Films: 2D Transition Metal Dichalcogenides Grown by MBE," 61st AVS International Symposium, Baltimore, Maryland 2014.
49. S. J. McDonnell, R. Addou, A. Azcatl, H. Dong, C. Buie, L. Colombo, R. M. Wallace, and C. Hinkle, "Defect Dominated Metal Contacts with MoS<sub>2</sub>," 2014 MRS Spring Meeting, San Francisco, California 2014.
48. R. Addou, S. McDonnell, C. T. Buie, C. L. Hinkle, and R. M. Wallace, "p-type conductivity on exfoliated MoS<sub>2</sub> generated by defects," 2014 Spring MRS Meeting, San Francisco, California 2014.
47. R. Addou, S. McDonnell, C. Buie, C. L. Hinkle, and R. M. Wallace, "Variability in Exfoliated MoS<sub>2</sub> Generated by Defects," 41st International Conference on the Physics and Chemistry of Surfaces and Interfaces, Santa Fe, New Mexico 2014.
46. S. McDonnell, C. Buie, A. Azcatl, R. M. Wallace, and C. L. Hinkle, "Chemical Bonding and Contact Resistivity of Metal Contacts on MoS<sub>2</sub>," 44th Semiconductor Interface Specialists Conference, Arlington, Virginia 2013.
45. H. Dong, W. Cabrera, K. C. Santosh, S. McDonnell, X. Qin, D. M. Zhernokletov, J. Kim, K. Cho, C. L. Hinkle, Y. J. Chabal, E. M. Vogel, and R. M. Wallace, "Characterization and Engineering of High-k/InP Interfaces," 44th Semiconductor Interface Specialists Conference, Arlington, Virginia 2013.
44. R. V. Galatage, E. M. Vogel, and C. L. Hinkle, "Quantum Mechanical Corrections for Accurate and Rapid Analysis of III-V/High-k MOS Devices," 60th AVS International Symposium, Long Beach, California 2013.
43. S. Anwar, C. Buie, and C. L. Hinkle, "Fabrication and Electrical Characterization of High-k/Germanium Tri Gate MOSFETs Grown by MBE on Bulk Silicon," 60th AVS International Symposium, Long Beach, California 2013.
42. S. McDonnell, A. Azcatl, C. Buie, N. Lu, J. Kim, C. L. Hinkle, M. J. Kim, R. M. Wallace, "Functionalization of MoS<sub>2</sub> Surfaces for High-k Atomic Layer Deposition," 60th AVS International Symposium, Long Beach, California 2013.
41. C. Buie, J. Chan, R. Chapman, D. Riley, A. Jain, S. C. Song, K. Y. Lim, J. Blatchford, J. Shaw, N. Lu, M. J. Kim, C. L. Hinkle, "Yb Incorporation for the Reduction of Schottky Barrier Height of NiPtSi on n-Si," TECHCON 2013, Austin, Texas 2013.
40. W. Cabrera, H. Dong, B. Brennan, E. O'Connor, P. Carolan, R. Galatage, S. Monaghan, I. Povey, P. K. Hurley, C. L. Hinkle, Y. Chabal, R. M. Wallace, "Detection of diffused III-V materials in high-k oxides during atomic layer deposition and annealing," TechConnect World, Washington, D.C. 2013.
39. R. Yue, A. Ascatl, C. Buie, S. McDonnell, R. M. Wallace, and C. L. Hinkle, "Contact Resistivity and Chemical Bonding of Metal Contacts on MoS<sub>2</sub>," E-MRS 2013 Spring Meeting, Strasbourg, France 2013.

