

Robert M. Wallace

Erik Jonsson Distinguished Chair
Department of Materials Science and Engineering
Affiliated appointments: Electrical Engineering, Mechanical Engineering, and Physics
University of Texas at Dallas
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Education

<u>Degree</u>	<u>Year</u>	<u>University</u>	<u>Field</u>
Ph.D.	1988	University of Pittsburgh	Physics
M.S.	1984	University of Pittsburgh	Physics
B.S.	1982	University of Pittsburgh	Physics Applied Mathematics

Professional Experience

<u>Years</u>	<u>Title</u>	<u>Organization</u>	<u>Location</u>
2011	Distinguished Chair	Materials Science and Engineering	Richardson
2010	Distinguished Professor	Materials Science and Engineering	Richardson
2006-present	Professor	Materials Science and Engineering	Richardson
2004-2010	Director	Cleanroom Research Laboratory	Richardson
2003-present	Professor	Depts. Of Electrical Engineering & Physics	Richardson
1999-2003	Professor	Dept. of Materials Science, UNT	Denton, TX
1999-2003	Director	Laboratory for Electronic Materials and Devices	Denton, TX
1997-1999	Manager	Advanced Technology Branch, Texas Inst.	Dallas, TX
1996-1997	Sr. Member Technical Staff	Central Research Laboratories, Texas Inst.	Dallas, TX
1990-1996	Member, Technical Staff	Central Research Laboratories, Texas Inst.	Dallas, TX
1988-1990	Postdoctoral Associate	Chemistry Dept., University of Pittsburgh	Pittsburgh, PA

(UNT=University of North Texas)

Professional Activity

Membership in Professional Organizations

American Association for the Advancement of Science
American Chemical Society
American Nuclear Society
American Vacuum Society
ASTM Committee E-42 on Surface Analysis
Electrochemical Society
Institute of Electronic and Electrical Engineers
Materials Research Society

Consulting

Expert consulting experience with corporations and legal firms in intellectual property generation, patent litigation matters, and science and technology in areas of electronic and optoelectronic materials, integrated circuit device processing and integration, high-k dielectrics, metal gate electrode materials, materials interdiffusion, surface and interface analysis, and field emission technologies.

Offices and Committee Assignments in Professional Organizations

- Editor – *Applied Surface Science* (4/2014)
- Editorial Board – *Applied Surface Science* (2012-2014)
- Technical Program Committee member for European INFOS (Insulating Films on Semiconductors) (2014)
- E-MRS Spring Meeting, Route to post-Si CMOS devices Symposium Scientific Committee (2012-13)

- AVS Physics and Chemistry of Surfaces and Interfaces Conference Program Chair (2012)
- AVS Physics and Chemistry of Surfaces and Interfaces Conference Program Committee (2011-2013)
- New Publications Products Subcommittee Chair for the Materials Research Society (2011-2013)
- Atomic Layer Deposition Conference International Advisory Committee (2011)
- MRS Spring meeting, Post-CMOS Emerging Channel Materials symposium organizer (2011)
- IEEE International Electron Device Meeting Process Technology Committee (2009-2011)
- Program Chair, Electronics Materials and Processing Division, AVS (2009)
- Associate Editor, Journal of Vacuum Science and Technology B (2009-2010)
- IEEE Semiconductor Interface Specialists Conference Program Committee (2009-2012)
- Vice Chair, Electronic Materials and Processing Division, AVS (2008)
- Executive Committee, Electronic Materials and Processing Division, AVS (2005-2007)
- SSDM Conference, Advanced Dielectrics Program Subcommittee (2005)
- MRS Spring meeting, High-k dielectric symposium organizer (2004)
- Editorial Board - *Journal of Materials Science: Materials in Electronics* (since 2002)
- Associate Editor, *Journal of Vacuum Science and Technology A* (2000-2003)
- Guest Editor for *Bulletin of Materials Research Society* – Advanced Dielectrics Issue – 2002
- Chair ASTM Committee E-42 on Surface Analysis (2000-2002)
- IEEE Semiconductor Interface Specialists Conference (SISC) Executive Committee (2001-2004)
- IEEE Semiconductor Interface Specialists Conference General Chair (2003)
- IEEE Semiconductor Interface Specialists Conference Program Committee (1997-2000)
- Co-chair, 47th American Vacuum Society Program Committee, Flat Panel Displays (2000)

Review Panels and Other External Service Activities

- Invited Panelist for New Argonne National Laboratory Advanced Photon Source Beamline Development for In-situ Analysis: (2012)
 - Contributor on “X-Ray Interface Science Workshop: Materials Synthesis Report”
- Proposals for Natural Sciences and Engineering Research Council of Canada
- Proposals for Hong Kong Science Council
- Proposals for Research Foundation – Flanders (Belgium)

Special Awards and Distinctions

- (2014) Erik Jonsson School Distinguished Senior Research Contributions Award
- (2011) Appointed Erik Jonsson Distinguished Chair
- (2011) IBM Faculty Award
- (2010) Appointed Louis A. Beecherl, Jr. Distinguished Professor
- (2010) Best Paper Award, “Fermi Level Unpinning of GaSb(100) using Plasma Enhanced ALD Al₂O₃ Dielectric,” A. Ali, H. S. Madan, A. P. Kirk, R.M. Wallace, D. A. Zhao, D. A. Mourey, M. Hudait, T. N. Jackson B. R. Bennett, J. B. Boos, and S. Datta, 68th Device Research Conference, June 21-23, 2010, Notre Dame, South Bend IN, USA
- (2009) Election to Fellow of the IEEE “for contributions to high-k gate dielectric materials for integrated circuits”
- (2007) Election to Fellow of the AVS “for significant contributions to high-k dielectric materials research enabling the scaling of integrated circuit technology”
- (2007) Best Paper Award, "Oxygen Species in HfO₂ Films: An in Situ X-Ray Photoelectron Spectroscopy Study" by C. Driemeier, R. M. Wallace, and I.J. R. Baumvol, High Dielectric Constant Materials and Gate Stack Symposium, 212th Electrochemical Society Meeting, Washington, D.C.
- Co-author of paper entitled “High-k Gate Dielectrics: Current Status and Materials Properties Considerations” (in the *Journal of Applied Physics* 89 (2001) 5243. (>3900 citations as of December 2014).
 - (2006) Selected as a high impact *Applied Physics Review* paper for the 75th Anniversary of the American Institute for Physics: http://jap.aip.org/09_10_09_75th_sample_articles

- (2005) Recognized by the Semiconductor Research Corporation as the top ranked “influential research paper” for the semiconductor industry sponsored by the SRC based upon peer citations
- (2003) Semiconductor Research Corporation Inventor Recognition Award
- (2002) Elected to Senior Member of the Institute for Electrical and Electronics Engineers
- (1998) ASTM E-42 Committee on Surface Analysis Service Award
- (1996) Sr. Member, Technical Staff – Texas Instruments (limited to top 5% of technical staff)
- (1988) Pittsburgh Crystal Growers Society Outstanding Researcher Award
- (1982) University of Pittsburgh David Halliday Prize for Outstanding Undergraduate Research in Physics

Reviewer (in the past 12 months)

Applied Physics Letters, Electron Device Letters, Transactions on Electron Devices, Thin Solid Films, Journals of Applied Physics, Journal of Electron Materials, Journal of Vacuum Science and Technology, Journal of the Electrochemical Society, Science, Thin Solid Films, Nano Letters.

Graduate Advisor

Prof. W.J.Choyke, Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA.

Postdoctoral Advisor

Prof. John T.Yates, Jr., Pittsburgh Surface Science Center, Department of Chemistry, University of Pittsburgh, Pittsburgh, PA. (Deceased)

Narrative

Robert M. Wallace holds the Erik Jonsson Distinguished Chair in the Jonsson School of Engineering and Computer Science at the University of Texas at Dallas and is a professor in the Department of Materials Science and Engineering. He received the B.S. in Physics and Applied Mathematics (1982), the M.S. (1984) and the Ph.D. (1988) in Physics at the University of Pittsburgh. He then was a postdoctoral research associate in the Department of Chemistry at the Pittsburgh Surface Science Center.

In 1990, he joined Texas Instruments Central Research Laboratories as a Member of Technical Staff (MTS) in the Materials Characterization Branch of the Materials Science Laboratory, and was elected as a Senior MTS in 1996. Dr. Wallace was then appointed in 1997 to manage the Advanced Technology branch in TI's R&D which focused on advanced device concepts and the associated material integration issues.

In 2003, he joined the faculty at the University of Texas at Dallas, was a founding member of the Materials Science and Engineering program, served as an interim head for the program, and facilitated the transformation of the program into a department to the current level of 15 faculty and more than 75 graduate students and postdocs. In addition to his research program in nanoelectronic materials, Wallace was also the director of the new 5000 sq. ft. Cleanroom Research Laboratory for 6 years, supervising a staff of 9 and an annual budget >\$2M. Dr. Wallace also has appointments in the Departments of Electrical Engineering, Mechanical Engineering, and Physics at UT-Dallas.

He has authored or co-authored over 350 publications in peer reviewed journals and proceedings with over 18000 citations, 275 contributed, and 90 invited talks at international meetings and symposia, as well as 45 US and 27 international patents/applications with over 2300 citations. A review published in the Journal of Applied Physics on high-k gate dielectrics which he coauthored was recognized by the Semiconductor Research Corporation as one of the most influential research publications in the field with more than 4400 (4800) citations to date according to the Science Citation Index (Scopus) database, and has been selected among the 45 top cited publications by the American Institute of Physics over the last 85 years. It is currently among the most highly cited publication in the Journal of Applied Physics – Applied Physics Reviews, and appears in the journal's 85th anniversary portfolio.

Dr. Wallace is also a co-inventor of the Hf-based high-k gate dielectric materials now used by the semiconductor industry for advanced high performance logic in microprocessors. He was named Fellow of the AVS in 2007 and an IEEE Fellow in 2009 for his contributions to the field of high-k dielectrics in integrated circuits. In 2010, he was appointed the Louis A. Beecherl, Jr. Distinguished Professor and in 2011 he was appointed the Erik Jonsson Distinguished Chair in the Erik Jonsson School of Engineering and

Computer Science at UT-Dallas, and received the school's Distinguished Senior Research Contributions Award in 2014.

He is a member of the American Vacuum Society, the Materials Research Society, the Institute of Electrical and Electronics Engineers, the American Chemical Society, the Electrochemical Society, the American Nuclear Society, and the American Association for the Advancement of Science. He also serves as an Editor of the Elsevier journal *Applied Surface Science* and on the Editorial Board of the Springer *Journal of Materials Science: Materials in Electronics*. His interests include nanoscale materials interfaces and integration issues for advanced devices including gate dielectrics, gate electrodes as well as nanoelectronics. Dr. Wallace also consults for semiconductor and nanotechnology companies as well as on intellectual property matters.

University Committee Assignments

University Committees and Councils – University of Texas at Dallas (UTD)

2004	Washington Advisory Group Response Committee
2004	EHS Director Search Committee
2005-2006	NSM Dean Search Committee
2006-2008, 2010-2014	Safety and Security Council (Chair, 2007-08)

School/College Committees & Councils - UTD

2003	EJS Chair of promotion committee for Moon Kim (EE)
2005	Member NSM 3rd year review committee: Assoc. Prof. Y. Gartstein (Physics)
2005 – 2006	Co-Chair of Joint EJS/NSM Materials Faculty Search Committee #776
2006 – 2007	Member NSM promotion committee for Gail Breen (Biology)
2007	Member EJS 3rd year review committee: Assoc. Prof. J. Kim (EE)
2007	Chair of Distinguished Nanoelectronics Chair search committee
2008	EJS Chair of promotion/tenure committee for Eric Vogel (MSEN)
2009	EJS Ad hoc Graduate Scholarship Committee
2009	Chair of Distinguished Nanoelectronics Chair search committee
2009	Member of EJS promotion/tenure committee for J. Kim (MSEN)
2010-2012	Member of EJS Academic Affairs Committee
2011	EJS Ad hoc IT Support Committee
2011	Chair of EJS promotion/tenure committee for A. Walker (MSEN)
2011	Member of EJS promotion/tenure committee for K. Cho (MSEN)
2012	Member of EJS promotion for J. Kim (MSEN)
2012	Member of EJS mid-term promotion/tenure committee for W. Voit (MSEN)
2014	Chair of EJS Space Committee
2014	Chair of EJS promotion committee for A. Walker (MSEN)
2015	Member of EJS promotion/tenure committee for W. Voit (MSEN)

Department/Division Committees & Councils - UTD

2003-2005	EJS EE Department Faculty Position Search Committee
2004-2005	EJS EE Department Chair Search Committee
2004	NSM Chair of Physics Faculty Search Committee #2066
2005-2006	Member NSM Physics Committee on Graduate Curriculum and Education
2007	MSEN SACS Liaison
2007	EE Merit Process Review Committee
2008-present	Mentor for MSE Faculty
2009	MSE Personnel Affairs Committee (Vice Chair)
2009	Graduate Faculty Membership Committee
2009	Graduate Admissions Committee (Alternate)
2010	MSE Personnel Affairs Committee (Chair)
2010	Graduate Examination Committee (Chair)
2010	Awards Committee (Chair)
2011	MSE Personnel Review Committee
2011	MSE Graduate Curriculum Committee
2011	MSE Undergraduate Curriculum Committee
2011	MSE Recruiting and Admissions Committee
2011	MSE External Relations Committee
2011-2012	Chair of MSE Ad hoc Faculty Search Committee
2012	MSE Personnel Affairs Committee
2012	MSE Graduate Curriculum Committee
2012	MSE Undergraduate Curriculum Committee
2014	MSE External Relations Committee
2014	MSE Curriculum Committee (Graduate and Undergraduate)
2014	MSE Qualifying Exam Committee

Special Assignments – UTD

2004-2010 Director, Cleanroom Research Laboratory (Supervisor for 9 Staff)

University Committees and Councils – University of North Texas (UNT)

2000-2003 Faculty Senate
2000-2003 Metroplex Research Consortium – Steering Committee
2002 College of Engineering, Dean Search Committee
2002-2003 Faculty Research Committee
2002-2003 University Planning Committee
2002-2003 University Patent Committee
2003 Screening Committee – Provost and V.P. Academic Affairs

School/College Committees & Councils - UNT

1999 “Materials Initiative” Faculty Search Committee – Chair

Department/Division Committees & Councils - UNT

2000-2003 Faculty Search Committee – Materials Science – Member
1999-2003 Personnel Affairs Committee – Materials Science – Member
2002 Promotion and Tenure Committee – Materials Science – Member
2002 Search Committee – Founding Dean of Engineering

Student and Postdoctoral Supervision

Completed Thesis/Dissertation Advisor (Chronological)

1. B.R. Chalamala (Univ. of North Texas, Physics, Ph.D. 1998, now at Sandia National Labs)
 2. Manuel Quevedo-Lopez (Univ. of North Texas, MSE, Ph.D. 2002 , now at UTD)
 3. Mr. In-sang Jeon (Seoul National University, Ph.D. MSE, 2004, now at ULVAC)
 4. Mr. Penghui Zhao (Univ. of Texas at Dallas, Ph.D. MSE, 2006, now at Intel)
 5. Mr. Prassana Sivasubramani (Univ. of Texas at Dallas, Ph.D. MSE, 2006, now at Lam Research)
 6. Mr. Tao Zheng (Univ. of Texas at Dallas, Ph.D. MSE, 2009, with B.Gnade, now at KAUST)
 7. Mr. Srinivas Gowrisanker (Univ. Of Texas at Dallas, Ph.D. Physics, 2009, with B.Gnade, now at UT-Dallas)
 8. Mr. Yuming Ai (Univ. of Texas at Dallas, Ph.D. EE, 2010, with B.Gnade, now at Avago)
 9. Mr. Marko Milojevic (Univ. of Texas at Dallas, Ph.D. MSE, 2010, now at Micron Technologies)
 10. Ms. Rocio Contreras Guerrero (CINVESTAV-IPN, Ph.D. Physics, 2010, now at Avago)
 11. Mr. Adam Pirkle (Univ. of Texas at Dallas, Ph.D. MSE, 2011, now at Intel)
 12. Mr. Dmitry Zhernokletov (Univ. of Texas at Dallas, Ph.D. Physics, 2013, now at Samsung Semiconductor, Inc.)
 13. Mr. Hong Dong (Univ. of Texas at Dallas, Ph.D. MSE, 2013, now at Nankai University, China)
 14. Mr. Xiaoye Qin (Univ. of Texas at Dallas, Ph.D. MSE, 2014, now at Qorvo, Inc.)
 15. Ms. Angelica Azcatl (Univ. of Texas at Dallas, Ph.D. MSE, 2016, now at ASM America)
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1. Ms. Danni Su, (Univ. of North Texas, MSE, M.S. 2002)
 2. Mr. Chun Yao, (Univ. of North Texas, MSE, M.S. 2003)
 3. Ms. Agnieszka Jakubowicz – (Univ. of North Texas, MSE, M.S. 2004. now at York University, Canada)
 4. Mr. Sheril Satija (Univ. Of Texas at Dallas, EE, M.S. 2006, now at Intel)
 5. Ms. Courtney Matthews (Univ. Of Texas at Dallas, Physics, M.S. 2007)
 6. Mr. Miles Selvidge (Univ. Of Texas at Dallas, EE, M.S. 2008, now at Learnatronics)
 7. Mr. Steven Zandstra (Univ. Of Texas at Dallas, Physics, M.S. 2007, now at Qorvo, Inc.)
 8. Mr. Amar Chowdhury (Univ. Of Texas at Dallas, EE, M.S. 2008, now at Qualcomm)

Current Thesis/Dissertation Advisor

1. Mr. Chris Cormier (Ph.D. MSE)
2. Ms. Ava Khosravi (Ph.D. MSE)
3. Ms. Hui Zhu (Ph.D. MSE)
4. Mr. Christopher M. Smyth (Ph.D. MSE) (Co-advisor)

Postdoctoral Researchers Advised

Dr. P.J.Chen (1995, now at ASM America)
Dr. S.P.Tang (1996, now at Texas Instruments)
Dr. Y.Weiz (1997, now at Zebra Technologies)
Dr. L.Archer (1998, now at Mesa Leadership Training and Development)
Dr. Swarna Addepalli (2000-03, now at India Institute of Science, Bangalore, India)
Dr. Prakaipetch Punchaipetch Kitiyanan (2000-03, Now at BASF Thai Limited, Thailand)
Dr. Honguo Zhang (2000-02, now at MicroXact Inc.)
Dr. Servando Aguirre-Tostado (2007-2009, now at CIMAV-Campus Monterrey, MX)
Dr. Manori Nadesaligam (2008-2010, now at Northern Virginia Community College)
Dr. Barry Brennan (2010-2013, now at National Physical Laboratory, UK)
Dr. Stephen McDonnell (2009-2015), now at Univ. of Virginia
Dr. Raffik Addou (2013-current)
Dr. Xiaoye Qin (2015-2017), now at Qorvo

Staff

David Stimson Richard Mills
Tommy Bennett

Teaching Experience

Courses Developed/Taught

Quantum Mechanics for Materials Scientists (UTD MSEN 6319)
Introduction to Nanoscience and technology (UTD NANO 3301)
Characterization and Nanotech Instrumentation (UTD NANO 3302)
Introduction to Materials Science (UTD MSEN 5100)
Electronic, Optical and Magnetic Materials (UTD EE/MSEN 6324)
Fundamentals of Surface and Thin Film Analysis (UTD MSEN 5360)
Materials Characterization (UNT)
Quantum Mechanics for Materials Scientists (UNT)
Diffraction Science (UNT)
Silicon Surface Chemistry and Physics (at Texas Instruments)

Course Descriptions- UTD

MSEN 5100 *Introduction to Materials Science* (3 semester hours) The basic concepts of physics and chemistry that a materials scientist needs to understand internal interactions within materials. Cross listed with PHYS 5376.