38. S. McDonnell, A. Ascatl, R. Yue, J. Kim, C. L. Hinkle, and R. M. Wallace, "In-Situ Characterisation of High-k Deposition on 2-D Transition Metal Dichalcogenides," E-MRS 2013 Spring Meeting, Strasbourg, France 2013.
37. S. R. M. Anwar, J. B. Burris, C. Buie, and C. L. Hinkle, "Controlling the Electrostatic Potential of Gate-Last Ge/High-k/Metal Gate Stacks Through Interface Dipole Formation," 40th International Conference on the Physics and Chemistry of Surfaces and Interfaces (PCSI-40), Waikoloa, Hawaii 2013.
36. S. Mohammed, M. Nimmo, Y. J. Chabal, A. V. Malko, and C. L. Hinkle, "Chemical Bonding and Defect States of Si Quantum Dots Embedded in Si<sub>3</sub>N<sub>4</sub>," 2012 MRS Fall Meeting, Boston, MA, 2012.
35. S. R. M. Anwar, C. Buie, N. Lu, M. J. Kim, and C. L. Hinkle, "Electrical and Physical Characteristics of High-k/Metal Gate MOS Devices on MBE-Grown Germanium on Silicon Using Aspect Ratio Trapping," 59<sup>th</sup> AVS International Symposium, Tampa, FL, 2012.
34. R. V. Galatage, D. 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," 59th AVS International Symposium, Tampa, Florida 2012.
33. C. Buie, B. Quigley, J. Chan, R. Chapman, E. Vogel, D. Riley, A. Jain, S. C. Song, K. Y. Lim, J. Blatchford, J. Shaw, and C. L. Hinkle, "Internal Photoemission and I-V Investigation of Interface Composition Control for Schottky Barrier Height Lowering of NiPtSi on n-Si through Incorporation of Yb," 43rd Semiconductor Interface Specialists Conference, San Diego, CA 2012.
32. J. Mendez, J. Chan, R. A. Chapman, E. M. Vogel, H. Niimi, J. J. Chambers, P. Srinivasan, J. B. Shaw, and C. L. Hinkle, "1/f Noise and Charge-pumping Investigation of Dit Formation During Gate-Last HfO<sub>2</sub>/TiN Band Edge Effective Work Function Tuning," 43rd Semiconductor Interface Specialists Conference, San Diego, CA 2012.
31. S. McDonnell, H. Dong, J. M. Hawkins, B. Brennan, M. Milojevic, F. S. Aguirre-Tostado, D. M. Zhernokletov, C. L. Hinkle, J. Kim, R. M. Wallace, "In-Situ vs Ex-situ Characterization of High-k /III-V Interfaces," PSCI-39, Santa Fe, NM, 2012.
30. A. K. Sra, D. E. Arreaga-Salas, K. Roodenko, Y. J. Chabal, and C. L. Hinkle, "Progression of solid electrolyte interphase formation on hydrogenated amorphous silicon anodes for lithium-ion batteries," American Vacuum Society Texas Chapter Conference, Richardson, Texas 2012.
29. A. Jain, C. L. Hinkle, J. Chan, F. J. Mendez-Lopez, R. A. Chapman, E. M. Vogel, D. Riley, S. C. Song, J. Blatchford, and J. Shaw, "Reduction of Ni<sub>x</sub>Pt<sub>1-x</sub>Si Schottky Barrier Height by Yb and Hf Incorporation," American Vacuum Society Texas Chapter Conference, Richardson, Texas 2012.
28. 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, "Gate-Last TiN/HfO<sub>2</sub> Band Edge Effective Work Functions Using Low-Temperature Anneals and Selective Cladding to Control Interface Composition," American Vacuum Society Texas Chapter Conference, Richardson, Texas 2012.
27. D. E. Arreaga-Salas, A. K. Sra, E. Roodenko, Y. J. Chabal, and C. L. Hinkle, "SEI formation kinetics on a-silicon nanotube anodes," 220<sup>th</sup> Electrochemical Society Meeting, Boston, Massachusetts 2011.