MSEN 5360 *Materials Characterization* (3 semester hours) Survey of atomic and structural analysis techniques as applied to surface and bulk materials. Physical processes involved in the interaction of ions, electrons and photons with solids; characteristics of the emergent radiation in relation to the structure and composition.

MSEN 6319 *Quantum Mechanics for Materials Scientists* (2 semester hours) Quantum-mechanical foundation for study of nanometer-scale materials. Principles of quantum physics, stationary-states for one-dimensional potentials, symmetry considerations, perturbation theory interaction with the electromagnetic radiation, scattering, spectroscopy, chemical bonding and molecular orbital theory, solids.

MSEN 6324 *Electronic, Optical and Magnetic Materials* (3 semester hours) Principles of selection, preparation, and characterization of electronic materials with emphasis on semiconductors. Fundamentals of crystallography and crystal growth. Defect and impurity control. Thermodynamics and phase equilibria as applied to semiconductor processing. Preparation and properties of epitaxial and heteroepitaxial structures. Advanced techniques for structural, chemical and electrical characterization of electronic materials. Prerequisite: EE 6320 or equivalent. (3-0) T Cross listed with EE 6324.

MSEN 6362 *Diffraction Science* (3 Semester Hours) Diffraction theory; scattering and diffraction experiments; kinematic theory; dynamical theory; x-ray topography; crystal structure analysis; disordered crystals; quasi-crystals.

NANO 3302 *Characterization and Nanotech Instrumentation* (3 semester hours) Introduction to the techniques and methods common to the field of nanotechnology. Topics include Raman and UV-vis-NIR spectroscopy, surface spectroscopy, SEM, AFM, sputtering and evaporation coating, and handling nanomaterials for analysis. The course will cover basic methods for NEMS and other nanostructure fabrication such as deposition, oxidation, etching, implanting.

NANO 3301 *Introduction to Nanoscience and Nanotechnology* (3 semester hours) Introduction to the underlying principles and applications of the emerging field of Nanotechnology and Nanoscience. Intended for a multidisciplinary audience with a variety of backgrounds. Introduces tools and principles relevant at the nanoscale dimension. Discusses current and future nanotechnology applications in engineering, materials, physics, chemistry, biology, electronics, and energy.

Course Descriptions (UNT)

MTSC 5500 *Electronic, Optical and Magnetic Materials* An intensive study of the properties of electronic, optical and magnetic materials. Electrical and Thermal conduction, elementary quantum physics, bonding, band theory, semiconductors, dielectrics, magnetic properties, superconductivity, optical properties

MTSC 5610 *Fundamentals of Surface and Thin Film Analysis* Survey of materials characterization techniques; optical microscopy; Rutherford backscattering; secondary ion mass spectroscopy; ion channeling; scanning tunneling and transmission microscopy; x-ray spectroscopy; surface properties. Prerequisites: MTSC 5600

MTSC 6000 *Quantum Mechanics for Materials Scientists* The Schrödinger equation, atomic theory, solid state theory, band structure, tunneling, and scattering with an emphasis on materials properties. Prerequisites: MTSC 5500

MTSC 6610 *Diffraction Science* Diffraction theory; scattering and diffraction experiments; kinematic theory; dynamical theory; x-ray topography; crystal structure analysis; disordered crystals; quasi-crystals

(Note: “MTSC” = Materials Science)

The following are all graduate level courses at the University of North Texas.

Fall 1999 (UNT)

MTSC 5610, “Fundamentals of Surface and Thin Film Analysis”, developed and taught the course. This was the first time that the course was offered at UNT. – 8 students

MTSC 6940 – Ph.D. Research – 1 student

Spring 2000 (UNT)

MTSC 5500, “Electronic and Optical Materials”, developed and taught the course at UNT. – 16 students

MTSC 6940 – Ph.D. Research – 1 student

Spring 2001 (UNT)

MTSC 6610, “Diffraction Theory”, developed and taught the course as a Special Problems class at UNT. – 1 student

MTSC 6900 - Special Problems – 1 students

MTSC 6940 – Ph.D. Research – 1 student

MTSC 6950 – Ph. D. Dissertation – 1 student

Summer 2001 (UNT)

MTSC 6940 – Ph.D. Research – 2 students

MTSC 6950 – Ph. D. Dissertation – 1 student

Fall 2001 (UNT)

MTSC 5500 - “Electronic, Optical and Magnetic Materials” – 22 students

MTSC 5920 - Problems in Lieu of Thesis – 1 student

MTSC 6900 - Special Problems – 2 students

MTSC 6940 – Ph.D. Research – 1 student

MTSC 6950 – Ph. D. Dissertation – 1 student

Spring 2002 (UNT)

MTSC 5610 – “Surface and Thin Film Analysis” (w/ B. Gnade) – 13 students

MTSC 5920 - Problems in Lieu of Thesis – 1 student

MTSC 6940 – Research – 2 students
MTSC 6950 – Ph. D. Dissertation – 1 student

Summer 2002 (UNT)

MTSC 6940 – Ph.D. Research – 3 students
MTSC 5830 – Ph. D. Co-op – 1 student
MTSC 2900 – Undergraduate TAMS – 2 students

Fall 2002 (UNT)

MTSC 6000 – “Quantum Mechanics for Materials Scientists” (Taught as Special Problems – MTSC 5900)
– 2 students (New course offering)
MTSC 6940 – Ph.D. Research – 3 students

Spring 2003 (UNT)

MTSC 5500 – “Electronic, Optical and Magnetic Materials” – 14 students
(2 sections: offered at UNT (5500.006 - 33 credit hrs) and TI (5500.016 – 9 credit hrs))
MTSC 6940 – Research – 3 students (15 credit hrs)
MTSC 2900 – Undergraduate Research – 1 student (2 credit hrs)

Summer 2003 (UNT)

MTSC 6940 – Ph.D. Research – 2 students
MTSC 5920 - Problems in Lieu of Thesis – 1 student

Dissertations/Thesis Supervised (UNT)

August 2002: Mr. Manuel-Quevedo Lopez – Ph.D. Materials Science and Engineering - Major Professor
**MATERIALS PROPERTIES OF HAFNIUM AND ZIRCONIUM SILICATES:
METAL INTERDIFFUSION AND DOPANT PENETRATION STUDIES**

August 2002: Ms. Danni Su – M.S. Materials Science and Engineering - Major Professor
Problem In-lieu of Thesis
**LITHOGRAPHY OF METAL-OXIDE-SEMICONDUCTOR STRUCTURES WITH HIGH-k
MATERIALS**

August 2003: Mr. Chun Yao – M.S. Materials Science and Engineering – Major Professor
Problem In-lieu of Thesis
POLY-SiGe AND Ru METAL GATE STUDIES WITH HIGH-K GATE DIELECTRICS

August 2004: Ms. Agnieszka Jakubowicz – M.S. Materials Science and Engineering – Co-Major Professor
**INVESTIGATION OF GROWTH KINETICS OF SELF-ASSEMBLING MONOLAYERS BY
MEANS OF CONTACT ANGLE, OPTICAL, ELLIPSOMETRY, ANGLE RESOLVED XPS AND
IR SPECTROSCOPY**

The following are courses at the University of Texas at Dallas.

Spring 2004

EE 8V70-074 - Research in EE – 2 students

Summer 2004

EE 8V70-074 - Research in EE – 3 students

Fall 2004

PHYS 5376.002 - Intro. Materials Sci. – 6 students

EE 7V82.002 - Intro. Materials Sci. – 7 students

PHYS 8V70.077 - Research in Mat. Sci. – 1 student

EE 8V70-074 - Research in EE – 2 students

Spring 2005

EE 6324.501 – Electronic Materials – 15 students

PHYS 8V70.077 - Research in Mat. Sci. – 1 student

EE 8V70-074 - Research in EE – 3 students

Summer 2005

EE 8V70-074 - Research in EE – 3 students

PHYS 8V70.077 - Research in Mat. Sci. – 2 student

Fall 2005

PHYS 4V10.016 - Research in Mat. Sci. – 1 student

PHYS 8V70.077 - Research in Mat. Sci. – 1 student

EE 8V70.074 - Research in EE – 3 students

EE E8V98.074 - Research in EE, Thesis – 1 student

EE E8V99.074 - Research in EE, Dissertation – 2 students

Spring 2006

EE 6324.501 – Electronic Materials – 9 students

EE 8V70-074 - Research in EE – 3 students

EE E8V98.074 - Thesis – 1 student

EE E8V99.074 - Dissertation – 2 students

PHYS 4V10.011 - Research in Mat. Sci. – 1 student

PHYS 4399.001 – Senior Honors in Physics – 1 student

PHYS 8V70.077 - Research in Mat. Sci. – 1 student

Summer 2006

EE 8V70-074 - Research in EE – 1 student

PHYS 8V70.077 - Research in Mat. Sci. – 3 students

Fall 2006

MSEN 5360.001 - Materials Characterization – 17 students

EE 8V70-074 - Research in EE – 1 student

PHYS 5100.077 - Problems in Mat. Sci. – 1 student

PHYS 8V70.077 - Research in Mat. Sci. – 2 students

Spring 2007

MSEN 6324.001 – Electronic Materials – 14 students

EE 8V70-074 - Research in EE – 2 students

PHYS 8V70.077 - Research in Mat. Sci. – 3 students

Summer 2007

EE 8V70-074 - Research in EE – 1 student
PHYS 8V70.077 - Research in Mat. Sci. – 2 students
EE 8V98.074 – Masters Thesis in EE – 1 student

Fall 2007

MSEN 6324.001 – Electronic Materials – 14 students
MSEN 8V70-074 - Research in MSEN – 1 student
EE 8V70-074 - Research in EE – 1 student
PHYS 5100.077 - Problems in Mat. Sci. – 2 students
PHYS 8V70.077 - Research in Mat. Sci. – 2 students

Spring 2007

MSEN 6324.001 – Electronic Materials – 10 students
EE 63204.01 - Electronic Materials – 4 students
MSEN 8V70-074 - Research in MSEN – 1 student
PHYS 8V70-077 - Research In Materials Science – 3 students

Summer 2007

EE 8V70-074 - Research in EE – 2 students
PHYS 8V70.077 - Studies in Solid State Microelectronics. – 2 students
EE 8V98.074 – Masters Thesis in EE – 1 student
MSEN 8V70-074 - Research in MSEN – 1 student

Fall 2007

MSEN 6324.001 – Electronic Materials – 11 students
EE 63204.01 - Electronic Materials – 3 students
MSEN 8V70-074 - Research in MSEN – 1 student
EE 8V70-074 - Research in EE – 1 student
PHYS 8V70-077 - Research In Materials Science – 2 students
PHYS 5100.077 - Problems in Mat. Sci. – 2 students

Spring 2008

MSEN 5360.001 - Materials Characterization – 17 students
MSEN 8V70-074 - Research in MSEN – 2 student
EE 8V70-074 - Research in EE – 1 student
EE 8V98.074 – Masters Thesis in EE – 1 student
PHYS 8V70.077 - Research in Mat. Sci. – 2 students

Summer 2008

PHYS 8V70.077 - Research in MSEN. – 3 students
MSEN 8V70-074 - Research in MSEN – 2 student

Fall 2008

MSEN 6324.001 – Electronic Materials – 13 students
EE 63204.01 - Electronic Materials – 1 students
MSEN 8V70-074 - Research in MSEN – 1 student
MSEN 8V70-274 - Research in MSEN – 1 student
EE -8V98-074 – Thesis – 1 student
PHYS-5V49-077 - Special Topics In Physics – 1 student

Spring 2009

PHYS.8399.077 - DISSERTATION – 1 student
PHYS.8V70.077 - RESEARCH IN MATERIALS SCIENCE – 1 student
MSEN.8V70.074 - RESEARCH IN MSEN – 2 students
MSEN.5360.001 - MATERIALS CHARACTERIZATION – 17 students

Summer 2009

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students

Fall 2009

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students

NANO.3302001 – CHAR. NANOTECH. INSTRUMENTATION – 2 students

Spring 2010

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students

MSEN.8V99.074 – DISSERTATION – 1 student

NANO 3301.001 – INTRO. NANOSCIENCE/NANOTECHNOLOGY – 13 Students

NANO 4V95.001 – UNDERGRAD RESEARCH IN NANOTECH – 1 student

Summer 2010

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students

MSEN.8V99.074 – DISSERTATION – 1 student

PHYS.8V70.077 - RESEARCH IN MATERIALS SCIENCE – 1 student

PHYS.4390.001 – SENIOR RESEARCH AND ADVANCED WRITING – 1 Student

Fall 2010

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students

MSEN 5361.001 – FUNDAMENTALS OF THIN FILM ANALYSIS – 7 students

PHYS.8V70.077 - RESEARCH IN MATERIALS SCIENCE – 1 student

NANO 4V95.001 - UNDERGRAD RESEARCH IN MAT. SCI. - 1 student

PHYS 4V10.004 - UNDERGRAD SPECIAL TOPIC – 1 student

Spring 2011

EE.4V97.006 – INDEPENDENT STUDY IN ELECTRICAL ENGINEERING – 1 student

EE.4V98.002 – RESEARCH IN ELECTRICAL ENGINEERING – 1 student

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students

NANO 3301.001 – INTRO. NANOSCIENCE/NANOTECHNOLOGY. – 6 Students

PHYS 4V10.106 - UNDERGRAD SPECIAL TOPIC – 1 student

PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student

Summer 2011

MSEN.8V70.074 - RESEARCH IN MSEN – 1 student

MSEN.8V99.074 – DISSERTATION – 1 student

PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student

Fall 2011

MSEN.8V70.074 - RESEARCH IN MSEN – 1 student

PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student

MSEN 5361.001 – FUNDAMENTALS OF THIN FILM ANALYSIS – 4 students

PHYS.4390.077 – SENIOR RESEARCH AND ADVANCED WRITING – 1 Student

Spring 2012

NANO 3301.001 – INTRO. NANOSCIENCE/NANOTECHNOLOGY – 14 Students

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students

PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student

Summer 2012

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students

PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student

Fall 2012

MSEN 6362.001 – DIFFRACTION SCIENCE – 7 students
MSEN.8V70.074 - RESEARCH IN MSEN – 2 students
PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student
PHYS.8399.077 – DISSERTATION – 1 student
NANO.4V95.002 – UNDERGRAD RESEARCH IN NANOTECHNOLOGY – 1 student

Spring 2013

MSEN.8V70.074 - RESEARCH IN MSEN – 4 students
PHYS.8V70.077 - RESEARCH IN MATERIALS PHYSICS – 1 student

Summer 2013

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students
MSEN.8V99.074 - DISSERTATION – 1 student

Fall 2013 (On Sabbatical)

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students

Spring 2014 (On Sabbatical)

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students

Summer 2014 (On Sabbatical)

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students

Fall 2014

MSEN.8V99.074 - DISSERTATION – 1 student
MSEN.8V70.074 - RESEARCH IN MSEN – 3 students
NANO 3302.501 – MICROSCOPY, SPECTROSCOPY, AND NANOTECHNOLOGY
INSTRUMENTATION – 10 Students
PHYS 4V10.077 - UNDERGRAD SPECIAL TOPIC IN PHYSICS – 1 student

Spring 2015

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students
PHYS 4V10.077 - UNDERGRAD SPECIAL TOPIC IN PHYSICS – 1 student
BMEN 4V97.013 - IND STUDY IN BIOMEDICAL ENGINEERING -1 student
MSEN 6319.001 – QUANTUM MECHANICS FOR MATERIALS SCIENTISTS – 21 students

Summer 2015

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students

Fall 2015

NANO 3302.501 – MICROSCOPY, SPECTROSCOPY, AND NANOTECHNOLOGY
INSTRUMENTATION – 10 Students
MSEN.8V70.074 - RESEARCH IN MSEN – 3 students
PHYS.4390.077 – SENIOR RESEARCH – 1 Student

Spring 2016

MSEN.8V70.074 - RESEARCH IN MSEN – 3 students
MSEN 6319.001 – QUANTUM MECHANICS FOR MATERIALS SCIENTISTS – 16 students

Fall 2016

MSEN.8V70.074 - RESEARCH IN MSEN – 2 students
MSEN.8V99.074 - DISSERTATION – 2 students
MSEN 6319.001 – QUANTUM MECHANICS FOR MATERIALS SCIENTISTS – 14 students
PHYS.4390.077 – SENIOR RESEARCH – 1 Student

Spring 2017

NANO 3302.501 – MICROSCOPY, SPECTROSCOPY, AND NANOTECHNOLOGY
INSTRUMENTATION – 5 Students
MSEN.8V70.074 - RESEARCH IN MSEN – 2 students
MSEN.8V99.074 - DISSERTATION – 1 students