26. R. V. Galatage, B. Brennan, H. Dong, D. M. Zhernokletov, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "Effect of Post Deposition Anneal on the Characteristics of InP MOS Capacitors with High-k Dielectrics," 58<sup>th</sup> AVS International Symposium, Nashville, TN 2011.
25. R. V. Galatage, H. Dong, D. M. Zhernokletov, B. Brennan, C. L. Hinkle, R. M. Wallace, and E. M. Vogel, "Thermal stability of the InP/high-k dielectric interface," Semiconductor Interface Specialists Conference, Arlington, VA 2011.
24. 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, "Dipole Controlled Metal Gate with Hybrid Low Resistivity Cladding for Gate-Last CMOS with Low  $V_t$ ," Symposium on VLSI Technology, Honolulu, HI 2010.
23. 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  $\text{In}_x\text{Ga}_{1-x}\text{As}$  ( $x=0.53, 0.65$ ) metal-oxide-semiconductor field effect transistors," TECHCON, Austin, TX 2010.
22. Marko Milojevic, Arif M. Sonnet, Christopher L. Hinkle, Jiyoung Kim, Eric M. Vogel and Robert M. Wallace, "The Role of Controlling III-V Surface Oxides for High Performance MOSFETs," Spring 2010 MRS meeting, San Francisco, CA 2010.
21. A. M. Sonnet, C. L. Hinkle, and E. M. Vogel, "Interfacial Layer Defect Response of Metal/High-k/GaAs C-V Characteristics," 41<sup>st</sup> Semiconductor Interface Specialists Conference, San Diego, CA 2010.
20. 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", 36th Conference on the Physics and Chemistry of Surfaces and Interfaces (PCSI), Santa Barbara, CA 2009.
19. C. L. Hinkle, A. M. Sonnet, M. Milojevic, F. S. Aguirre-Tostado, J. Kim, R. M. Wallace, B. Brennan, G. J. Hughes, and E. M. Vogel, "Surface states, interface traps, and Fermi level pinning correlation to the interface oxidation states of Ga", 39<sup>th</sup> IEEE Semiconductor Interface Specialists Conference (SISC), San Diego, CA 2008.
18. E. M. Vogel, A. M. 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  $\text{Al}_2\text{O}_3/\text{a-Si}$  Gate Dielectric Stacks", 5th International Symposium on Advanced Gate Stack Technology (ISAGST), Austin, TX 2008.
17. M. Milojevic, B. Brennan, F. S. Aguirre-Tostado, C. Hinkle, H. C. Kim, G. Hughes, E. M. Vogel, R. M. Wallace, and J. Kim, "In-Situ XPS study of ALD  $\text{Al}_2\text{O}_3$  deposition on  $\text{In}_x\text{Ga}_{1-x}\text{As}$ ", 5th International Symposium on Advanced Gate Stack Technology (ISAGST), Austin, TX 2008.
16. 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", 15<sup>th</sup> Workshop on Dielectrics in Microelectronics (WODiM), Bad Saarow, Germany 2008.