Dissertations/Thesis Supervised (UTD)

DOCTORATE

- 1) May 2006: Mr. Penghui Zhao – Ph.D. Materials Science and Engineering – Major Professor
THE WORK FUNCTION ENGINEERING AND THERMAL STABILITY OF NOVEL METAL GATE ELECTRODES FOR ADVANCED CMOS DEVICES
- 2) May 2006: Mr. Prasanna Sivasubramani – Ph.D. Materials Science and Engineering – Major Professor
MATERIALS PROPERTIES AND THERMAL STABILITY OF HAFNIUM AND LANTHANUM BASED HIGH-K GATE DIELECTRICS FOR MOSFET DIGITAL LOGIC
- 3) May 2009: Mr. Tao Zheng – Ph.D. Materials Science and Engineering – Co-Major Professor (with B. Gnade)
PATTERNING AND ELECTRICAL CHARACTERIZATION OF SINGLE GRAIN METAL GATE MOS CAPACITORS
- 4) March 2009: Mr. Srinivas Gowrisanker – Ph.D. Physics – Co-Major Professor (with B. Gnade)
ORGANIC THIN-FILM TRANSISTORS: CHARACTERIZATION AND INTEGRATION ON LOW TEMPERATURE SUBSTRATES FOR FLEXIBLE ELECTRONICS
- 5) January 2010: Mr. Yuming Ai – Ph.D. Electrical Engineering – Co-Major Professor (with B. Gnade)
DESIGN AND FABRICATION OF ORGANIC SEMICONDUCTOR DEVICES AND INTEGRATED CIRCUITS FOR RF APPLICATIONS
- 6) July 2010: Mr. Marko Milojevic – Ph.D. Materials Science and Engineering – Major Professor
CONTROLLING INTERFACE CHEMISTRY OF HIGH MOBILITY SUBSTRATES THROUGH PASSIVATION LAYERS AND ATOMIC LAYER DEPOSITION
- 7) August 2011: Mr. Adam Pirkle – Ph.D. Materials Science and Engineering – Major Professor
STUDIES OF DIELECTRICS ON GRAPHITE AND LARGE-AREA GRAPHENE
- 8) October 2011: Mr. Brian Coss – Ph.D. Materials Science and Engineering – Co-Major Professor (with Jiyoung Kim)
DIELECTRIC DIPOLE MITIGATED SCHOTTKY BARRIER HEIGHT TUNING FOR CONTACT RESISTANCE REDUCTION
- 9) May 2013: Mr. Dmitry Zhernokletov – Ph.D. Physics – Major Professor
SURFACE AND INTERFACE CHARACTERIZATION OF HIGH-K DIELECTRIC MATERIALS ON III-Sb SEMICONDUCTOR SUBSTRATES
- 10) July 2013: Mr. Hong Dong – Ph.D. Materials Science and Engineering – Major Professor
THE SURFACE AND INTERFACE CHARACTERIZATION OF HIGH-K DIELECTRICS ON INDIUM PHOSPHIDE AND GALLIUM PHOSPHIDE

- 11) October 2014: Mr. Xiaoye Qin – Ph.D. Materials Science and Engineering – Major Professor
INTERFACE STUDY OF HIGH K DIELECTRIC ON ALUMINIUM GALLIUM NITRIDE/GALLIUM NITRIDE HETEROSTRUCTURE
- 12) October 2016: Ms. Angelica Azcatl – Ph.D. Materials Science and Engineering – Major Professor
SURFACE ENGINEERING OF TRANSITION METAL DICHALCOGENIDES FOR TWO-DIMENSIONAL ELECTRONIC DEVICE APPLICATIONS

MASTERS

May 2006: Mr. Sheril Satija – M.S. Electrical Engineering – Major Professor
HYDROGEN BARRIERS FOR FERROELECTRIC MEMORIES

May 2008: Mr. Amar Chowdhury – M.S. Electrical Engineering – Major Professor
ALUMINUM OXIDE AND SILICON NITRIDE AS HYDROGEN BARRIERS FOR FERROELECTRIC MEMORY DEVICES

December 2008: Mr. Miles Selvidge – M.S. Electrical Engineering – Major Professor
THERMAL STABILITY STUDY OF HAFNIUM-BASED METAL GATE STACKS

BACHELORS

May 2006: Ms. Courtney Mathews – B.S. Physics (Honors Thesis) – Major Professor
HYDROGEN DIFFUSION THROUGH BARRIER LAYERS ON FERROELECTRIC MEMORY DEVICES (Also received non-thesis M.S. Physics May 2007)

Publications

Total Peer-Reviewed Publication Citations and Impact Indices (as of September 2017):

Thompson's Science Citation Index: <http://www.researcherid.com/rid/A-5283-2008>Scopus: <http://www.scopus.com/authid/detail.url?authorId=56544754700>

Google Scholar (includes Patents and other publications):

<http://scholar.google.com/citations?user=zyDcuY0AAAAJ&hl=en>

Total Peer Reviewed Publications	Senior author publications						
369	188						
<i>Journal Articles (peer reviewed)</i>	<i>Reviews</i>	<i>Book Chapters</i>	<i>Books</i>	<i>Conference publications (peer reviewed)</i>	<i>Other</i>	<i>US Patents Issued</i>	
						<i>Number</i>	<i>Citations</i>
295	5	9	0	74	12	45	>2300
Publications	Current			Last 5 years			
Database	Citations	<i>h-index</i>	<i>i-10</i>	Citations	<i>h-index</i>	<i>i-10</i>	
Thomson SCI	>18400	56	175				
Scopus	>19700	58	178	>10800			
Google Scholar	>28500	72	259	>14700	56	175	

Top 5 cited Author/Co-author papers (Google Scholar)

Title/Citation	# Cites	Year
High- κ gate dielectrics: Current status and materials properties considerations GD Wilk, RM Wallace, JM Anthony <i>Journal of Applied Physics</i> 89 (10), 5243-5275	>6200	2001
Carbon-based supercapacitors produced by activation of graphene Y Zhu, S Murali, MD Stoller, KJ Ganesh, W Cai, PJ Ferreira, A Pirkle, RM Wallace, KA Cychosz, M Thommes, D Su, EA Stach, RS Ruoff <i>Science</i> 332 (6037), 1537-1541	>3000	2011
Hafnium and zirconium silicates for advanced gate dielectrics GD Wilk, RM Wallace, JM Anthony <i>Journal of Applied Physics</i> 87 (1), 484-492	1210	2000
Electrical properties of hafnium silicate gate dielectrics deposited directly on silicon GD Wilk, RM Wallace <i>Applied Physics Letters</i> 74 (19), 2854-2856	686	1999
The effect of chemical residues on the physical and electrical properties of chemical vapor deposited graphene transferred to SiO ₂ A Pirkle, J Chan, A Venugopal, D Hinojos, CW Magnuson, S McDonnell, L Colombo, EM Vogel, RS Ruoff, RM Wallace <i>Applied Physics Letters</i> 99 (12), 122108	527	2011

Top 5 cited Author/Co-author papers – Last 5 years (Google Scholar)

Title/Citation	# Cites	Year
Near-unity photoluminescence quantum yield in MoS ₂ SM. Amani, D.-H. Lien, D. Kiriya, J. Xiao, A. Azcatl, J. Noh, S. R. Madhvapathy, R. Addou, Santosh KC, M. Dubey, K. Cho, R. M. Wallace, S.-C. Lee, J.-H. He, J. W. Ager III, X. Zhang, E. Yablonovitch, and A. Javey <i>Science</i> 350 (6264), 1065-1068 (2015).	198	2015
Defect-dominated doping and contact resistance in MoS ₂ S McDonnell, R Addou, C Buie, RM Wallace, CL Hinkle <i>ACS Nano</i> 8 (3), 2880-2888	261	2014
S. Chuang, C. Battaglia, A. Azcatl, S. McDonnell, J.S. Kang, X. Yin, M. Tosun, R. Kapadia, H. Fang, R. M. Wallace, and A. Javey, “MoS ₂ P-type Transistors and Diodes Enabled by High Workfunction MoO _x Contacts,” <i>NanoLetters</i> , 14, 1337 (2014).	211	2014
The unusual mechanism of partial Fermi level pinning at metal–MoS ₂ interfaces C Gong, L Colombo, RM Wallace, K Cho <i>Nano Letters</i> 14 (4), 1714-1720	186	2014
Band alignment of two-dimensional transition metal dichalcogenides: Application in tunnel field effect transistors C Gong, H Zhang, W Wang, L Colombo, RM Wallace, K Cho <i>Applied Physics Letters</i> 103 (5), 053513	210	2013

Selected Recent Breaking Research Author/Co-author papers – (Google Scholar)

Title/Citation	# Cites	Year
H. Zhu, Q. Wang, C. Zhang, R. Addou, K. Cho, R. M. Wallace and M. J. Kim, "New Mo ₆ Te ₆ Subnanometer-diameter Nanowire Phase from 2H-MoTe ₂ ", <i>Advanced Materials</i> , in press (2017).	1	2017
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 and R. M. Wallace, “Covalent Nitrogen Doping and Compressive Strain in MoS ₂ by Remote N ₂ Plasma Exposure,” <i>Nano Letters</i> , 16, 5473	24	2016
Z. Al Balushi, K. Wang, R. K Ghosh, R.I Vilá, S. Eichfeld, J. Caldwell, X. Qin, Y.-C. Lin, P. DeSario, G. Stone, S. Subramanian, D. Paul, R. M. Wallace, S. Datta, J. Redwing, “Two-dimensional gallium nitride realized via graphene encapsulation,” <i>Nature Materials</i> , 15, 1156	46	2016
J. Robertson and R.M.Wallace, “High-K materials and metal gates for CMOS applications,” <i>Materials Science and Engineering R</i> , 88, 1-41.	130	2015
“Near-unity photoluminescence quantum yield in MoS ₂ ,” M. Amani, D.-H. Lien, D. Kiriya, J. Xiao, A. Azcatl, J. Noh, S. R. Madhvapathy, R. Addou, Santosh KC, M. Dubey, K. Cho, R. M. Wallace, S.-C. Lee, J.-H. He, J. W. Ager III, X. Zhang, E. Yablonovitch, and A. Javey <i>Science</i> 350 (6264), 1065-1068 (2015).	198	2015

Atomically Thin Resonant Tunnel Diodes built from Synthetic van der Waals Heterostructures YC Lin, RK Ghosh, R Addou, N Lu, SM Eichfeld, H Zhu, MY Li, X Peng, MJ Kim, L-J Li, RM Wallace, S Datta, JA Robinson <i>Nature Communications</i> 6 , 7311	97	2015
Impurities and electronic property variations of natural MoS ₂ crystal surfaces R Addou, S McDonnell, D Barrera, Z Guo, A Azcatl, J Wang, H Zhu, Christopher L Hinkle, Manuel Quevedo-Lopez, Husam N Alshareef, Luigi Colombo, Julia WP Hsu, Robert M Wallace <i>ACS Nano</i> 9 (9), 9124-9133	73	2015
Defect-dominated doping and contact resistance in MoS ₂ S McDonnell, R Addou, C Buie, RM Wallace, CL Hinkle <i>ACS Nano</i> 8 (3), 2880-2888	261	2014
MoS ₂ p-Type Transistors and Diodes Enabled by High Work Function MoO _x Contacts S Chuang, C Battaglia, A Azcatl, S McDonnell, JS Kang, X Yin, M Tosun, R Kapadia, H Fang, RM Wallace, A Javey <i>Nano Letters</i> 14 (3), 1337-1342	211	2014
The unusual mechanism of partial Fermi level pinning at metal–MoS ₂ interfaces C Gong, L Colombo, RM Wallace, K Cho <i>Nano Letters</i> 14 (4), 1714-1720	186	2014
MoS ₂ Functionalization for Ultra-thin Atomic Layer Deposited Dielectrics A. Azcatl, S. McDonnell, Santosh KC, X. Peng, H. Dong, X. Qin, R. Addou, G. I. Mordi, N. Lu, J. Kim, M. J. Kim, K. Cho, and R. M. Wallace <i>Applied Physics Letters</i> , 104 , 111601 (2014).	69	2014

Publications (Peer Reviewed Journals) – R.M.Wallace

2017

295. R. Yue, Y. Nie, L. Walsh, R. Addou, C. Liang, N. Lu, A. Barton, H. Zhu, Z. Che, D. Barrera, L. Cheng, P-R. Cha, Y. Chabal, J. Hsu, J. Kim, M. Kim, L. Colombo, R. M. Wallace, K. Cho, and C. Hinkle, "Nucleation and growth of WSe₂: Enabling large grain transition metal dichalcogenides," *2D Materials*, in press (2017).

294. L. Cheng, J. Lee, H. Zhu, A.V. Ravichandran, Q. Wang, A. Lucero, M. Kim, R.M. Wallace, L. Colombo, and J. Kim, "Sub-10 Nanometer Tunable Hybrid Dielectric Engineering on MoS₂ for Two-Dimensional Material-Based Devices," in press, *ACS Nano* (2017).

293. A. Azcatl, Q. Wang, M.J. Kim and **R.M. Wallace**, "Al₂O₃ on WSe₂ by Ozone based Atomic Layer Deposition: Nucleation and Interface Study," *APL Materials*, **5**, 086108 (2017).

292. P. Bolshakov, P. Zhao, A. Azcatl, P. K. Hurley, **R. M. Wallace**, C. D. Young, "Improvement in Top-Gate MoS₂ Transistor Performance due to High Quality Backside Al₂O₃ Layer," *Applied Physics Letters*, **111**, 032110 (2017).

291. P. Zhao, A. Azcatl, Y. Y. Gomeniuk, P. Bolshakov, M. Schmidt, S. J. McDonnell, C. L. Hinkle, P. K. Hurley, **R. M. Wallace**, and C. D. Young,
“Probing Interface Defects in Top-Gated MoS₂ Transistors with Impedance Spectroscopy,”
ACS Applied Materials and Interfaces, **9**(28), 24348 (2017).
290. Santosh KC, R.C. Longo, **R.M. Wallace**, and K.Cho,
“Computational Study of MoS₂/HfO₂ Defective Interfaces for Nanometer-Scale Electronics,”
ACS Omega, **2**, 2827 (2017).
289. Y. Nie, C. Liang, P.-R. Cha, L. Colombo, **R. M. Wallace**, K. Cho,
“A kinetic Monte Carlo simulation method of van der Waals epitaxy for atomistic nucleation-growth processes of transition metal dichalcogenides,”
Scientific Reports, **7**, 2977 (2017).
288. A. Ismach, H. Chou, P. Mende, A. Dolocan, R. Addou, S. Aloni, **R.M. Wallace**, R. Feenstra, R. Ruoff, L. Colombo,
“Carbon-Assisted Chemical Vapor Deposition of Hexagonal Boron Nitride,”
2D Materials, **4**, 025117 (2017).
287. P. Bolshakov, P. Zhao, A. Azcatla, P. K. Hurley, **R. M. Wallace**, C.D. Young,
“Electrical characterization of top-gated molybdenum disulfide field-effect-transistors with high-k dielectrics,”
Microelectronic Materials, **179**, 190 (2017).
286. C. Smyth, R. Addou, S. McDonnell, C. Hinkle, **R.M. Wallace**,
“WSe₂-Contact Metal Interface Chemistry and Band Alignment under High Vacuum and Ultra High Vacuum Deposition Conditions,”
2D Materials, 025284 (2017)
285. X. Qin, W.-E. Wang, R. Droopad, M.S.Rodder, **R.M.Wallace**,
“A crystalline oxide passivation on In_{0.53}Ga_{0.47}As(100),”
Journal of Applied Physics, **121**, 125302 (2017).
284. R.C. Longo, R. Addou, Santosh KC, J.-Y. Noh, C.M. Smyth, D. Barrera, C. Chang, J. W.P. Hsu, **R.M.Wallace**, K. Cho,
“Intrinsic air stability mechanisms of two-dimensional transition metal dichalcogenide surfaces: basal versus edge oxidation,”
2D Materials, **4**, 025050 (2017).
283. L. Walsh, R. Yue, Q. Wang, A. Barton, R. Addou, C. M. Smyth, Christopher; H. Zhu, J. Kim, L. Colombo, M. J. Kim, **R.M. Wallace**, C. L. Hinkle,
“WTe₂ thin films grown by beam-interrupted molecular beam epitaxy,”
2D Materials, **4**, 025044 (2017).
282. C. Gong, C. Zhang, Y. J. Oh, W. Wang, G. Lee, B. Shan, **R. M Wallace** and K. Cho,
“Electronic transport across metal-graphene edge contact,”
2D Materials **4**, 025033 (2017).
281. T.J. Park, Y.-C. Byun, **R. M. Wallace**, and J. Kim,
“Impurity and silicate formation dependence on O₃ pulse time and the growth temperature in atomic-layer-deposited La₂O₃ thin films,”
Journal of Chemical Physics **146**, 052821 (2017).
280. P. Zhao, A. Azcatl, P. Bolshakov, J. Moon, and C. L. Hinkle, P. K. Hurley, **R. M. Wallace**, and C. D. Young,
“Effects of annealing on top-gated MoS₂ transistors with HfO₂ dielectric,”

Journal of Vacuum Science and Technology B, **35**, 01A118 (2017).

279. H. Zhu, Q. Wang, C. Zhang, R. Addou, K. Cho, **R. M. Wallace** and M. J. Kim,
“New Mo₆Te₆ Subnanometer-diameter Nanowire Phase from 2H-MoTe₂,”
Advanced Materials, 1606264 (2017).

278. K-A. Min, J. Park, **R. M. Wallace**, K. Cho, S. Hong,
“Reduction of Fermi level pinning at Au-MoS₂ interfaces by atomic passivation on Au surface,”
2D Materials **4**, 015019 (2017).

277. C.Zhang, C.Gong, Y.Nie, K.A. Min, C.Liang, Y.J.Oh, H.Zhang, W.Wang, S.Hong, L.Colombo,
R.M.Wallace, K.Cho,
“Systematic Study of Electronic Structure and Band Alignment of Monolayer Transition Metal
Dichalcogenides in Van der Waals Heterostructures,”
2D Materials, **4**, 015026 (2017).

2016

276. A. T. Lucero, Y-C. Byun, X. Qin, L. Cheng, H. Kim, **R. M. Wallace**, and J. Kim,
“Formation of a ZnO/ZnS interface passivation layer on (NH₄)₂S treated In_{0.53}Ga_{0.47}As: Electrical and
in-situ X-ray photoelectron spectroscopy characterization,”
Japanese Journal of Applied Physics, **55**, 08PC02 (2016).

275. L. Bjaalie, A. Azcatl, S. McDonnell, C. R. Freeeze, S. Stemmer, **R. M. Wallace**, and C. G. Van
de Walle,
“Band alignments between SmTiO₃, GdTiO₃, and SrTiO₃,”
Journal of Vacuum Science and Technology A, **34**, 061102 (2016).

274. S. J. McDonnell and **R.M.Wallace**,
“Atomically-Thin Layered Films for Device Applications based upon 2D TMDC Materials,”
Thin Solid Films (Invited Review), **616**, 482 (2016).

273. R. Addou and **R.M.Wallace**,
“Surface Analysis of WSe₂ Crystals: Spatial and Electronic Variability,”
ACS Applied Materials and Interfaces, **8** (39), 26400 (2016).

272. Santosh KC , R. Longo , R. Addou , **R. M. Wallace**, K. Cho,
“Electronic properties of MoS₂ / MoO_x interfaces: Implications in Tunnel Field Effect Transistors and
Hole Contacts,”
Nature Scientific Reports, **6**, 33562 (2016).

271. Z. Y. Al Balushi, K. Wang, R. K Ghosh , R.A. Vilá , S. M. Eichfeld , J. D. Caldwell , X. Qin ,
Y.-C. Lin , P. A. DeSario , G. Stone , S. Subramanian , D. F. Paul , R. M. Wallace , S. Datta , J. M.
Redwing, J. A. Robinson,
“Two-dimensional gallium nitride realized via graphene encapsulation,”
Nature Materials, **15**, 1166-1171 (2016).

270. J. Bullock, D. Kiriya, N. Grant, A. Azcatl, M. Hettick, T. Kho, P. Phang, H. C. Sio, D. Yan, D.
Macdonald, M. A. Quevedo-Lopez, **R. M. Wallace**, A. Cuevas, A. Javey,
“Super acid passivation of crystalline silicon surfaces,”
ACS Applied Materials and Interfaces, **8** (36), 24205 (2016).

269. C. Zhang, Santosh KC, Y.Nie, C. Liang, W.G. Vandenberghe, R. C. Longo, Y. Zheng, F. Kong,
S. Hong, **R. M. Wallace**, and K. Cho,

- “Charge Mediated Reversible Metal–Insulator Transition in Monolayer MoTe₂ and W_xMo_{1-x}Te₂ Alloy,”
ACS Nano, **10** (8), 7370 (2016).
268. 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 and **R. M. Wallace**,
“Covalent Nitrogen Doping and Compressive Strain in MoS₂ by Remote N₂ Plasma Exposure,”
Nano Letters, **16** (9), 5437 (2016).
267. X. Qin, W.-E Wang, M. S. Rodder, **R. M. Wallace**,
“In situ surface and interface study of crystalline (3×1)-O on InAs,”
Applied Physics Letters, **109**, 041601 (2016).
266. H. Zhu, X. Qin, L. Cheng, A. Azcatl, J. Kim, and **R. M. Wallace**,
“Remote plasma oxidation and atomic layer etching of MoS₂,”
ACS Applied Materials and Interfaces, **8** (29), 19119 (2016).
265. C. Smyth, R. Addou, S. McDonnell, C. L. Hinkle, **R. M. Wallace**,
“Contact Metal-MoS₂ Interfacial Reactions and Potential Implications on MoS₂-based Device Performance,”
Journal of Physical Chemistry C, **120** (27), 14719 (2016).
264. Y. Nie, C. Liang, K. Zhang, R. Zhao, S. Eichfeld, P-R. Cha, L. Colombo, J. Robinson, **R. M. Wallace**, K. Cho,
“First Principles Kinetic Monte Carlo Study on the Growth Patterns of WSe₂ Monolayer,”
2D Materials, **3**, 025029 (2016).
263. Y-C. Lin, J. Li, S. C. de La Barrera, S. M. Eichfeld, Y. Nie, R. Addou, P. C. Mende, **R. M. Wallace**, K. Cho, R. M. Feenstra, and J. A. Robinson,
“Tuning Electronic Transport in Epitaxial Graphene-based van der Waals Heterostructures,”
Nanoscale, **8**, 8947-8954 (2016).
262. N. Lu, C. Zhang, C-H. Lee, J. P. Oviedo, M. Nguyen, X. Peng, **R. Wallace**, T. Mallouk, J. Robinson, J. Wang, K. Cho, M. Kim,
“Atomic and Electronic Structures of WTe₂ Probed by High Resolution Electron Microscopy and *ab initio* Calculation,”
Journal of Physical Chemistry C, **120** (15), 8364–8369 (2016).
261. M. Amani, R. Addou, G.H. Ahn, D. Kiriya, P. Taheri, D-H. Lien, J. Ager, **R.M. Wallace**, A. Javey,
“Recombination kinetics and effects of superacid treatment in sulfur and selenium based transition metal dichalcogenides,”
Nano Letters, **16** (4), 2786–2791 (2016).
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2017

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201. “Fabrication and Characterization of Large Arrays of Graphene Tunneling Field Effect Transistors (TFETs),” C. M. Corbet, S. McDonnell, S. S. Sonde, B. Fallahazad, S. Larentis, D.Hinojos, R.M. Wallace, E.Tutuc, S.K. Banerjee, Techcon 2013, Sept. 9-10, 2013, Austin, TX
200. “Improved Removal of PMMA Residues from Transferred Graphene by Thermal Annealing in a CO₂ Environment,” C. Gong, H. C. Floresca, D. Hinojos, S. McDonnell, X. Qin), Y.Hao, S.Jandhyala, G. Mordi, J.Kim, L. Colombo, R. S. Ruoff, M.Kim, K.Cho, R.M. Wallace, and Y. J. Chabal , Techcon 2013, Sept. 9-10, 2013, Austin, TX
199. “Diffusion of In_{0.53}Ga_{0.47}As Elements through Hafnium Oxide during Post Deposition Annealing,” W. Cabrera, B. Brennan, H. Dong, Univ. of Texas at Dallas; T.P. O’regan, I.M. Povey, S. Monaghan, E. O’connor, P.K. Hurley, Univ. College Cork; R.M. Wallace, Y.J. Chabal, 13th International Conference on Atomic Layer Deposition, July 28-31, 2013, San Diego, CA*
198. “In-situ Infrared Study of Aluminum Silicate on Chemically-treated InP(100) Using Atomic Layer Deposition,” W. Cabrera, K.B. Ramos, Univ. of Texas at Dallas; I.M. Povey, Univ. College Cork; H. Dong, B. Brennan, R.M. Wallace, Y.J. Chabal, 13th International Conference on Atomic Layer Deposition, July 28-31, 2013, San Diego, CA*
197. “High-k Atomic Layer Deposition on 2-D Materials,” S. McDonnell, A. Azcatl, J. Kim, R.M. Wallace, 13th International Conference on Atomic Layer Deposition, July 28-31, 2013, San Diego, CA*
196. "Patterned Atomic Layer Deposition of TiO₂ on Silicon Surfaces," S. McDonnell, R.C. Longo, O. Seitz, Univ. of Texas at Dallas; J.B. Ballard, G. Mordi, J.F. Veyan, J.H.G. Owen, J.N. Randall, J. Kim, Y.J. Chabal, K.J. Cho, R.M. Wallace, 13th International Conference on Atomic Layer Deposition, July 28-31, 2013, San Diego, CA *
195. “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 ECS Meeting, May 12-17, 2013, Toronto, Canada*

194. “Highly Efficient Thermal Cleaning of Chemical Residues on Transferred Graphene in CO₂ Atmosphere,” C. Gong, D. Hinojos, S. Kim, K. Cho, R. M. Wallace, Y. J. Chabal, 2013 MRS Spring Meeting, April 1-5, 2013, San Francisco, CA, USA*
193. “Electrical and Physical Characterization on the Effect of Post Deposition Treatments on HfO₂ on Epi-ready In_{0.53}Ga_{0.47}As,” W. Cabrera, T. O'Regan, I. M. Povey, B. Brennan, E.O'Connor, S. Monaghan, R. M. Wallace, P.K. Hurley, Y. J. Chabal, 2013 MRS Spring Meeting, April 1-5, 2013, San Francisco, CA, USA*
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191. “A Comparative In situ Study of HfO₂ Growth on Al_{0.25}Ga_{0.75}N by Atomic Layer Deposition, Electron Beam Evaporation and RF Sputtering,” X. Qin, B. Brennan, H. Dong, R. Wallace, 2013 MRS Spring Meeting, April 1-5, 2013, San Francisco, CA, USA*
190. “Atomic Structure and Electronic Transport Properties of Realistic Metal-graphene Contacts,” C. Gong, S. McDonnell, A. Azcatl, W. Wang, G. Lee, D. Hinojos, Bin Shan, Y. J. Chabal, R. M. Wallace, K. Cho, 2013 MRS Spring Meeting, April 1-5, 2013, San Francisco, CA, USA*
189. “Selective TiO₂ Deposition on Oxidized and Hydrogen Passivated Silicon,” S. McDonnell, R.C. Longo, O. Seitz, G. Mordi, J. Kim, Y.J. Chabal, K. Cho, R.M. Wallace, 40th Conference on the Physics and Chemistry of Surfaces and Interfaces, January 20-24, Waikoloa, HI*
188. “Impact of Atomic Hydrogen Exposure on the Growth, Interfacial, and Electrical Characteristics of HfO₂ on Al_{0.25}Ga_{0.75}N,” X. Qin, S. Anwar, B. Brennan, C.L. Hinkle, R.M. Wallace, 40th Conference on the Physics and Chemistry of Surfaces and Interfaces, January 20-24, Waikoloa, HI*
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187. “Achieving Scaled Dielectrics on Graphene Using Atomic Layer Deposition,” S. Jandhyala, G. Mordi, R.M. Wallace, J. Kim, AVS 59th International Symposium, October 28 - November 2, 2012, Tampa, FL, USA*
186. “Increasing Interface Bonding and Tuning Doping Behavior at Metal-Graphene-Metal Sandwich Contact,” C. Gong, R.M. Wallace, K.J. Cho, Y.J. Chabal, AVS 59th International Symposium, October 28 - November 2, 2012, Tampa, FL, USA*
185. “An Investigation into the Origin of Anomalous Frequency Dispersion in Accumulation Capacitance of MOS Devices on III-V Substrates,” R.V. Galatage, D.M. Zhernokletov, H. Dong, B. Brennan, C.L. Hinkle, R.M. Wallace, E.M. Vogel, AVS 59th International Symposium, October 28 - November 2, 2012, Tampa, FL, USA*
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183. “Interface oxide evolution on InP(100) during atomic layer deposition of Al₂O₃ studied by in-situ infrared spectroscopy,” W. Cabrera, B. Brennan, H. Dong, R.M. Wallace, Y. J. Chabal, I. M.Povey AVS 12th International Conference on Atomic Layer Deposition, June 17- 20, 2012, Dresden, Germany*
182. “Reduction of transfer induced residues for CVD graphene systems,” S. McDonnell, A. Pirkle, J. Chan, S. Jandhyala, A. Azcatl, D. Hinojos, G. Mordi, C. W. Magnuson, L. Colombo, E. M. Vogel, R. S. Ruoff, J. Kim and R. M. Wallace, AVS Texas Chapter Conference June 6-7, 2012, Dallas, TX, USA.*

181. "Impact of oxygen on the electronic structure of GaSb(100) surface and GaSb(100)/HfO₂(001) interface," K. Xiong, W. Wang, Santosh KC, R. Longo, R. M. Wallace and Kyeongjae Cho
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180. "Optimizing the transfer process for CVD-grown graphene," S. McDonnell, S. Jandhyala, A. Azcatl, D. Hinojos, J. Kim and R. M. Wallace
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177. "In situ Raman and FTIR Study of the Thermal Effect on Graphene Transferred to SiO₂," C. Gong, K. Cho, R. M. Wallace, and Y. J. Chabal
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176. "In-situ interfacial study of e-beam Al deposition on native oxide InP (100)," H. Dong, X. Qin, D. M. Zhernokletov, B. Brennan, J. Kim and R. M. Wallace,
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175. "Chemical and electrical properties of the crystalline oxide/In_{0.53}Ga_{0.47}As (100) interface," D. Zhernokletov, H. Dong, B. Brennan, J. Kim and R. M. Wallace
72nd Annual PEC conference, June 3-6, 2012, The University of Texas at Dallas, Richardson, TX. *
174. "Growth and evolution of the native oxide on the atomically clean and (NH₄)₂S treated In_{0.53}Ga_{0.47}As surface," B. Brennan, D. M. Zhernokletov, H. Dong, G. Hughes, and R. M. Wallace,
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173. Tunable Interface Electronic Properties at Metal-Graphene-Metal Sandwich Contacts," C. Gong, R. Wallace, K. Cho, and Y. J. Chabal,
72nd Annual PEC conference, June 3-6, 2012, The University of Texas at Dallas, Richardson, TX. *
172. "Large Area Mapping of Graphene Grain Structure and Orientation," H. Floresca, D. Hinojos, N. Lu, J. Chan, L. Colombo, **R. Wallace**, J. Kim, and M. Kim,
221st ECS Meeting in Seattle, Washington (May 6 -10, 2012) *
171. "X-ray photoelectron spectroscopy study of Al₂O₃ deposition by ALD on native oxide and HF etched AlGaN," **R.M.Wallace**
9th Taiwan/U.S. Air Force Nanoscience Workshop, Kenting, Taiwan
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170. "An investigation of arsenic and antimony capping layers, and half cycle reactions during atomic layer deposition of Al₂O₃ on GaSb(100)," D.M. Zhernokletov, H.Dong, B. Brennan, J. Kim, S. Oktyabrsky and **R. M. Wallace**
MRS Spring Meeting, April 10-14, 2012, San Francisco, CA, USA.*
169. "Growth and Characterization HfO₂ on Large Area Transferred CVD Graphene," S. McDonnell, A. Pirkle, J.M. Hawkins, D. Hinojos, S. Jandhyala, G. Mordi, H.C. Floresca, L. Colombo, M.J. Kim, J. Kim, **R.M. Wallace**
PSCI-39, January 22-26, 2012, Santa Fe, NM, USA*

168. “In-Situ vs Ex-situ Characterization of High-k /III-V Interfaces,” 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**
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167. “Optimization of the Ammonium Sulfide (NH₄)₂S Passivation Process on InSb(111)A,” D.M. Zhernokletov, H. Dong, B. Brennan, J. Kim, **R.M. Wallace**
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166. “Investigation of Interfacial Oxidation Control Using Sacrificial Metallic Al and La Passivation Layers on InGaAs,” B. Brennan, M. Milojevic, University of Texas at Dallas; R. Contreras-Guerrero, H.C. Kim, M. Lopez-Lopez, J. Kim, **R.M. Wallace**
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164. “In Situ XPS and STM Studies of Ge₂H₆ Interactions with the Si(100) Surface,” S. McDonnell, J.F. Veyan, University of Texas at Dallas, J. Ballard, J.H.G. Owen, J.N. Randall, Y.J. Chabal, **R.M. Wallace**,
AVS 58th International Symposium, October 30-November 4, 2011, Nashville, TN, USA.*