15. A. M. Sonnet, C. L. Hinkle, N. Jivani, J. Kim, R. M. Wallace and E. M. Vogel, "Performance Enhancement of n-Channel Inversion Type  $\text{In}_x\text{Ga}_{1-x}\text{As}$  MOSFET by Effective Surface Passivation Using Ex-Situ Deposited Thin Amorphous Si Layer", 38<sup>th</sup> IEEE Semiconductor Interface Specialists Conference (SISC), Washington, D.C. 2008.
14. C. L. Hinkle, M. Milojevic, S. McDonnell, G. J. Hughes, F. S. Aguirre-Tostado, A. M. Sonnet, B. Lee, K. J. Choi, J. Kim, R. M. Wallace, and E. M. Vogel, "Studies of *In-situ* GaAs high-k/interface reactions and their effects on electrical characteristics", 38<sup>th</sup> IEEE Semiconductor Interface Specialists Conference (SISC), Washington, D.C. 2007.
13. 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," 38<sup>th</sup> IEEE Semiconductor Interface Specialists Conference (SISC), Washington, D.C. 2007.
12. C. L. Hinkle, M. Milojevic, S. McDonnell, G. J. Hughes, F. S. Aguirre-Tostado, A. M. Sonnet, B. Lee, K. J. Choi, J. Kim, 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 (ISAGST), Dallas, TX 2007.
11. E. M. Vogel, A. M. Sonnet, and C. L. Hinkle, "Characterization of Electrically Active Interfacial Defects in High- $\kappa$  Gate Dielectrics", Electrochemical Society Meeting 2007.
10. C. Hinkle, C. Krug, and G. Lucovsky, "Optimization of (a) compound semiconductor/dielectric, and (b) internal dielectric interfaces for GaAs and GaN MOS devices: processing and functionality", 35<sup>th</sup> IEEE Semiconductor Interface Specialists Conference (SISC), San Diego, CA 2004.
9. C. Hinkle and G. Lucovsky, "A Novel Approach for Determination of  $E_b$ - $m_{eff}$  Product for Hi-k Dielectrics", SRC/iSEMATECH FEP Transition Center Review, Raleigh 2003.
8. C. Hinkle and G. Lucovsky, "A Novel Approach for Determination of Tunneling Mass,  $m_{eff}$ , Conduction Band Offset Energy,  $E_b$ , Products for Advanced Gate Dielectrics", 34<sup>th</sup> IEEE Semiconductor Interface Specialists Conference (SISC), Washington, DC 2003.
7. C. Hinkle and G. Lucovsky, "Enhanced Tunneling in Symmetric Stacked Gate Dielectrics with Ultra-thin  $\text{HfO}_2$  layers (0.5-1.0 nm) Sandwiched Between Thicker  $\text{SiO}_2$  layers (1.5 nm)", AVS 50<sup>th</sup> International Symposium, Baltimore 2003.
6. C. Hinkle and G. Lucovsky, "Enhanced Tunneling in Symmetric Stacked Gate Dielectrics with Ultra-thin  $\text{HfO}_2$  layers (0.5-1.0 nm) Sandwiched Between Thicker  $\text{SiO}_2$  layers (1.5 nm)", The 9<sup>th</sup> International Conference on the Formation of Semiconductor Interfaces (ICFSI-9), Madrid 2003.
5. C. Hinkle and G. Lucovsky, "Remote Plasma Assisted Nitridation of  $\text{Al}_2\text{O}_3$  and Zr and Hf Silicate Alloys Films", TECHCON 2003, Dallas 2003.
4. C. Hinkle and G. Lucovsky, "A Novel Approach for Determining the Effective Tunneling Mass of Electrons in  $\text{HfO}_2$  and Other High-K Gate Dielectrics", INFOS 2003, Barcelona 2003.

## Christopher L. Hinkle

3. C. Hinkle and G. Lucovsky, "Formation of Al Oxynitride Alloys by Low-Temperature Remote Plasma Nitridation", 33<sup>rd</sup> IEEE Semiconductor Interface Specialists Conference (SISC), San Diego 2002.

2. C. Hinkle and G. Lucovsky, "Controlled Incorporation of Nitrogen in Aluminum Oxide using Remote Plasma Enhanced Chemical Vapor Deposition.", American Vacuum Society Fall Meeting, Denver 2002.

1. C. L. Hinkle and J. M. Blondin, "Hydrodynamic Instabilities in Young Supernova Remnants," 11th Annual October Astrophysics Conference in Maryland, College Park, MD 2000.

### **Patents Issued as Inventor and Co-inventor**

3. "Memory devices based on gate controlled ferromagnetism and spin-polarized current injection"  
W. G. Vandenberghe, C. L. Hinkle, M. V. Fischetti, Filed September 12, 2016  
U.S. 9,741,416, Awarded August 22, 2017

2. "Devices having inhomogeneous silicide Schottky barrier contacts,"  
C. L. Hinkle, C. Buie, D. Riley, J. Shaw  
U.S. 9,263,444, Awarded February 16, 2016.

1. "Semiconductor devices having an interfacial dielectric layer and related methods,"  
G. Lucovsky and C. L. Hinkle  
US 7,507,629 B2, Awarded March 24, 2009

### **External Funding: Received Grants/Contracts (\$10.27 Million total awarded, \$3.94 Million to Hinkle)**

20. NEW materials for Logic, Memory and InTerconnectS (NEW LIMITS), nCore Center  
SRC-NRI Center (Purdue lead)  
\$4,500,000, (\$1,350,000 to UTD) 1/2018-12/2020 (\$450,000 to Hinkle)  
C. L. Hinkle, R. Wallace, M. Fischetti

19. MBE Growth of  $\text{Bi}_2\text{Se}_{(3-x)}\text{Te}_x$ /Ferromagnetic Heterostructures  
Intel  
\$350,000, 12/2015-12/2018 + Matching Funds of \$175,000  
C. L. Hinkle (PI)

18. Materials for Topological Insulators  
Texas Instruments  
\$150,000 for, 12/2016-12/2018 + Matching Funds of \$75,000  
C. L. Hinkle (PI)

17. South West Academy of Nanoelectronics (SWAN) Center  
SRC-NRI Center (UT-Austin Lead)  
\$2,383,885 to UTD, 10/2012-12/2017, (\$460,000 to Hinkle)  
R. Wallace (PI), J. Kim, M. Kim, C. L. Hinkle (co-PI), M. Fischetti

Christopher L. Hinkle

16. Low Energy Systems and Technologies (LEAST) Center  
STARNET/SRC/DARPA Center (Notre Dame Lead)  
\$3,360,232 to UTD, 11/2012-12/2017, (\$300,000 to Hinkle, 11/2015-10/2017)  
R. Wallace (PI), K. Cho, M. Kim, C. L. Hinkle (co-PI)
  
15. NRI supplemental funds for TMD research  
NRI/SRC/NIST  
\$33,000, 12/2016-12/2018  
C. L. Hinkle (PI)
  
14. MRI Acquisition: High-Resolution and Ultra-High Speed X-Ray Diffractometer for Structure, Crystal Quality, and Preferred Orientation Determination  
NSF  
\$263,041, 9/2015-12/2017  
C. L. Hinkle (PI), S. McDonnell, M. Kim, J. Chan, M. Stefan
  
13. Understanding the Nature of Interfaces in Two Dimensional Electronic Devices (UNITE)  
NSF  
\$420,000, 9/2014-8/2018, (\$140,000 to Hinkle)  
R. Wallace (PI), C. L. Hinkle (co-PI), C. D. Young
  
12. New Transition Metal Dichalcogenides for High Energy Density Li-ion Batteries  
Norman Hackerman Advanced Research Program, Young Investigator Award  
\$100,000, 9/2014-8/2016  
C. L. Hinkle (PI)
  
11. Advanced Contact Resistivity Reduction Pathfinding for N7 Requirements  
SRC/Applied Materials  
\$50,000, 8/2014-7/2015  
C. L. Hinkle (PI)
  
10. Internal Photoemission for CdTe based Solar Cells  
Intermolecular Inc.  
\$25,000 unrestricted gift on 6/1/2014  
C. L. Hinkle (PI)
  
9. Extraction of CV Parameters for III-V/High-k Devices  
Tokyo Electron Ltd, SRC  
\$250,000, 6/2012-12/2014  
C. L. Hinkle (PI)
  
8. Contact Resistance Reduction in n-Si and MBE Grown p-SiGe Source/Drains  
Texas Instruments  
\$153,000, 6/2012-5/2013  
C. L. Hinkle (PI)
  
7. High-k/Metal Gate Fixed Charge and Mobility Degradation  
Texas Instruments

## Christopher L. Hinkle

\$80,000, 2/2012-1/2013

C. L. Hinkle (PI)

6. Triple-Gate MOSFETs with High-k/Metal Gate on High-mobility Channels on Bulk Si Substrates  
SRC

\$150,000, 9/2010-8/2013,

C. L. Hinkle (PI)

5. Schottky Barrier Height Measurement and Engineering

Texas Instruments

\$273,008, 6/2010-5/2012, (\$213,000 to Hinkle)

C. L. Hinkle (PI), E. M. Vogel

4. MRI Acquisition: Compound Semiconductor Reactive Ion Etcher for Diverse Materials and Devices  
NSF

\$415,000, 11/2010-10/2012

C. L. Hinkle (PI), D. MacFarlane, R. M. Wallace

3. 1/f Flicker Noise in High-k/Metal Gate Digital and Analog Devices

Texas Instruments

\$8,000 unrestricted gift on 8/24/2011

C. L. Hinkle (PI)

2. Metal Gate Work Function Integration

Texas Instruments

\$83,126, 6/2010-5/2011, (\$41,500 to Hinkle)