163. “In Situ TMA Pre-Treatment Study of GaAs and In_{0.53}Ga_{0.47}As Surfaces,” B. Brennan, D.M. Zhernokletov, H. Dong, R.V. Galatage, J. Kim, E.M. Vogel, **R.M. Wallace**,
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162. “Half-cycle Atomic Layer Deposition Studies of HfO₂ on the GaSb(001) Surface,” D.M. Zhernokletov, H. Dong, B. Brennan, J. Kim, **R.M. Wallace**,
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161. “Effect of Post Deposition Anneal on the Characteristics of InP MOS Capacitors with High-k Dielectrics,” R.V. Galatage, B. Brennan, H. Dong, D.M. Zhernokletov, C.L. Hinkle, **R.M. Wallace**, E.M. Vogel,
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159. “Improving Performance of CVD Graphene Field Effect Transistors by Reducing Water Trapped at the Graphene/Substrate Interface,” J. Chan, A. Venugopal, A. Pirkle, S. McDonnell, D. Hinojos, The Univ. of Texas at Dallas, C. Magnuson, R.S. Ruoff, L. Colombo, **R.M. Wallace**, E.M. Vogel
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156. “In-situ XPS and Half-cycle Studies of Atomic Layer Deposited Al₂O₃ on HF-treated and O₃-oxidized GaN Substrate for MOS-HEMT Applications,” P. Sivasubramani, T. J. Park, A. Lucero, B. E. Coss, B. Brennan, **R. M. Wallace**, J. Kim, Y. Cao, D. Jena and H. Xing, 2011 MRS Spring Meeting, April 26-28, 2011, San Francisco, CA, USA.*
155. “In-situ Electrical Studies of Ozone Based Atomic Layer Deposition on Graphene,” S. Jandhyala, B. Lee, G. Lee, G. Mordi, K. J. Cho, **R. M. Wallace** and J. Kim, 2011 MRS Spring Meeting, April 26-28, 2011, San Francisco, CA, USA.*
154. “Physical and Electrical Studies of CVD Graphene Grown on Cu and Transferred to SiO₂,” A. Pirkle, A. Venugopal, D. Hinojos, T. W. Chan, S. McDonnell, L. Colombo, E. M. Vogel and R. M. Wallace, 2011 MRS Spring Meeting, April 26-28, 2011, San Francisco, CA, USA.*
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152. “Origin of interfacial gap states in Ga₂O₃ layer grown on GaAs surface and interface passivation by F and Gd,” W. Wang, K. Xiong, **R. M. Wallace**, and K. Cho, 2011 APS March Meeting, March 21-25, 2011, Dallas, TX, USA.*
151. Atomic Layer Epitaxy of Si and Ge on Si(100)-(2×1), J.-F. Veyan, H. Choi, J. Ballard. S. McDonnell, W. P. Kirk, **R. M. Wallace**, J. Randall K. Cho, Y. J. Chabal, 2011 APS March Meeting, March 21-25, 2011, Dallas, TX, USA.*
150. Epitaxial growth and characterization of strained LaCoO₃ on Si (100), A. Posadas, M. Berg, H. Seo, D. Smith, A. Kirk, D. Zhernokletov, **R. Wallace**, A. De Lozanne, A. Demkov, 2011 APS March Meeting, March 21-25, 2011, Dallas, TX, USA.*
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- 149 “Contact Resistance Reduction to FinFET Source/Drain Using Dielectric Dipole Mitigated Schottky Barrier Height Tuning,” B.E. Coss, C. Smith, W.-Y. Loh, K.J. Chung, P. Majhi, **R.M. Wallace**, J. Kim, R. Jammy, IEEE International Electron Device Meeting, December 6-8, 2010, San Francisco, CA, USA.*
148. “Investigation of GaSb Interface Evolution by in situ X-ray Photoelectron Spectroscopy,” A. P. Kirk, D. M. Zhernokletov, S. McDonnell, J. Kim, and **R. M. Wallace**, 41st IEEE Semiconductor Interface Specialists Conference, December 2-4, 2010, San Diego, CA, USA.*
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142. “In-situ XPS and Half-Cycle Studies of Atomic Layer Deposited Al₂O₃ on Group-III Nitride Substrate for MOSHEMT Applications,” P. Sivasubramani, T.J. Park, B.E. Coss, S. McDonnell, **R.M. Wallace**, J. Kim, Y. Cao, D. Jena, H. Xing, AVS 57th International Symposium, October 17-22, 2010, Albuquerque, NM, USA.*
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140. “Fermi Level Unpinning of GaSb(100) using Plasma Enhanced ALD Al₂O₃ Dielectric,” A. Ali, H. S. Madan, A. P. Kirk, **R.M. Wallace**, D. A. Zhao, D. A. Mourey, M. Hudait, T. N. Jackson B. R. Bennett, J. B. Boos, and S. Datta, Device Research Conference, June 21-23, 2010, Notre Dame, South Bend IN, USA.*
139. “C and N-related impurities behavior in atomic-layer-deposited La₂O₃ films observed by in-situ x-ray photoelectron spectroscopy,” T.J. Park, P. Sivasubramani, B. E. Coss, B. Lee, **R. M. Wallace**, J. Kim, M. Rousseau, X. Liu, D. Shenai, D. Hong, J.-S. Lehn, and H. Li, ALD 2010, June 20-23, 2010, Seoul, Korea.*
138. “(NH₄)₂S passivation of high-k/In_{0.53}Ga_{0.47}As interfaces: A systematic study of (NH₄)₂S concentration,” E O’Connor, B. Brennan, R. Contreras, M. Milojevic, K. Cherkaoui, S. Monaghan, G. Hughes, M. E. Pemble, **R. M. Wallace**, and P. K. Hurley, 217th Electrochemical Society Meeting, April 27, 2010, Vancouver, BC, Canada.*
137. “Thermal Stability, Band Offsets, Bonding and Interface States of GaAs:HfO₂ Interface,” W. Wang, K. Xiong , G. Lee, M. Huang, **R. Wallace**, and K.J. Cho, 2010 MRS Spring Symposium, April 9, 2010, San Francisco, CA, USA.*

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135. “Characterization of the “clean-up” of the GeO and GeON passivated Ge(100) surfaces by ALD using in-situ monochromatic XPS,” M. Milojevic, R. Contreras-Guerrero, M. Lopez-Lopez, J. Kim, **R. M. Wallace**, 40th IEEE Semiconductor Interface Specialists Conference, December 3-5, 2009, Washington, D.C., USA.*
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128. “SpinFET on Epitaxial Graphene,” T. Shen, Y. Q. Wu, A. Chernyshov, L. P. Rokhinson, M. L. Bolen, M. A. Capano, A. R. Pirkle, J. Kim, **R. M. Wallace**, J. J. Gu, K. Xu, L. W. Engel and P. D. Ye, International Conference on Solid State Devices and Materials, Oct. 7-9, 2009, Miyagi, Japan*
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126. “Interface Passivation of III-V Semiconductors by ALD Reactions and Direct Gallium Oxide Deposition,” M. Milojevic, R. Contreras-Guerro, B. Brennan, C.L. Hinkle, H.C. Kim, G. Hughes, M. Lopez-Lopez, E.M. Vogel, J. Kim, and **R.M.Wallace**, SRC Techcon 2009, September 13-15, 2009, Austin, TX, USA.*
125. “Contact Resistance and Transport Studies on Few Layer Graphene Stacks,” A. Venugopal, A. Pirkle, R.M.Wallace, L. Colombo, and E. M. Vogel, SRC Techcon 2009, September 13-15, 2009, Austin, TX, USA.*
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44. “A novel methodology of tuning work function of metal gate using stacking bi-metallic layers,” I.S. Jeon, J. Lee, P. Zhao, P. Sivasubramani, T. Oh, H.J. Kim, D.K. Cha, J. Huang, M.J. Kim, B.E. Gnade, J. Kim and **R.M. Wallace**, 2004 IEEE International Electron Devices Meeting (IEDM), Dec. 13-15, 2004, San Francisco, CA, USA.*

43. “Characteristics of Mo_xSi_y Gate Electrodes for Advanced CMOS Applications,” P. Sivasubramani, P. Zhao, I.S. Jeon, J. Lee, J. Y. Kim, M.J. Kim, B.E. Gnade, and **R.M. Wallace**, AVS 51st International Symposium, November 15, 2004, Anaheim, CA, USA.*

42. “Physical and Electrical Properties of Mo_xN_y and Mo_xSi_yN_z as Gate Electrode Materials for MOS Devices, P. Zhao, P. Sivasubramani, I.S. Jeon, J. Lee, J. Y. Kim, M.J. Kim, B.E. Gnade, and **R.M. Wallace**,” AVS 51st International Symposium, November 16, 2004, Anaheim, CA, USA.*

41. “Low Temperature Gate Dielectrics for Organic Thin Film Transistors on Plastic Substrates,” P. Panchaipetch, G. Pant, **R.M. Wallace**, and B.E. Gnade, 11th International Workshop on Active-Matrix Liquid Crystal Displays-TFT Technologies and Related Materials, August 25-27, 2004, Tokyo, Japan.

2003

40. “Hafnium Germanosilicate Thin Films for Gate and Capacitor Dielectric Applications: Thermal Stability Studies,” S. Addepalli, P. Sivasubramani, P. Zhao, M.J. Kim, M. El-Bouanani, B.E. Gnade, and **R.M. Wallace**, AVS 50th International Symposium, November 3, 2003, Baltimore, MD, USA.*

39. “Surface Characterization and inter-diffusion study of copper on ruthenium thin film deposited on silicon substrates,” O. Chyan, T. Arunagiri, R. Chan, **R.M. Wallace**, M.J. Kim, and T. Hurd, AVS 50th International Symposium, November 3, 2003, Baltimore, MD, USA.*

38. “Evaluating Ruthenium thin film deposited on Silicon as a directly plate-able Cu diffusion barrier,” O. Chyan, T.G. Hurd, **R.M. Wallace**, M.J. Kim, and R. Chan, T. Arunagiri, AVS 50th International Symposium, November 3, 2003, Baltimore, MD, USA.*

37. “Ruthenium-based Copper diffusion barrier studied by Electrochemistry, SIMS depth profiling and sheet resistance measurements,” O. Chyan, R. Chan, T. Arunagiri, **R.M. Wallace**, and T. Hurd, 204th Electrochemical Society Meeting, October 13, 2003, Orlando, FL, USA.*

36. “Investigation of Oxide Growth on Ruthenium and its Interactions with Copper,” Y. Zhang, L. Huang, T. Arunagiri, R. Chan, **R.M. Wallace**, and Oliver Chyan, 204th Electrochemical Society Meeting, October 13, 2003, Orlando, FL, USA.*

35. “Growth and characterization of hafnium silicate films formed by UV/ozone oxidation,” P. Panchaipetch, G. Pant, M.J. Kim, M. El Bouanani, **R. Wallace**, and B. Gnade, American Physical Society March Meeting, March 5, 2003, Austin, TX, USA.*

34. "Hafnium silicate and hafnium silicon oxynitride gate dielectrics for strained Si_xGe_{1-x}: Interface stability," S. Addepalli, P. Sivasubramani, M. El Bouanani, M. Kim, B. Gnade, and **R.M. Wallace**, American Physical Society March Meeting, March 5, 2003, Austin, TX, USA.*
33. "HfSiON with less than 2 nm EOT by UV ozone oxidation," G. Pant, P. Puchaipetch, M. J. Kim, M. El Bouanani, **R. Wallace**, and B. Gnade, American Physical Society March Meeting, March 5, 2003, Austin, TX, USA.*
32. "Hafnium germanosilicate thin films for gate and capacitor dielectric applications: thermal stability studies," S. Addepalli, P. Sivasubramani, M. El Bouanani, M. Kim, B. Gnade, and **R.M. Wallace**, American Physical Society March Meeting, March 5, 2003, Austin, TX, USA.*

2002

31. "Effect of nitrogen in boron penetration from p+ polycrystalline -Si through Hf-silicate films," M. A. Quevedo-Lopez, M. El-Bouanani, M. J. Kim, B. E. Gnade, **R. M. Wallace**, M. R. Visokay, A. LiFatou, M. J. Bevan, and L. Colombo, 33rd IEEE Semiconductor Interface Specialists Conference, December 5-7, 2002, San Diego, CA, USA.*
30. "Ultrathin hafnium silicon-oxynitride films grown by uv/ozone oxidation," P. Puchaipetch, G. Pant, M. A. Quevedo-Lopez, C. Yao, H. Zhang, M. J. Kim, M. El-Bouanani, **R.M. Wallace** and B. E. Gnade, Materials Research Society Fall Symposium, December 2-6, 2002, Boston, MA USA.*
29. "Stacked structure of hafnium silicate gate dielectrics from UV Ozone oxidation of hafnium silicide and reactive sputtering," P. Puchaipetch, G. Pant, M. Quevedo-Lopez, C. Yao, H. Zhang, M. J. Kim, M. El-Bouanani, **R.M. Wallace** and B. E. Gnade, 33rd IEEE Semiconductor Interface Specialists Conference, December 5-7, 2002, San Diego, CA, USA.*
28. "Hafnium Silicate and Nitrated Hafnium Silicate as Gate Dielectric Candidates for SiGe-based CMOS Technology," S. Addepalli, P. Sivasubramani, H. Zhang, M. El-Bouanani, M. J. Kim, B. E. Gnade, and **R.M. Wallace**, American Vacuum Society National Symposium, November 4 - 8, 2002, Denver CO, USA.*
27. "Dopant Penetration Studies in Hf Based Gate Dielectrics from Doped Polysilicon Films: Effect of Nitrogen in Penetration Robustness," M. A. Quevedo-Lopez, H. Zhang, M. J. Kim, M. El-Bouanani, B. E. Gnade, **R.M. Wallace**, M. R. Visokay, A. Li-Fateau, J. J. Chambers, A. L. P. Rotondaro, and L. Colombo, American Vacuum Society National Symposium, November 4 - 8, 2002, Denver CO, USA.*
26. "Deposition of Hafnium Silicate Gate Dielectric on SiGe: Interface Characterization and Control," Swarna Addepalli, Prasanna Sivasubramani, Bruce E. Gnade, and **Robert M. Wallace**, Surface Analysis 2002, Vanderbilt University, Nashville TN, May 22, 2002.*
25. "Low Temperature Deposition Of Zirconium And Hafnium Silicate Gate Dielectrics For Flexible Display Applications," P. Puchaipetch, G. Pant, M. A. Quevedo-Lopez, M. El Bouanani, H. Zhang, **R.M. Wallace** and B. Gnade, Materials Research Society Spring Symposium, April 2, 2002.*
24. "Dopant Diffusion Studies From As-, B- And P-Doped Polysilicon Through CVD Deposited Hf Silicate Thin Films," M. Quevedo-Lopez, P. Puchaipetch, G. Pant, M. El-Bouanani, M. Kim, B. E. Gnade, **R.M. Wallace**, L. Colombo, M. Bevan, M. Douglas, A. Li'fatou and M. Visokay, Materials Research Society Spring Symposium, April 2, 2002.*
23. "Hafnium Silicate Formation By The UV-Ozone Oxidation Of Hafnium Silicide" G. Pant, P. Puchaipetch, M. A. Quevedo-Lopez, M. El Bouanani, **R.M. Wallace** and Bruce Gnade, Materials Research Society Spring Symposium, April 2, 2002.*

2001

22. “Thermal stability of high-k gate dielectrics on Si: Studies of metal incorporation from silicates into Silicon”, M. Quevedo-Lopez, M. El-Bouanani, S. Addepalli, J. L. Duggan, B. E. Gnade, R. M. Wallace, M.R.Visokay, M.Douglas, M.J.Bevan, A.Rotondaro and L. Colombo, 32nd IEEE Semiconductor Interface Specialists Conference, Washington, D.C., November 30, 2001.*
21. “Interfacial diffusion studies of Hf and Zr into Si from thermally annealed Hf and Zr silicates”, M. Quevedo-Lopez, M. El-Bouanani, S. Addepalli, B.E. Gnade and **R.M. Wallace**, L. Colombo, M. Bevan, M. Douglas, and M. Visokay, MRS Fall Meeting, Boston, Mass., November 28, 2001.*
20. “Diffusion Studies of High k Gate Dielectric Candidates Hafnium and Zirconium Silicates into Si”, M. Quevedo-Lopez, M.ElBounani, J.L.Duggan, B.E.Gnade, **R.M. Wallace**, L.Colombo, M.Bevan, M.Douglas, H.-Y.Liu, , M.Visokay , 48th AVS International Symposium, San Francisco, CA, October 29, 2001.*
19. “Interfacial diffusion studies of Hf and Zr into Si from thermally annealed Hf and Zr silicates”, M.ElBounani, _M. Quevedo-Lopez, , J.L.Duggan, B.E.Gnade, **R.M. Wallace**, L.Colombo, M.Bevan, M.Douglas, H.-Y.Liu, , M.Visokay, International Workshop on Device Technology, Porto Allegre, Brazil, September 2001.*

and earlier

18. “Zirconium diffusion measurements into Si from Zr-based gate dielectrics”, M. Quevedo-Lopez, M.ElBounani, **R.M. Wallace**, L.Colombo, M.Bevan, M.Douglas, H.-Y.Liu, D.Mercer, A.Rotondaro, M.Visokay, IEEE Semiconductor Interface Specialists Conference, San Diego, CA., December 2000.*
17. “Low Voltage Stress-Induced-Leakage-Current in Ultrathin Gate Oxides,” P.E. Nicollian, M.Rodder, D.T. Grider, P.Chen, R.M. Wallace, S.V. Hattangady, IEEE 99CH362S'6. 37fu Annual International Reliability Physics Symposium, San Diego, 1999
16. “Stable Hafnium and Zirconium Silicate Advanced Gate Dielectrics Directly on Si”, G.D. Wilk and **R.M. Wallace**, IEEE Semiconductor Interface Specialists Conference, Charleston S.C., December 1999.*
15. “Electrical and Physical Properties of HfSi_xO_y and ZrSi_xO_y Gate Dielectric Films Deposited Directly on Si”, G.D.Wilk and **R.M.Wallace**, Spring MRS Meeting, San Fransisco, 1999. *
14. “Examination of Deuterium Transport through CMOS Device Structures”, **R.M.Wallace** and P.J.Chen, IEEE Semiconductor Interface Specialists Conference, SanDiego, December 1998.*
13. “Hydrogen/Deuterium interaction with CMOS transistor device structure: Physical Characterization by SIMS”, P.J.Chen and **R.M.Wallace**, April MRS Symposium, San Francisco, 1998. *
12. “Proton trapping at the Si/SiO₂ interface studied by first-principles method”, S.Tang, Q.Zhang and **R.M.Wallace**, March Meeting of the APS, 1998.*
11. “Void formation and enlargement in thermally grown ultrathin Si-oxide on Si(001)”, Y.Weï and **R.M.Wallace**, March Meeting of the APS, 1998.*
10. “Non-volatile field effect transistors based on protons and Si/SiO₂/Si Structures”, IEEE Nuclear and Space Radiation Effects Conference,_W.L.Warren, D.M.Fleetwood, J.R.Schwank, M.R.Shaneyfelt, B.L.Draper, P.S.Winokur, M.G.Knoll, K.Vanheusden, R.A.B.Devine, L.B.Archer and **R.M.Wallace** 1997.*

9. “Oxide/Si/Oxide Resonant Tunneling Diode Structure and Process”, **R.M.Wallace** and A.Seabaugh AFOSR Review, Santa Barbara, 1997.
8. “Controlled growth of Si-oxide barriers for Si based resonant tunneling devices”, Y.We, **R.M.Wallace**, and A.Seabaugh, 43rd National Symposium of the AVS, 1996.*
7. “Controlled growth of Si-oxide barriers for Si based resonant tunneling devices”, **R.M.Wallace** and A.Seabaugh, Si-Nanoelectronics Workshop, 1996
6. “Electronic structure of the ultrathin SiO₂/Si(100) interface: a first-principles study”, S.P.Tang and **R.M.Wallace**, March Meeting of the APS, 1996.
5. “Evolution of Si(100) surface morphology during thermal oxidation and post-oxidation”, S.P.Tang and **R.M.Wallace**, March Meeting of the APS, 1996.
4. “Field emission cathode arrays: Effect of various gasses on device performance”, **R.M.Wallace**, B.Chalamala and B.Gnade, 43rd National Symposium of the AVS, 1996.*
3. “Thermal Stability of Perfluorinated n-alkanoic acid self-assembled on native aluminum oxide surfaces”, P.J.Chen, **R.M.Wallace**, S.A.Henck and D.A.Webb, 42nd National Symposium of the AVS, 1995.*
2. A.C. Seabaugh, C.-C. Cho, R.M. Steinhoff, T.S. Moise, S. Tang, **R.M. Wallace**, E.A. Beam, Y.-C. Kao, R.C. Bowen, W.R. Frensley, K. H. Park, Y. Okuno, 2nd International Workshop on Quantum Functional Devices, Matsue, Japan, May 23- 25 1995.
1. “The surface chemistry of self-assembled and vapor deposited perfluorinated n-alkanoic acid monolayers on native aluminum oxide”, **R.M.Wallace**, S.A.Henck and D.A.Webb ,41st National Symposium of the AVS, 1994.*

Invited Presentations - R.M.Wallace
International meeting or symposia

2017

91. “2D Materials for Advanced Devices: Integration Challenges and Opportunities,” **R.M. Wallace**, 64th AVS International Symposium, October 30, 2017, Tampa FL, USA.
90. “High-K Dielectrics: A Perspective on Applications from Silicon to 2D Materials,” **R. M. Wallace**, 232nd ECS Meeting, October 1, 2017, National Harbor, MD, USA.
89. “Integration of 2D Materials for Advanced Devices: Challenges and Opportunities,” **R.M. Wallace**, 6th International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors, May 21-25, 2017, Hernstein, Austria
88. “Physical Characterization of 2D Device Materials: Challenges and Opportunities,” **R.M. Wallace**, Graphene and Beyond Workshop, May 10-12, 2017, State College, PA, USA. (Keynote)
87. “Characterization of 2D Materials: Challenges and Opportunities,” **R.M. Wallace**, Frontiers of Characterization and Metrology of Nanomaterials, March 20-23, 2017, Monterey, CA, USA.
86. “2D Materials: Integration Challenges and Opportunities for Device Applications,” **R.M. Wallace**, National Institute of Standards and Metrology Colloquium, January 25, 2017, Gaithersburg, MD, USA.
85. “2D Materials: Integration Challenges and Opportunities for Device Applications,” **R.M. Wallace**, Naval Research Laboratory Colloquium, January 24, 2017, Alexandria, VA, USA.