C. L. Hinkle (PI), E. M. Vogel

1. PMOS Metal Gate Electrodes on High-k Dielectrics

Texas Instruments

\$122,744 over 1 year, 7/2009-6/2010, (\$61,000 to Hinkle)

C. L. Hinkle (PI), E. M. Vogel

### Teaching:

#### Doctoral advisement/direction

##### *Ph.D. – Degree Awarded*

Mr. Sarkar Anwar – Ph.D. – Major Professor- EE, Awarded December 2016

Mr. Diego Barrera – Ph.D. – Committee Member – MSEN, Awarded July 2016

Mr. Bhaswar Chakrabarti – Ph.D. – Committee Member – MSEN, Awarded December 2013

Mr. Wilfredo Cabrera – Ph.D. – Committee Member – MSEN, Awarded November 2014

Mr. Hong Dong – Ph.D. – Committee Member – MSEN, Awarded July 2013

Mr. Jingtian Fang – Ph.D. – Committee Member – PHYS, Awarded April 2016

Ms. Poornika Fernandes – Ph.D. – Committee Member – EE, Awarded March 2011

Mr. Rohit Galatage – Ph.D. – Committee Member – EE, Awarded June 2013

Mr. Santosh KC – Ph.D. – Committee Member – MSEN, Awarded November 2014

Mr. Antonio Lucero – Ph.D. – Committee Member – MSEN, Awarded April 2016

Mr. Shakil Mohammed – Ph.D. – Major Professor- MSEN, Awarded December 2016

## Christopher L. Hinkle

Mr. Jigarkumar Patel – Ph.D. – External Chair – Mathematical Sciences, Awarded April 2011

Mr. Adam Pirkle – Ph.D. – Committee Member – MSEN, Awarded July 2011

Mr. Xiaoye Qin – Ph.D. – Committee Member – MSEN, Awarded November 2014

Mr. Joseph Velten – Ph.D. – Committee Member – PHYS, Awarded April 2012

Mr. Weichao Wang – Ph.D. – Committee Member – MSEN, Awarded February 2011

Mr. Ruoyu Yue – Ph.D. – Major Professor- MSEN, Awarded October 2017

Mr. Dmitry Zhernokletov – Ph.D. – Committee Member - MSEN, Awarded March 2013

Mr. Jun Wu – Ph.D., Lund University – External Faculty Opponent – Electrical and Information Technology, Awarded April 2016