2016

83. “Addressing Process Integration Challenges for 2D Semiconductor Materials,” **R.M. Wallace**, IEEE Semiconductor Interface Specialists Conference (SISC), December 8-10, 2016, San Diego, CA, USA.
82. “Physical Characterization of Advanced Devices,” IEEE International Electron Devices Meeting, **R.M. Wallace**, December 3, 2016, San Francisco, CA, USA (Invited Tutorial).
81. “2D Materials—Integration Challenges and Opportunities for Device Applications,” **R.M. Wallace**, Fall MRS 2016 MRS Symposium, December 1, 2016, Boston, MA, USA.
80. “Selected highlights on 2D Materials Research from the STARnet Center for Low Energy Systems Technology,” **R.M. Wallace**, Steep Slope Workshop, September 11-12, 2016, Lausanne, Switzerland
79. “Evaluation of Few-Layer MoS₂ Transistors with a Top Gate and HfO₂ Dielectric,” C. D. Young, P. Zhao, P. Bolshakov-Barrett, A. Azcatl, C. L. Hinkle, **R. M. Wallace**, Y. Y. Gomeniuk, M. Schmidt, and P. K. Hurley, PRiME 2016/230th ECS Meeting (October 2-7, 2016), Honolulu, HI., USA
78. “2D Materials: Challenges and Opportunities for Future Electronics,” **R.M. Wallace**, 4th Hellenic Forum for Science, Technology and Innovation, July 11-15, 2016, Athens, Greece.
77. “TMD Materials Challenges: Defects, Impurities, Passivation and Interfaces,” **R.M. Wallace**, 229th ECS Meeting, May 29 - June 2, 2016, San Diego, CA, USA.
76. “TMD 2D Materials: Defects, Passivation, Functionalization and Device Impact,” **R.M. Wallace**, 2016 APS March Meeting, March 15, 2016, Baltimore, MD, USA
75. “High-k gate oxides on 2D Materials,”

S. McDonnell, A. Azcatl, P. Zhao, C. L. Hinkle, C. D. Young, J. Kim, **R. M. Wallace**, Spring MRS Meeting and Exhibition, March 30, 2016, Phoenix, AZ, USA.

74. “Transition Metal Dichalcogenide Layered Crystals: Surface Defects, Impurities and Passivation,” R. Addou and **R. M. Wallace**, International Symposium on 2D Layered Materials and Art: Two Worlds Meet, Marseille, France. 25-Mar-2016

73. “The Impact of Interfaces on the Integration of 2D Materials into Nanoelectronics.” S. McDonnell; K. Freedy; A. Azcatl; C. Smyth; R. Addou; C. Hinkle; **R. Wallace**, TMS 2016, 145th Annual Meeting and Exhibition February 15, 2016, Nashville, TN, USA

2015

72. “Correlating interface properties and device behavior,” **R.M. Wallace**, INFOS 2015, June 29-July 2, 2015, Udine, Italy

71. “Surface and Interfaces for 2D Beyond CMOS Materials,” **R.M. Wallace**, 2015 MRS Spring Meeting and Exhibit, April 6-10, 2015, San Francisco, CA, USA

2014

70. “2D Materials Growth and Prospects,” L. Colombo, S. Banerjee, **R.M. Wallace**, and C. L. Hinkle, 45th IEEE Semiconductor Interface Specialists Conference, December 10-13, 2014, San Diego, CA, USA

69. “In-situ studies on 2D Materials,” **R.M. Wallace**, ENGE 2014, November 17-19, 2015, Jeju, S. Korea (Keynote).

68. “ALD and Beyond CMOS Materials,” **R.M. Wallace**, AVS 61st International Symposium & Exhibition, November 9-14, 2014. Baltimore, MD, USA

67. “In-Situ Studies of ALD Growth on 2D Materials,” **R.M. Wallace**, 226th International Meeting of the Electrochemical Society, October 5-10, 2014, Cancun, MX

66. “In-situ Characterization of 2D Materials for Beyond CMOS Applications,” **R.M. Wallace**, IEEE Nano: 14th International Conference on Nanotechnology, August 18-21, 2014, Toronto, Canada

65. “Correlating Interface Chemistry and Device Behavior,” **R.M. Wallace**, 72nd Device Research Conference, June 22-25, 2014, Santa Barbara, CA, USA

64. “In-situ studies of low reactivity 2D surfaces: Defects, functionalization, and device implications,” **R. M. Wallace**, S. McDonnell, R. Addou, A. Azcatl, and C. J. Hinkle, 18th Workshop on Dielectrics in Microelectronics, June 9-11, 2014, Kinsale, Ireland

63. “Optimization of the III-V oxide interface of III-V MOSFETs,” Tutorial BB, **R.M. Wallace**, 2014 MRS Spring Meeting and Exhibit, April 21-25, 2014, San Francisco, CA, USA

62. “Challenges and Prospects for 2D Materials,” Graphene and Beyond Workshop, **R.M. Wallace**, April 1-2, 2014, Pennsylvania State University, State College, PA, USA

61. “In-situ studies of low reactivity surfaces: Defects and functionalization,” **R.M. Wallace**, 247th American Chemical Society National Meeting & Exposition, March 16 - 20, 2014, Dallas, TX, USA

2013

60. “In-situ Studies of High-k/High-mobility Materials Interfaces,” **R.M. Wallace**
2013 International Workshop on Dielectric Thin Films for Future Electron Devices: Science and Technology, November 7-9, 2013, Tokyo, Japan
59. “In-situ Studies of High-k/III-V Interfaces: A Survey of the Interfacial Chemistry and Correlations to Electrical Behavior,” **R.M. Wallace**
IEEE Nanotechnology Materials and Device Research Conference, October 6-9, 2013, Tainan, Taiwan
58. “Beyond CMOS: Materials Research for Future High Performance Processors,” **R.M. Wallace**
2nd International Semina Symposium, September 18-19, 2013 Hermosillo, Mexico
57. “In-situ studies of Post-Si CMOS Interfaces: InAs to MoS₂,” **R.M. Wallace**
2013 e-MRS, May 27-30, 2013, Strasbourg, France
56. “In-situ Studies of High-k/High-mobility Materials Interfaces,” **R.M. Wallace**
2013 MRS Spring Meeting, April 1-5, 2013, San Francisco, CA, USA
55. “X-ray Photo Electron Spectroscopy of Nanomaterial of Graphene and III-V Interfaces,” **R.M. Wallace**
Frontiers of Characterization and Metrology: 2013, March 25-28, 2103, NIST, Gaithersburg, MD, USA

2012

54. “XPS studies of oxides on III-V,” **R.M. Wallace**
43rd IEEE Semiconductor Interface Specialists Conference, December 6-8, 2012, San Diego, CA, USA.
53. “Novel Gate Stack Featuring High-Mobility Channel,” **R.M. Wallace**
Samsung Electronics Future Technology Forum, November 8, 2012, Seoul, Korea
52. “Surface Preparation and Dielectric Growth for Graphene-based Devices,” **R.M. Wallace**
AVS 59th International Symposium, October 28 - November 2, 2012, Tampa, FL, USA
51. “In-situ studies of III-V surfaces and high-k atomic layer deposition ,” **R.M. Wallace**
11th International Symposium on Ultraclean Processing of Semiconductor Surfaces, September, 16-19, 2012, Ghent, Belgium
50. “In-Situ Studies of High-K/III-V Interfaces for Advanced Electronics,” **R.M. Wallace**,
TMS 2012 141st Annual Meeting and Exhibition, March 11-15, 2012, Orlando, FL, USA.

2011

49. “Interface Traps and Low Subthreshold Swing in III-V Tunnel FETs,” A. Seabaugh, S.-D. Chae, P. Fay, W.-S. Hwang, T. Kosel, R. Li, Q. Liu, Y. Lu, T. Vasen, M. Wistey, H. Xing, G. Zhou, Q. Zhang, **R.M. Wallace**,
AVS 58th International Symposium, October 30-November 4, 2011, Nashville, TN, USA.
48. “Interface Studies of High-k Oxides on III-V Semiconductors,” C.L. Hinkle, B. Brennan, M. Milojevic, A. Sonnet, D. Zhernokletov, R. Galatage, E. Vogel and **R. Wallace**, 2011 MRS Spring Meeting, April 26-28, 2011, San Francisco, CA, USA.*
47. “In-situ studies of High-k/High-Mobility III-V Interfaces,” **R.M. Wallace**
33rd Symposium on Applied Surface Analysis
April 11-13, 2011, The College of Nanoscale Science and Engineering
University at Albany, State University of New York.

46. “In-situ studies of High-k/High-Mobility III-V Interfaces,” **R.M.Wallace**
38th Conference on the Physics and Chemistry of Surfaces and Interfaces
January 16-20, 2011, San Diego, California, USA.

2010

45. “Atomic Precision Fabrication Using Patterned Si Atomic Layer Epitaxy: Processing Capabilities, Throughput Limitations, and Applications,” J.N. Randall, J.B. Ballard, J.R. Von Ehr, J. Alexander, R. Saini, J.W. Lyding, **R.M. Wallace**, Y.J. Chabal, R.M. Silver, J. Gorman, N. Sarkar, T. Toth-Fejel, AVS 57th International Symposium, October 17-22, 2010, Albuquerque, NM, USA.

44. “Interface Passivation and High Mobility NMOS,” **R.M. Wallace**, International Union of Materials research Societies – International Conference on Electronic Materials, August 25-27, 2010, Seoul, Korea.

43. “Future Directions in the Heart of CMOS Technology: Gate Dielectrics, Interfaces, and High-Mobility Channels,”(Keynote Lecture) **R.M. Wallace**, 18th International Vacuum Conference, August 23-24, 2010, Beijing, China.

42. “In-situ studies of Oxide/III-V Interfaces.” **R.M. Wallace**, 37th International Symposium on Compound Semiconductors, May 31- June 4, 2010, Kagawa, Japan.

41. “Dielectric/III-V Interfaces and Their Impact on Device Behavior,” **R.M. Wallace**, 4th International Workshop on High k dielectrics on high carrier mobility semiconductors, May 25-27, 2010, National Tsing Hua University, Hsin Chu, Taiwan

40. “Dielectric Interfaces for Graphene-Based Devices,” A. Pirkle, B. Lee, C. Floresca, S. McDonnell, L. Colombo, J. Kim, M. Kim, Y. Chabal and **R. M. Wallace** , 217th Meeting of the Electrochemical Society, April 25-30, 2010, Vancouver, BC, Canada.

39. “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**, 217th Meeting of the Electrochemical Society, April 25-30, 2010, Vancouver, BC, Canada.

38. “ $(\text{NH}_4)_2\text{S}$ Passivation of High-k/ $\text{In}_{0.53}\text{Ga}_{0.47}\text{As}$ Interfaces: A Systematic Study of $(\text{NH}_4)_2\text{S}$ Concentration,” E. O'Connor, B. Brennan, R. Contreras, M. Milojevic, K. Cherkaoui, S. Monaghan, G. Hughes, M. Pemble, **R. M. Wallace**, and P. Hurley, 217th Meeting of the Electrochemical Society, April 25-30, 2010, Vancouver, BC, Canada.

37. “The Role of Controlling III-V Surface Oxides for High Performance MOSFETs,” M. Milojevic, A. M. Sonnet, C. L. Hinkle, J. Kim, E. M. Vogel and **R. M. Wallace** Materials Research Society Spring Meeting, April 5-9, 2010, San Francisco, CA USA.

2009

36. “In-situ studies of oxide/III-V interfaces,” **R.M.Wallace**, International Workshop on Nanoscience using Advanced Light Sources, December 15, 2009 Lund University, Sweden.

35. “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**, 56th International Symposium if the AVS, November 9-11, 2009, San Jose, CA, USA.

34. “In-situ studies of ALD high-k/III-V interfaces,” **R.M.Wallace**, 5th Symposium on Atomic Layer Deposition, 216th Meeting of the Electrochemical Society, October 4-9, 2009, Vienna, Austria.

33. “Tutorial: Challenges for High-K Dielectrics on High Mobility Channels” **R.M.Wallace**, International Symposium on Integrated Ferroelectrics and Functionalities (ISIF²), Sep. 27-30, 2009, Colorado Springs, CO, USA.

32. “Studies of ALD processes for high-k dielectrics on III-V and Ge surfaces,” **R.M.Wallace**, ALD 2009 – 9th international Conference on Atomic Layer Deposition, July 19, 2009 Monterey, CA, USA.

31. "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, June 28 – July 1, 2009, Cambridge University, UK.

2008

30. “High- κ 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, 23rd - 25th June 2008, Bad Saarow (Berlin)

29. “Electrical and Physical Properties of GaAs MOS Devices with Al₂O₃/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), September 28- October 1, 2008, Lakeway Resort & Spa – Austin, TX, USA

28. “High-k Dielectrics for CMOS Beyond 22nm,” **R.M. Wallace**, High k Dielectric Constant Materials and Gate Stacks, 214th ECS Meeting, October 12 - 17, 2008, Honolulu, HI

2007

27. “New Devices and Materials for 32nm and Beyond,” **R.M. Wallace**, Semicon West, San Francisco , CA July 18, 2007.

26. “The importance of film microstructure for high-k gate dielectric applications,” **R.M. Wallace**, 5th International Conference on Silicon Epitaxy and Heterostructures, Marseille, France, May 20-25, 2007.

25. High-k Metal Stacks for Application in High Performance CMOS Technologies,” P.D. Kirsch, M.A. Quevedo-Lopez, S.A. Krishnan, P. Sivasubramani, T.S.Boscke, J. Huan, Y.N. Tan, C. Krug, B.S. Ju, S.C. Song, C.S. Park, C. Young, D. Heh, P. Majhi, H. Niimi, H.C. Wen, H.R. Harris, C. Park, R. Choi, H.B. Park, J. Barnett, N. Moumen, G. Bersuker, P. Lysaght, B.H. Lee, B.E. Gnade, M. J. Kim, **R.M. Wallace**, J.S. Jur, D.J. Lichtenwalner, A.I. Kingon, H.-H. Tseng, and R. Jammy, 19th International Symposium on Integrated Ferroelectrics (ISIF), May 8-11, 2007, Bordeaux, France.

24. “Angle Resolved X-ray Photoelectron Spectroscopy – Applications in University Research,” **R.M.Wallace**, 47th IUVSTA Workshop on Angle-Resolved XPS, Riviera Maya, Mexico, March 26-30, 2007

23. “High-k Gate Stack Stability at the Nanoscale,” **R. M. Wallace**, F. Testado-Aguirre, A. Herrera-Gomez, M. J.Kim, J. Kim, and B. E. Gnade, Nano and Giga Challenges in Electronics and Photonics, Phoenix, AZ , March 12-16, 2007.

2005

22. “Interdiffusion Studies of High-k Gate Dielectric Stack Constituents,” P. Sivasubramiani, M. A. Quevedo-Lopez , T.H. Lee, M.J. Kim, B.E. Gnade, **R. M. Wallace**, NATO Advanced Workshop on Defects in High-K, St. Petersburg, Russia, July 11-14, 2005.

2004

21. “Challenges for the Characterization and Integration of High-k Dielectrics,” **R.M.Wallace**, AVS 51st International Symposium, November 19, 2004, Anaheim, CA, USA.
20. “High-k Gate Dielectric Integration – Invited Tutorial,” **R.M.Wallace**, Mexican Vacuum Society Symposium, September 27, 2004, Playa del Carmen, Mexico
19. “Interfacial reactions and Stability of High-k Dielectrics and Metals – Invited Tutorial,” **R. M. Wallace**, International Reliability Physics Symposium, April 25, 2004, Pheonix, Arizona.
18. “High-k Gate Dielectric Materials Issues for CMOS Integration,” **R.M.Wallace**, International Symposium on Integrated Ferroelectrics, April 5-8, 2004, Gyeongju, Korea.

2003

17. “Challenges for the Characterization and Integration of High-k Gate Dielectrics,” **R. M. Wallace**, SIMS XIV, September 16, 2003, San Diego, CA.
16. “Metal Gate/dielectric interactions”, **R.M.Wallace**, International Workshop on Metal Gate/Work Function Engineering, August 28-29, 2003, Stanford University, Stanford, CA. (Also served as Expert Panelist)
15. “Hafnium silicate and germanosilicate thin films for gate and capacitor dielectric applications: thermal stability studies,” **R.M.Wallace**, International Workshop on Surface Science, March 18, 2003, Porto Alegre, Brazil.
14. “Advanced Gate Dielectrics,” **R.M.Wallace**, American Physical Society March Meeting, March 5, 2003, Austin, TX, USA.