### ***Ph.D. – Students admitted to Candidacy***

Mr. Adam Barton – Ph.D. – Major Professor- MSEN

Mr. Gautam Gaddemane – Ph.D. – Committee Member - MSEN

Mr. Yifan Nie – Ph.D. – Committee Member - MSEN

Mr. Chris Smyth – Ph.D. – Major Professor- MSEN

Ms. Hui Zhu – Ph.D. – Committee Member - MSEN

### ***Ph.D. – Students declared***

Mr. Shahi Honari – Ph.D. – Major Professor- MSEN

### ***M.S. – Degree Awarded***

Mr. Creighton Buie – M.S. – Major Professor- MSEN, Awarded December 2013

### **Classroom Teaching**

<b>Semester</b>	<b>Prefix</b>	<b>Number</b>	<b>Course Name</b>	<b>Enrollment</b>
Spring 2018	MSEN	6327.001	Semi. Dev. Char.	13
Spring 2018	MSEN	8V70.003	Research in Mat. Sci.	4
Spring 2017	MSEN	6327.001	Semi. Dev. Char.	15
Spring 2017	MSEN	8V70.003	Research in Mat. Sci.	4
Spring 2016	MSEN	6327.001	Semi. Dev. Char.	13
Spring 2016	MSEN	8V70.003	Research in Mat. Sci.	4
Fall 2016	MSEN	5310.001	Thermo. of Mats.	20
Fall 2016	MSEN	8V70.003	Research in Mat. Sci.	3
Fall 2016	MSEN	8V99.003	Dissertation	1
Summer 2016	MSEN	8V70.003	Research in Mat. Sci.	1
Summer 2016	MSEN	8V99.003	Dissertation	1
Spring 2016	MSEN	5320.001	Mat. For Sust. Energy	24
Spring 2016	MSEN	6327.001	Semi. Dev. Char.	12
Spring 2016	MSEN	8V70.003	Research in Mat. Sci.	2
Spring 2016	MSEN	8V99.003	Dissertation	1
Fall 2015	MSEN	8V70.003	Research in Mat. Sci.	3
Fall 2015	MSEN	8V99.003	Dissertation	1
Summer 2015	MSEN	8V70.003	Research in Mat. Sci.	3
Spring 2015	MSEN	6327.001	Semi. Dev. Char.	16
Spring 2015	MSEN	8V70.003	Research in Mat. Sci.	3
Spring 2015	MSEN	8V99.003	Dissertation	1
Fall 2014	MSEN	5310.001	Thermo. of Mats.	17



Christopher L. Hinkle

Fall 2014	MSEN 8V70.003	Research in Mat. Sci.	2
Fall 2014	MSEN 8V99.003	Dissertation	1
Summer 2014	MSEN 8V70.003	Research in Mat. Sci.	3
Summer 2014	MSEN 8V99.003	Dissertation	1
Spring 2014	MSEN 8V70.003	Research in Mat. Sci.	4
Spring 2014	MSEN 8V99.003	Dissertation	1
Fall 2013	MSEN 8V70.003	Research in Mat. Sci.	3
Fall 2013	MSEN 5310.001	Thermo. of Mats.	22
Summer 2013	MSEN 8V70.003	Research in Mat. Sci.	4
Spring 2013	MSEN 8V70.003	Research in Mat. Sci.	4
Spring 2013	MSEN 7V80.002	Semi. Dev. Char.	9
Fall 2012	MSEN 8V70.003	Research in Mat. Sci.	3
Fall 2012	MSEN 5310.001	Thermo. of Mats.	25
Summer 2012	MSEN 8V70.003	Research in Mat. Sci.	3
Spring 2012	MSEN 8V70.003	Research in Mat. Sci.	3
Spring 2012	PHYS 3352.501	Modern Physics I	26
Fall 2011	MSEN 5310.001	Thermo. of Mats.	25
Fall 2011	MSEN 8V70.003	Research in Mat. Sci.	2
Fall 2011	EEGR 8V70.003	Research in EE	1
Summer 2011	MSEN 8V70.003	Research in Mat. Sci.	2
Summer 2011	PHYS 8V50.055	Research in Atomic Phys.	1
Summer 2011	EEGR 8V70.003	Research in EE	1
Spring 2011	PHYS 3352.001	Modern Physics I	29
Spring 2011	EEGR 8V70.003	Research in EE	1
Spring 2011	MSEN 8V70.001	Research in Mat. Sci.	2
Spring 2011	PHYS 8V50.055	Research in Atomic Phys.	1
Fall 2010	MSEN 8V70.001	Research in Mat. Sci.	2
Fall 2010	EEGR 8V70.003	Research in EE	1
Fall 2010	PHYS 8V50.055	Research in Atomic Phys.	1
Fall 2010	MSEN 7V80.501	Semi. Dev. Char	6
Summer 2010	MSEN 8V70.001	Research in Mat. Sci.	1
Summer 2010	PHYS 8V50.055	Research in Atomic Phys.	1
Spring 2010	MSEN 8V70.001	Research in Mat. Sci.	2
Spring 2010	PHYS 8V50.055	Research in Atomic Phys.	1
Spring 2010	MSEN 6350.001	Imperfections in Solids	18

**Service**

Director of the Advanced Electrical Characterization Laboratory (AECL) shared user facility

General Conference Chair for the 2017 IEEE SISC. Technical Program Chair for the 2016 IEEE SISC, Arrangements Chair/Treasurer for the 2015 IEEE SISC

Appointed to the Technical Program Committee for the Electronics Materials Conference, IEEE International Reliability Physics Symposium (IRPS) Transistors Division, 72<sup>nd</sup> Physical Electronics Conference

## Christopher L. Hinkle

Elected to the executive committee of the Electronic Materials and Processing Division of the American Vacuum Society (served 2013-2014)

EMPD Session Organizer, 59<sup>th</sup>, 60<sup>th</sup>, 61<sup>st</sup>, and 62<sup>nd</sup> American Vacuum Society (AVS) Meeting

Panel Reviewer for the National Science Foundation, Department of Energy (including Energy Frontier Research Centers (EFRC)), Oak Ridge Associated Universities (ORAU) Ralph E. Powe Awards

Leadership roles in multiple center proposals through the SRC and NSF

### *Reviewer (in the past 12 months)*

ACS Nano

Advanced Functional Materials

Advanced Materials

Applied Physics Letters

Applied Surface Science

IEEE Electron Device Letters

IEEE Transactions on Electron Devices

IEEE Transactions on Nanotechnology

Journal of Applied Physics

Journal of Chemical Physics

Journal of the Electrochemical Society

Journal of Vacuum Science and Technology A

Journal of Vacuum Science and Technology B

Microelectronic Engineering

Nano Letters

Nature

Nature Chemistry

Nature Communications

RSC Advances

2D Materials

### **Department/School/University Committees & Councils**

2009-2010 MSEN – Chair -- Colloquium Committee

2009-2010 MSEN – Member -- Graduate Admissions Committee

2009-2010 MSEN – Member -- Curriculum and Courses of Study Committee

2009-2010 MSEN – Member -- Departmental Committee

2010-2011 MSEN – Member -- Colloquium Committee

2010-2011 MSEN – Member -- Graduate Student Recruiting Committee

2010-2011 MSEN – Member -- Graduate Examination Committee

2010-2011 MSEN – Member -- Graduate Admissions Committee

2010-2011 MSEN – Member -- Departmental Committee

2011-2012 MSEN – Chair -- Graduate Examination Committee

2011-2012 MSEN – Member -- Graduate Admissions Committee

2011-2012 MSEN – Member -- Departmental Committee

2011-2012 MSEN – Member -- Curriculum Committee

Christopher L. Hinkle

2012-2013 MSEN – Chair -- Graduate Ph.D. Qualifying Examination Committee  
2012-2013 MSEN – Member – Curriculum Committee  
2012-2013 MSEN – Member -- Graduate Recruiting and Admissions Committee  
2012-2013 MSEN – Member -- Departmental Committee  
2013-2014 MSEN – Chair -- Graduate Ph.D. Qualifying Examination Committee  
2013-2014 MSEN – Member – Curriculum Committee  
2013-2014 MSEN – Member -- Graduate Recruiting and Admissions Committee  
2013-2014 MSEN – Member -- Departmental Committee  
2014-2015 MSEN – Chair -- Graduate Ph.D. Qualifying Examination Committee  
2014-2015 MSEN – Member -- Graduate Admissions Committee  
2014-2015 MSEN – Member – Recruiting Committee  
2014-2015 MSEN – Member -- Departmental Committee  
2015-2016 MSEN – Chair -- Graduate Ph.D. Qualifying Examination Committee  
2015-2016 MSEN – Member -- Graduate Admissions Committee  
2015-2016 MSEN – Member – Graduate Recruiting Committee  
2015-2016 MSEN – Member -- Departmental Committee  
2016-2017 MSEN – Chair – Graduate Admissions Committee  
2016-2017 MSEN – Member -- Ph.D. Qualifying Examination Committee  
2016-2017 MSEN – Member – Graduate Recruiting Committee  
2016-2017 MSEN – Member -- Departmental Committee  
2017-2018 MSEN – Chair – Graduate Admissions Committee  
2017-2018 MSEN – Member – Curriculum Committee  
2017-2018 MSEN – Member -- Departmental Committee  
**2014-2017 Jonsson School of Engineering – Member -- Business Continuity Committee**  
**2016-2017 UT-Dallas – Member – Eugene McDermott Graduate Fellowship Selection Committee**