2002

13. “Low Temperature Deposition of Hafnium Silicate Gate Dielectrics for TFTs on Plastic Substrates,” B.E. Gnade, G. Pant, P. Panchaipetch, **R. M. Wallace**, 15th Annual Meeting of the IEEE Lasers & Electro-Optics Society, Glasgow, Scotland, November 12, 2002.
12. “Challenges for the Characterization and Integration of High-k Gate Dielectrics”, **R.M.Wallace**, American Vacuum Society International Symposium, November 4 - 8, 2002, Denver CO, USA.
11. “Critical Materials Issues for Alternate Gate Dielectric Integration,” **R.M.Wallace**, First International Symposium on High Dielectric Constant Materials: Materials Science, Processing, Manufacturing, and Reliability Issues, 202nd Electrochemical Society Meeting, October 20-25, 2002, Salt Lake City, Utah.
10. “Critical Materials Issues for Alternate Gate Dielectric Integration,” **R.M.Wallace**, 2002 International Conf. on Solid State Devices & Materials, September 17-20, 2002, Nagoya Congress Center, Aichi, Japan.
9. “Toward Practical Standards”, **R.M.Wallace**, Surface Analysis 2002, May 20-22, 2002, Nashville, TN, USA.
8. “A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics”, **R.M.Wallace**, Third International Conference on Microelectronics and Interfaces, Santa Clara, CA, February 13, 2002.

2001

7. “A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics”, **R.M.Wallace**, March Meeting of the American Physical Society, Seattle, WA, March 13, 2001.

2000 and earlier

6. “Novel High Permittivity Gate Dielectric Materials for Advanced Microelectronics,” **R.M.Wallace**, Applied Materials Strategic Technology Symposium, *Future Directions for Transistor Processing*, Yokohoma, Japan, October 13, 2000.

5. “Materials Considerations for High-k Gate Dielectrics for Scaled CMOS,” G.D. Wilk and **R.M.Wallace**, 47th International Symposium of the American Vacuum Society, Boston, MA, October 5, 2000.

4. “A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics”, **R.M.Wallace**, 52nd Pacific Coast Regional and Basic Science Division Meeting of the American Ceramic Society, San Francisco, CA, September 6, 2000.

3. “High-K Gate Dielectrics for Scaled CMOS,” **R.M.Wallace**, 197th Meeting of the Electrochemical Society, Toronto, Ontario, Canada, May 18, 2000

2. “Effects of Residual Gas Exposures on the Emission Characteristics of Field Emission Arrays”, **R.M.Wallace**, 46th International Symposium of the American Vacuum Society, Seattle, October 1999.

1. "Advanced gate dielectrics and STM studies of oxide formation", **R.M.Wallace**, Shanghai Conference on “Next Generation Materials and Devices for Si-based Microelectronics”, Shanghai, China, June, 1999.

Invited Presentations - R.M.Wallace

Other forums

54. “2D Materials: Challenges and Opportunities for Future Electronics,” **R.M.Wallace**, Department of Chemical Engineering, University of Pittsburgh, November 4, 2016, Pittsburgh, PA, USA

53. “2D Materials: Challenges and Opportunities for Future Electronics,” **R.M.Wallace**, Tyndall National Institute, July 27, 2016, Cork, Ireland

52. “2D Materials: Challenges and Opportunities for Electronics,” **R.M.Wallace**, Indiana University of Pennsylvania, “Science Inspires Series”, October 1, 2015, Indiana, PA, USA.

51. “2D materials research for beyond CMOS devices,” **R.M.Wallace**, University of Sonora, March 11, 2015, Hermosilla, MX

50. “US-Ireland R&D Partnership Experiences,” **R. M. Wallace**, Science Foundation Ireland St. Patrick's Day Science Medal Award Celebration, March 16, 2015, Washington, DC

49. “In-situ studies of low reactivity 2D surfaces: Defects, functionalization, and device implications,” **R.M. Wallace**, National Science Foundation US-Ireland R&D Partnership Programme Workshop, September 30-October 1, 2014, Dublin, Ireland

48. “Properties and Characterization of 2D Materials,” **R.M. Wallace**, Sejong University, May 22, 2014, Seoul, S. Korea

47. "Properties and Characterization of 2D Materials," **R.M. Wallace**, Ulsan National Institute of Science and Technology, May 20, 2014, Ulsan, S. Korea
46. "Controlling the Atomic Layer Deposition of Titanium Dioxide on Silicon: Dependence on Surface Termination," S. McDonnell, R. C. Longo, O. Seitz, J. B. Ballard, G. Mordi, D. Dick, J. H. G. Owen, J.N. Randall, J. Kim, Y. J. Chabal, K. Cho, and **R. M. Wallace**, Ultratech/Cambridge NanoTech Annual ALD User Group Meeting, April 2, 2014, Stanford University, Stanford, CA, USA
45. "Properties and Characterization of 2D Materials," **R.M. Wallace**, 1st Workshop of UTD-KMU INFUSION Center - Multifunctional Flexible Electronics Applications, February 5-6, 2014, Seoul, Korea
44. "Functionalization of MoS₂ Surfaces for High-k Atomic Layer Deposition," S. McDonnell, A. Azcatl, C. Buie, N. Lu, J. Kim, C.L. Hinkle, M.J. Kim, **R.M. Wallace**, Army Research Laboratory, December 12, 2013, Adelphi, MD
43. "Functionalization of MoS₂ Surfaces for High-k Atomic Layer Deposition," S. McDonnell, A. Azcatl, C. Buie, N. Lu, J. Kim, C.L. Hinkle, M.J. Kim, **R.M. Wallace**, National Institute of Standards and Technology, December 3, 2013, Washington, DC
42. "Functionalization of MoS₂ Surfaces for High-k Atomic Layer Deposition," S. McDonnell, A. Azcatl, C. Buie, N. Lu, J. Kim, C.L. Hinkle, M.J. Kim, **R.M. Wallace**, University of Tokyo, November 11, 2013, Tokyo, Japan.
41. "In-situ studies of Post-Si CMOS Interfaces: InAs to MoS₂," **R.M. Wallace** 2013 Seoul National University, August 23, 2013, Seoul, S. Korea
40. "In-situ studies of High-k/High-Mobility Interfaces," **R.M. Wallace** University of Delaware, March 4, 2013, Pittsburgh, PA, USA
39. "In-situ studies of High-k/High-Mobility Interfaces," **R.M. Wallace** University of South Florida, February 15, 2013, Pittsburgh, PA, USA
38. "In-situ studies of High-k/High-Mobility Interfaces," **R.M. Wallace** Carnegie Mellon University, November 15, 2010, Pittsburgh, PA, USA
37. "In-situ studies of High-k/High-Mobility Interfaces," **R.M. Wallace** IMEC, November 2, 2010, Leuven, Belgium
36. "Materials Science of Graphene for Novel Device Applications," E.M.Vogel. S.Y.Park, M.J.Kim, Y.J.Chabal, **R.M. Wallace**, J. Kim, K.J.Cho, Nanoelectronics Research Initiative e-Workshop, July 28, 2009.
35. "Surface science studies for graphene-based devices," **R. M. Wallace**, Texas Instruments, Dallas, Texas, June 5, 2009.
34. "In-situ studies Oxide/III-V Interfaces," **R. M. Wallace**, College of Nanoscale Science and Engineering, University at Albany, May 11, 2009, Albany, NY, USA.
33. "High-k gate dielectrics and high-mobility substrates," **R. M. Wallace**, Queen's University, Belfast, Ireland, February 1, 2008

32. “High-k gate dielectrics and high-mobility substrates,” **R. M. Wallace**, Tyndall National Institute, Cork, Ireland, January 30, 2008.
31. “High-k gate dielectrics and high-mobility substrates,” **R. M. Wallace**, Dublin City University, Dublin, Ireland, January 28, 2008
30. “Gate Stack Stability Research at the University of Texas at Dallas,” **R.M. Wallace**, Rutgers University, December 15, 2006.
29. “Gate Stack Materials Integration Studies at UT-Dallas,” **R.M. Wallace**, IBM –Yorktown Heights, NY, March 8, 2005
28. “Gate Stack Materials Integration Studies at UT-Dallas,” **R.M. Wallace**, Yale University, New Haven, CT, March 9, 2005
27. “Gate Stack Integration for Advanced ULSI,” **R.M. Wallace**, University of Kentucky, February 25, 2005
- “Interdiffusion Studies of High-k Gate Dielectric Stack Constituents,” **R. M. Wallace**, Sematech, June 23, 2005.
26. “Interdiffusion Studies of High-k Gate Dielectric Stack Constituents,” **R. M. Wallace**, University of Texas at Arlington, June 24, 2005.
25. Nanoelectronic Materials Research, **R.M. Wallace**, SPRING Taiwan Workshop, UT-Dallas, August 8, 2005
24. “Interdiffusion Studies of High-k Gate Dielectric Stack Constituents,” **R. M. Wallace**, Selete Consortium, Tsukuba Japan, September 19, 2005
23. National Institute of Materials Science, **R.M.Wallace**, Tsukuba, Japan, September 20, 2005
22. Sematech International Advanced Gate Stack Workshop, **R.M.Wallace**, Austin, TX, September 26-28, 2005 (Invited Panelist)
21. “Electronic Materials Research at UT-Dallas,” **R.M. Wallace**, Physics Department Colloquium, University of Texas at Austin, October 11, 2005
20. “Electronic Materials Integration,” **R.M. Wallace**, University of Notre Dame, November 29, 2005
19. “Issues for Gate Dielectrics,” **R. M. Wallace**, Workshop on Complex Oxides Theme for the DoE Center for Nanoscale Materials at Argonne National Laboratory, October 1, 2003, Argonne, IL.
18. “Challenges for the Integration of High-k Dielectrics,” **R.M.W allace**, Solid State Technology and Devices Seminar, Dept. of Electrical Engineering and Computer Science, April 4, 2003, University of California, Berkeley, CA.
17. “Looking at “Practical Standards for Surface Analysis,” **R.M. Wallace**, ATSM –E42 Annual Meeting, November 3, 2002, Denver CO, USA*
16. “Low Temperature Deposition of Hafnium Silicate Gate Dielectrics for TFTs on Plastic Substrates,” B.E. Gnade, G. Pant, P. Panchaipecth, and **R.M. Wallace**, LEOS 2002 – 15th Annual Meeting of the IEEE Lasers & Electro-Optics Society, Glasgow, Scotland, Nov. 2002.*
<https://doi.org/10.1109/LEOS.2002.1134049>

15. "Critical Materials Issues for CMOS Transistor Scaling," **R.M. Wallace**, 2002 Texas Systems Day, September 28, 2002, University of Texas at Arlington
14. "A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics," **R.M. Wallace**, Air Force and Sandia National Laboratories, March 5, 2002, Albuquerque, NM.
13. "A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics," **R.M. Wallace**, Texas Christian University, February 19, 2002.
12. "A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics," **R.M. Wallace**, University of Houston, November 16, 2001.
11. "A Grand Challenge for CMOS Scaling: Alternate Gate Dielectrics," **R.M. Wallace**, Texas Tech University, October 12, 2001.
10. "High- k gate dielectrics: Materials properties considerations and recent results," **R.M. Wallace**, National Institute of Standards and Technology, May 22, 2001.
9. "Advanced Silicate Gate Dielectrics and Photoemission Studies," **R.M. Wallace**, SEMATECH Lab Managers Meeting, Texas Instruments, Dallas, March 7, 2000.
8. "Novel High K Permittivity Gate Dielectric Materials for Advanced Microelectronics," **R.M. Wallace**, SEMATECH/SRC Front End Processes Technical Advisory Group, Austin, February 8, 2000.
7. "Materials Challenges for Future Device Technologies," **R.M. Wallace**, Materials Science Department Colloquium, University of North Texas, November, 1998.
6. "Materials Challenges for Future Device Technologies," **R.M. Wallace**, Electrical Engineering Department Colloquium, University of Texas at Arlington, October, 1998.
5. "Materials Challenges for Future Device Technologies," **R.M. Wallace**, Physics Department Colloquium, University of Central Florida, September, 1998.
4. "Surface science studies of ultrathin silicon oxide films," **R.M. Wallace**, 26th symposium on Applied Vacuum Science and Technology, Orlando, 1998.
3. "Physical and electrical characterization of a deuterium sintering process," **R.M. Wallace**, 2nd Deuterium Workshop, University of Illinois at Urbana-Champaign, 1998.
2. "Energetics of void growth in SiO₂ on Si(100)," **R.M. Wallace**, Gordon Research Conference on Surface Chemical Reactions, Ventura, 1997.
1. "Energetics of void enlargement in thermally grown ultrathin Si-oxide on Si(001)," **R.M. Wallace**, 1st Air Force Phillips Laboratory Si/SiO₂ Workshop, 1996.

Patents Issued as Inventor and Co-inventor

Patent Citations to date (December 2016): >2300 (h=21)

45. 8,461,028 (2013) Synthesizing Graphene from Metal-Carbon Solutions Using Ion Implantation
L. Colombo, **R.M. Wallace**, and R. Ruoff
44. 8,309,438 (2012) Synthesizing Graphene from Metal-Carbon Solutions Using Ion Implantation
L. Colombo, **R.M. Wallace**, and R. Ruoff
43. 7,288,171 (2007) Method for using field emitter arrays in chemical and biological hazard mitigation and remediation
B.E.Gnade and **R.M. Wallace**
42. 7,115,461 (2006) High permittivity silicate gate dielectric
J.M.Anthony, S.R.Summerfelt, G.D.Wilk and **R.M. Wallace**
41. 7,030,038 (2006) Low Temperature Method for forming a thin, uniform oxide
G.D. Wilk, **R.M. Wallace** and B.P.S.Brar
40. 6,933,235 (2005) Method for removing contaminants from a substrate
M. A. Quevedo-Lopez, **R.M. Wallace**, M. El-Bouanani, and B.E.Gnade
39. 6,897,105 (2005) Method of forming metal oxide gate structures and capacitor electrodes
G.D.Wilk; **R.M. Wallace**; J.M. Anthony; and P. McIntyre
38. 6,841,439 (2005) High permittivity silicate gate dielectric
J.M.Anthony, S.R.Summerfelt, G.D.Wilk and **R.M. Wallace**
37. 6,784,507 (2004) Gate Structure and Method
R.M. Wallace and B.E.Gnade
36. 6,730,977 (2004) Lower temperature method for forming high quality silicon-nitrogen dielectrics
G.D.Wilk, J.M.Anthony, Y.Wei, and **R.M. Wallace**
35. 6,624,944 (2003) Fluorinated coating for an optical element (>80 citations)
R.M. Wallace, M.W.Cowens and S.A.Henck
34. 6,613,698 (2003) Low temperature methods for forming high quality silicon-nitrogen dielectrics
G.D. Wilk, J.M.Anthony, Y.Wei and **R.M. Wallace**
33. 6,552,388 (2003) Hafnium Nitride Gate Dielectric
G.D.Wilk and **R.M. Wallace**
32. 6,468,856 (2002) High charge storage density integrated circuit capacitor
R.M. Wallace, G.D.Wilk, M.Anthony, D-L. Kwong
31. 6,436,801 (2002) Hafnium Nitride Gate Dielectric
G.D.Wilk and **R.M. Wallace**
30. 6,420,729 (2001) Process to produce ultrathin crystalline silicon nitride on Si(111) for advanced gate dielectrics
R.M. Wallace, G.D. Wilk, Y.Wei and S.V.Hattangady

29. 6,335,238 (2002) Integrated dielectric and method
S.V.Hanttangady, **R.M. Wallace**, B.E.Gnade and Y.Okuno
28. 6,291,867 (2001) Zirconium and/or hafnium silicon-oxynitride gate dielectric (>80 citations)
R.M. Wallace, R.A.Stolz and G.D. Wilk
27. 6,291,866 (2001) Zirconium and/or hafnium oxynitride gate dielectric (>80 citations)
R.M. Wallace, R.A.Stolz and G.D. Wilk
26. 6,277,681 (2001) Process to produce ultrathin crystalline silicon nitride on Si(111) for advanced gate dielectrics
R.M. Wallace, G.D. Wilk, Y.Weii and S.V.Hattangady
25. 6,274,510 (2001) Low temperature methods for forming high quality silicon-nitrogen dielectrics
G.D. Wilk, J.M.Anthony, Y.Weii and **R.M. Wallace**
24. 6,258,637 (2001) Method for thin film deposition on single-crystal semiconductor substrates
G.D. Wilk, Y.Weii and **R.M. Wallace**
23. 6,245,606 (2001) Low Temperature method for forming a thin, uniform layer of aluminum oxide
G.D. Wilk and **R.M. Wallace**
22. 6,159,829 (2000): Memory device using movement of protons
W. L. Warren, K.L.Vanheusden, D.M.Fleetwood, R.A.B.Devine, L.B.Archer, G.A.Brown, **R.M. Wallace**
21. 6,150,242 (2000): Method of growing crystalline silicon overlayers on thin amorphous silicon oxide layers and forming by method a resonant tunneling diode
J.P.Van der Wagt, G.D.Wilk and **R.M. Wallace**
20. 6,143,634 (2000): Semiconductor process with deuterium predominance at high temperature
R.M. Wallace and P.J.Chen
19. 6,140,243 (2000): Low temperature process for post-etch defluoridation of metals
R.M. Wallace, P.J.Chen, S.C.Baber, S.A.Henck
18. 6,071,751 (2000): Deuterium Sintering with Rapid Quenching
R.M. Wallace and K.C.Harvey
17. 6,040,230 (2000): Method of forming a nano-rugged silicon-containing layer
J.M.Anthony, **R.M. Wallace**, Y.Weii and G.D.Wilk
16. 6,024,801 (2000): Method of cleaning and treating a semiconductor device including a micromechanical device. (>90 citations)
R.M. Wallace and M.A.Douglas
15. 6,020,247 (2000): Method for thin film deposition on single-crystal semiconductor substrates
G.D.Wilk, Y.Weii and **R.M. Wallace**
14. 6,020,243 (2000): Zirconium and/or Hafnium Silicon-Oxynitride Gate Dielectric (>200 citations)
R.M. Wallace, R.A.Stolz and G.D.Wilk
13. 6,013,553 (2000): Zirconium and/or Hafnium Oxynitride Gate Dielectric (>250 citations)
R.M. Wallace, R.A.Stolz and G.D.Wilk
12. 5,830,532 (1998): Method to Produce Ultrathin Porous Silicon-Oxide Layer
S.Tang, **R.M. Wallace**, and Y.Weii

11. 5,689,151 (1997): Anode plate for Flat Panel Display having integrated getter
R.M. Wallace, J.M.Anthony, C.-C.Cho, B.E. Gnade
10. 5,614,785 (1997): Anode plate for Flat Panel Display having silicon getter (>50 citations)
R.M. Wallace, B.E.Gnade and W.P.Kirk
9. 5,610,438 (1997): Micro-mechanical device with non-evaporable getter (>250 citations)
R.M. Wallace and D.A.Webb
8. 5,606,177 (1997): Silicon oxide resonant tunneling diode structure (>100 citations)
R.M. Wallace and A. C. Seabaugh
7. 5,523,878 (1996): Self-Assembled Monolayer Coating for Micro-Mechanical Devices (>50 citations)
R.M. Wallace, D.A.Webb and B.E.Gnade
6. 5,520,563 (1996): Method of making a field emission device anode having an integrated getter
R.M. Wallace, B.E. Gnade, C.C. Shen, J. D.Levine, and R.H. Taylor
5. 5,512,374 (1996): PFPE Coatings for Micro-mechanical Devices (>90 citations)
R.M. Wallace, S.A.Henck and D.A.Webb
4. 5,482,564 (1996): Method of Unsticking Components of Micro-mechanical Devices (>100 citations)
M.A.Douglas and **R.M. Wallace**
3. 5,453,659 (1995): Anode plate for Flat Panel Display having integrated getter (>60 citations)
R.M. Wallace, B.E. Gnade, C.C. Shen, J. D.Levine, and R.H. Taylor
2. 5,352,330 (1994): Process for Producing Nanometer-Size Structures on Surfaces Using Electron Beam Induced Chemistry through Electron Stimulated Desorption
R.M. Wallace
1. 5,316,793 (1994): Directed Effusive Beam Atomic Layer Epitaxy System and Method (>80 citations)
R.M. Wallace and B.E.Gnade

**Foreign Patents/Applications as Inventor and Co-inventor
(as of 2002, EU patents are now applicable in 24 countries)**

27. JP 2003188275 (2003): Gate structure and method of forming the same
R.M. Wallace and B.E.Gnade
26. EP 1298712 (2003): Gate structure and method of forming the same
R.M. Wallace and B.E.Gnade
25. DE69524815T (2002): Improvements in or relating to micro-mechanical devices
M.A.Douglas and **R.M. Wallace**
24. TW402779 (2000): High Permittivity Silicate Gate Dielectric
J.M.Anthony, G.D.Wilk, S.R.Summerfelt and **R.M. Wallace**
23. JP2000049349 (2000): Manufacture for field-effect device in integrated circuit
R.M. Wallace, R.A.Stolz and G.D.Wilk
22. JP2000058832 (2000): Oxyzirconium nitride and/or hafnium gate dielectrics
R.M. Wallace, R.A.Stolz and G.D.Wilk

21. JP11283975 (1999): Low temperature method for forming a uniform thin oxide layer
B.Brar, G.D.Wilk and **R.M. Wallace**
20. JP11135774 (1999): High Permittivity Silicate Gate Dielectric
J.M.Anthony, G.D.Wilk, S.R.Summerfelt and **R.M. Wallace**
19. EP746013A3 (1999): Method of cleaning and treating a micromechanical device
R.M. Wallace and M.A.Douglas
18. JP10189554A2 (1998): Defluorinating process
R.M. Wallace, P.J.Chen, S.C.Baber and S.A.Henck
17. EP0851474/A2/A3 (1998): Improvements in or relating to integrated circuits
R.M. Wallace, S.C.Baber, P.J.Chen and S.A.Henck
16. EP0828287/A3 (1998): Improvements in or relating to semiconductors
Y.Weï, G.D.Wilk and **R.M. Wallace**
15. JP10079376 (1998): Method of depositing thin film on single crystalline semiconductor substrate
Y.Weï, G.D.Wilk and **R.M. Wallace**
14. EP0911869 (1997): Low temperature method for forming a uniform thin oxide layer
B.Brar, G.D.Wilk and **R.M. Wallace**
13. CN1149190A (1997): Method of unsticking components of micro-mechanical devices
M.A.Douglas and **R.M. Wallace**
12. JP8086969A2 (1996): Method for preventing tacky adhesion of parts of micromechanical device
M.A.Douglas and **R.M. Wallace**
11. EP746013A2 (1996): Method of cleaning and treating a micromechanical device
R.M. Wallace and M.A.Douglas
10. EP0690330 (1996): improvements in or relating to micro-mechanical devices
B.E.Gnade, D.A.Webb and **R.M. Wallace** (equivalents: CA2149952, CN1120990, JP8082755)
9. JP8330266A2 (1996): Method of cleaning and treating surface of semiconductor device or the like
R.M. Wallace and M.A.Douglas
8. JP8082754A2 (1996): Self-assembly type monolayer coating for micromechanical device
R.M. Wallace, D.A.Webb and B.E.Gnade
7. JP8171877A2 (1996): Anode plate for flat panel display with integrated getter
R.M. Wallace, B.E. Gnade, C.C. Shen, J. D.Levine, and R.H. Taylor
6. EP689076A1 (1995): Improvements in or relating to micro-mechanical devices
M.A.Douglas and **R.M. Wallace** (equivalents: CA2149934, CN1149190, JP8086969)
5. CA2149934AA (1995): Method of unsticking components of micro-mechanical devices
M.A.Douglas and **R.M. Wallace**
4. JP7318819A2 (1995): PFPE coating for micromechanical device
R.M. Wallace, S.A.Henck and D.A.Webb
3. EP686992A1(1995): Display device

R.M. Wallace, B.E. Gnade, C.C. Shen, J. D.Levine, and R.H. Taylor

2. JP7022359A2 (1995): Method of forming nanometer-size structure on surface, using electron beam induced chemistry with electron-excited desorption

R.M. Wallace

1. JP6224138A2 (1994): Atomic-layer epitaxy device

R.M. Wallace and B.E.Gnade

Received Grants/Contracts for R.M.Wallace

Beginning-Ending date	Title	Agency	Amount
1) 11/99 – 10/02	Silicates for Advanced Alternate Gate Dielectrics	Semiconductor Research Corp.	\$275,000
	Matching Capital Equipment	HEAF ^a	\$50,000
<i>R. Wallace(PI) with B.Gnade (Co-PI)</i>			
2) 10/99-09/01	Silicates for Advanced Gate Dielectrics	Texas Advanced Technology Program	\$296,541
	Matching Capital Equipment	UNT Portion HEAF	\$186,000 \$50,000
<i>R. Wallace (PI) with B.Gnade (Co-PI) and W. Kirk (Co-PI) – UT Arlington</i>			
3) 07/00 – 07/02	Silicates and Germanates for Advanced Alternate Gate and Capacitor Dielectrics	DARPA UNT Portion	\$696,000 \$506,000
	Matching Capital Equipment	HEAF	\$75,000
<i>R. Wallace (PI) with B.Gnade (Co-PI)</i>			
4) 01/00 – 12/00	Vacuum Maintenance for Field Emission Displays	Motorola	\$20,200
<i>B.Gnade (PI) with R. Wallace (Co-PI)</i>			
5) 03/00 – 02/01	Robust Materials for field emission arrays	PixTech	\$50,250
	Matching Capital Equipment	HEAF	\$15,000
<i>B.Gnade (PI) with R. Wallace (Co-PI)</i>			
6) 09/00 – 08/03	Low Temperature Dielectrics for Polycrystalline Silicon Thin-Film Transistors on Plastic Substrates	U.S. Army Soldier Systems Center	\$487,095
	Matching Capital Equipment	HEAF	\$70,000
<i>B.Gnade (PI) with R. Wallace (Co-PI)</i>			
7) 09/00 – 08/03	Very High Information Content Displays for Ultra High Definition Systems	U.S. Army Soldier Systems Center	\$1,348,399
	Matching Capital Equipment	HEAF	\$70,000
<i>B.Gnade (PI) with R. Wallace (Co-PI) and T. Akinwande (Co-PI) MIT \$900,000 subcontract to MIT</i>			
8) 11/00-10/02	Active devices on fiber: Building blocks for computational fabric	U.S. Army Soldier Systems Center	\$1,014,824
	Matching Capital Equipment	HEAF	\$72,000
<i>B.Gnade (PI) with R. Wallace (Co-PI), T. Akinwande (Co-PI) MIT, S.Wagner (Co-PI)Princeton, G.Parsons (Co-PI)NCSU \$800,000 subcontract to MIT, Princeton, NCSU</i>			

^a HEAF – “Higher Education Assistance Fund”; funding from the State of Texas, administered by the University, in support of research activities.

Robert M. Wallace –Extramural Funding

9) 11/00-10/04	Self-Assembly Approaches to Molecular Devices	Naval Research Labs/DARPA	\$614,569
	Matching Capital Equipment	HEAF	\$95,000
<i>R. Shashidar (PI) NRL with B. Ratna (Co-PI) NRL, J. Naciri (Co-PI) NRL, B. Gnade (Co-PI), R. Wallace (Co-PI), G. G. Milliaras (Co-PI) Cornell, J. Johnson (Co-PI) Scripps Institute</i>			
10) 09/99 – 08/00	Novel High-Permittivity Gate Dielectric Materials	Faculty Research Grant (UNT)	\$5,000
11) 09/00 – 08/01	Silicates as Alternate Gate Dielectrics for wide bandgap semiconductors	Faculty Research Grant (UNT)	\$5,000
12) 01/02-12/04	Metal Gate Electrodes for High-k dielectric stacks	Texas Advanced Technology Program	\$223,000
	Matching Capital Equipment	HEAF	\$50,000
<i>R. Wallace (PI) with L. Trombetta (Co-PI; U of Houston)</i>			
13) 09/01-08/06	Reduced Stiction in MEMS devices	NIST-ATP with Zyvex Corp.	\$400,000
<i>B. Gnade (PI) with R. Wallace (Co-PI)</i>			
14) 04/02 – 12/04	REU Site for Electronic Materials	NSF	\$264,498
<i>J. Duggan (PI) with R. Wallace (Co-PI), M. ElBouanani (Co-PI)</i>			
15) 12/01 – 11/02	Organic Transistors on Threads	SRC	\$40K
<i>B. Gnade (PI) with R. Wallace (Co-PI)</i>			
16) 5/2003	Unrestricted Gift	Texas Instruments	\$50K
<i>R. Wallace (PI)</i>			
17) 5/2003	Planning Visit – US – Brazil Research	NSF	\$3K
<i>R. Wallace (PI)</i>			
18) 4/2004-4/2006	Diffusion of Gate Stack Constituents	SRC	\$161K
<i>R. Wallace (PI)</i>			
19) 1/2004-1/2006	Mobility Degradation Mechanisms in Advanced High-k CMOS Devices	TATP	\$190K
<i>R. Wallace (Co-PI) and W. Kirk (Co-PI; UTA)</i>			
20) 7/2004 – 7/2007	Hf-based metal gate stack stability research	SRC	\$210K

Robert M. Wallace –Extramural Funding

R.M.Wallace(PI) and B.E.Gnade (Co-PI)

21) 7/2004-7/2007	Role of Microstructure in Metal Gates	SRC	\$210K
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B.E.Gnade (PI), R.M.Wallace (Co-PI) and M.J.Kim (Co-PI)

22) 10/2004 – 02/2005	Materials and Supplies for SRC Research	SRC	\$40K
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B.E.Gnade (PI) and R.M.Wallace (Co-PI)

23) 9/2004-2/2005	X-ray Diffraction Suite	VonEhr Foundation \$485K	
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R.M.Wallace (PI)

24) 9/2004	Plasma Enhanced Chemical Vapor Deposition Tool	Mykrolis Corporation \$99K	
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R.M.Wallace (PI)

25) 3/2004-3/2008	Field Ionization Arrays based Micro Gas Analyzer	DARPA	\$3,473K
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B.E. Gnade (Co-PI), R.M. Wallace(Co-PI) and Tayo Akinwande (MIT - PI)

26) 6/2005	Monochromatic X-ray Photoelectron Spectrometer System	Texas Instruments, Inc. \$426K	
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R.M.Wallace (PI)

27) 7/2005 – 7/2008	Hydrogen barrier studies for FeRAM devices	SRC	\$228K
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R.M.Wallace (PI) and B.E.Gnade (CoPI)

28) 9/2006 – 9/2009	Surface science of high mobility channel materials – MARCO MSD Center	MARCO	\$378K \$21.3M total
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R.M.Wallace (PI) – subcontract to MIT

29) 4/2007 – 5/2008	Atomic Layer Deposition Studies	Rohm & Haas	\$112K
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J. Kim (PI) and R.M.Wallace (Co-PI)

Robert M. Wallace –Extramural Funding

30) 5/2007 – 5/2008 <i>R.M.Wallace (PI)</i>	Atomically Precise Machining	DARPA/Zyvex	\$100K
31) 8/2008 – 6/2013	Nanoscale Tip-based Manufacturing	DARPA/Zyvex	\$1788K (UTD Portion) \$13.2M Total
<i>R.M.Wallace (PI), Y. Chabal and K.J.Cho (Co-PI's)</i>			
31) 3/2008 – 3/2009	Atomic Layer Deposition Precursor Studies	Rohm and Haas	\$93K
<i>J. Kim (PI) and R.M.Wallace (Co-PI)</i>			
32) 8/2008 – 8/2011	Ferroelectric Barrier Studies	SRC	\$165K
<i>J. Kim (PI) and R.M.Wallace (Co-PI)</i>			
33) 6/2008 – 6/2009	MOS Transistor Process Integration	Sematech	\$100K
<i>R.M.Wallace (PI) and J. Kim, E.M.Vogel (Co-PI)</i>			
34) 06/2008 – 06/2012	Future Semiconductor Commercialization	Texas ETF	\$5000K
<i>M.Kim, (PI) J.Kim, B.Gnade, E.Vogel, R.M.Wallace (Co-PI)</i>			
35) 06/2008 – 06/2012	Future Semiconductor Commercialization	Korea MKE	\$6000K
<i>J.Kim, (PI) M.Kim, B.Gnade, E.Vogel, R.M.Wallace(Co-PI)</i>			
36) 06/2008	Surface Analysis Equipment Donation	Texas Inst.	\$400K
<i>R.M.Wallace (PI)</i>			
37) 11/2008-8/2009	National Initiative on Applications of Multifunctional Materials	ONR	\$457K
<i>R.M.Wallace (PI)</i>			
38) 4/2009-9/2010	National Initiative on Applications of Multifunctional Materials	ONR	\$457K
<i>R.M.Wallace (PI)</i>			

Robert M. Wallace –Extramural Funding

39) 8/2009	Molecular Beam Epitaxy Donation	UT Arlington	\$1.3M
<i>R.M.Wallace (PI), W.P.Kirk (Co-PI)</i>			
40) 4/2008 – 3/2011	Southwest Academy of Nanoelectronics	NRI	\$673K
<i>E.M.Vogel (PI), Y.Chabal, K.J.Cho, J.Kim, M.Kim, R.M.Wallace (Co-PI)</i>			
41) 4/2008-3/2011	Midwest Institute of Nanoelectronics and Discovery	NRI	\$167K
<i>R.M.Wallace (PI), Co-PI (J.Kim)</i>			
42) 9/2009-9/2013	US-Ireland collaborative research on Future Oxides and Channel materials for Ultimate Scaling (FOCUS)	NSF	\$330K
<i>R.M.Wallace (PI), Y.Chabal (Co-PI)</i>			
43) 11/2009-11/2012	Surface science of high mobility channel materials – MARCO MSD Center	FCRP	\$815K (UTD portion)
<i>R.M.Wallace (PI), M.Fischetti (Co-PI), J.Kim (Co-PI), E.M.Vogel (Co-PI)</i>			
<i>\$18.9M Center total</i>			
44) 11/2010-11/2012	MRI Acquisition: Compound Semiconductor Reactive Ion Etcher for Functionally Diverse Materials, Structures and Devices	NSF	\$415K
<i>C. Hinkle (PI), D.MacFarlane (Co-PI), R.M.Wallace (Co-PI)</i>			
45) 03/2011-03/2013	Southwest Academy of Nanoelectronics	NRI	\$540K
<i>R.M.Wallace (PI), J.Kim, M.Kim, (Co-PI)</i>			
46) 03/2011-03/2013	Midwest Institute of Nanoelectronics and Discovery	NRI	\$197K
<i>R.M.Wallace (PI), Co-PI (J.Kim)</i>			
47) 01/2013-01/2018	Center for Low Energy Systems Technology	StarNET	\$3.5M
<i>R.M.Wallace (PI), K.Cho, M.Kim, (Co-PI)</i>			
48) 05/2013-12/2017	Southwest Academy of Nanoelectronics 2.0	NRI	\$3.3M
<i>R.M.Wallace (PI), C. Hinkle, M. Fischetti, J. Kim, M.Kim, (Co-PI)</i>			

Robert M. Wallace –Extramural Funding

49) 07/2011-1/2015 <i>R.M.Wallace (PI)</i>	Air Force Office of Scientific Research	\$270K
49) 06/2014-12/2015 <i>R.M.Wallace (PI)</i>	Air Force Office of Scientific Research	\$60K
50) 06/2014-11/2017 <i>R.M.Wallace (PI), C. Young (Co-PI)</i>	Air Force Office of Scientific Research	\$290K
51) 09/2014-05/2018 <i>R.M.Wallace (PI), C. Hinkle, C. Young (Co-PI)</i>	"Understanding the Nature of Interfaces in Two Dimensional Electronic Devices(UNITE), NSF	\$420K
52) 10/2015-09/2017 <i>R.M.Wallace (PI)</i>	"Feasibility of Crystalline Oxide Passivation for In _x Ga _{1-x} As Surface for III-V MOSFET application" Samsung Semiconductor, Inc.	\$144K

**TOTAL EXTERNAL FUNDING AS PI/CO-PI GENERATED AT UNIVERSITY SINCE 1999:
>\$ 28M**

**ASSOCIATED AS PI/CO-PI WITH TOTAL EXTERNAL AWARDS SINCE 1999:
>\$ 80M**