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Institute for Space and Defense Electronics
Electrical Engineering and Computer Science Department
Vanderbilt University
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EDUCATION

1986	Ph.D. (Electrical Engineering), University of Minnesota
1984	Master of Science in Electrical Engineering, University of Minnesota
1981	Bachelor of Electrical Engineering with Distinction, University of Minnesota

EMPLOYMENT

Vanderbilt University

9/08-present	Orrin Henry Ingram Professor of Engineering
9/07-5/12	Faculty Head of House, Memorial House
9/02-present	Director, Institute for Space and Defense Electronics
9/96-present	Professor of Electrical Engineering

University of Arizona

8/96-9/96	Professor of Electrical and Computer Engineering
8/91-8/96	Associate Professor of Electrical and Computer Engineering
8/86-8/91	Assistant Professor of Electrical and Computer Engineering

University of Minnesota

9/81-7/86	Research Assistant
9/77-6/81	Laboratory Technician, Microelectronics Laboratory

RESEARCH

Ron Schrimpf's research activities focus on microelectronics and semiconductor devices. In particular, he has a very active research program dealing with the effects of radiation on semiconductor devices and integrated circuits, with cumulative funding of greater than \$60 million while at Vanderbilt. Projects include semiconductor-device design and simulation, atomic-scale analysis of radiation-induced defects, application and development of design and simulation tools for radiation effects, total-dose and single-event effects in electronic devices and circuits, and development of radiation-effects and hardness-assurance test methodologies. Ron has served as the Principal Investigator for numerous programs, including two Multi-Disciplinary University Research Initiative (MURI) programs, which have included researchers

from Arizona State University, Georgia Tech University, Rutgers University, North Carolina State University, Ohio State University, the University of California–Santa Barbara, and the University of Florida. Ron also is a founding Principal Investigator and represents the School of Engineering in Vanderbilt’s Advanced Computing Center for Research and Education, a high-performance computing center with approximately 6,000 cores.

TEACHING

Ron Schrimpf teaches courses on semiconductor devices, semiconductor materials, integrated-circuit manufacturing, and audio engineering. He also has taught a freshman seminar on high-fidelity sound reproduction and has led sections of the Vanderbilt Visions program for freshmen. He originated and developed VU’s course on audio engineering, which integrates material from multiple sub-disciplines within engineering and is based on his personal interest in high fidelity music reproduction. Ron received the Vanderbilt University School of Engineering Outstanding Teaching Award in 2008.

MANAGEMENT

Ron Schrimpf is the founding Director of Vanderbilt’s Institute for Space and Defense Electronics (ISDE), which involves ten faculty members, twelve research and staff engineers, and approximately thirty graduate students. ISDE was formed in 2002 with the goal of applying the research conducted in Vanderbilt’s Radiation Effects and Reliability Group to the practical problems of companies and governmental organizations. The Radiation Effects and Reliability Group at Vanderbilt is the largest of its type at any US University. As Director of ISDE, Ron is responsible for managing the finances, hiring, and technical activities of an organization with typical annual expenditures of \$5-6 million.

FACULTY HEAD OF HOUSE

Ron was the first Faculty Head of House for Memorial House in Vanderbilt’s residential college program for first-year students: The Martha Rivers Ingram Commons. The Ingram Commons is located on Vanderbilt’s Peabody Campus and it comprises ten Houses, the Commons Center, and a residence for the Dean of the Commons. Each of the Houses has a Faculty Head who lives in an apartment in the House and participates in the life of the House. Ron led Memorial House with his wife, Kathy. Each House includes students from all four undergraduate schools; for incoming engineering students, this builds on Vanderbilt’s tradition of offering an outstanding engineering education that is fully integrated into the overall University experience. Students in the Ingram Commons benefit from opportunities to interact with Vanderbilt’s faculty and visiting researchers in an informal setting. Discussions, receptions, and meals at which students mingle with faculty serve as a catalyst for this type of interaction. The participation of faculty from all of Vanderbilt’s undergraduate, graduate, and professional schools gives students access to information that they would be unlikely to encounter in a conventional undergraduate experience.

HONORS AND AWARDS

- Chancellor's Cup, Vanderbilt University, 2010. The Chancellor's Cup is given annually for "the greatest contribution outside the classroom to undergraduate student-faculty relationships in the recent past." The faculty member's contribution "shall be one of educational importance, relevant to the central purpose of the University."
- Harvey Branscomb Distinguished Professor Award, Vanderbilt University, 2008-09. The purpose of the award is "to recognize, and thereby to encourage in others, that combination of talents and achievements which we identify as desirable in the University faculty member: creative scholarship; stimulating and inspiring teaching which results in learning of a high order; and service to students, colleagues, the University at large, and society at large."
- Outstanding Teaching Award, Vanderbilt University School of Engineering, 2008.
- Chancellor's Award for Research, Vanderbilt University, 2003. The Chancellor's Awards for Research recognize excellence in research, scholarship, or creative expression.
- "Yuri Gagarin First Spaceflight 50th Anniversary" medal from the Cosmonautics Federation of Russia for contributions to promoting international cooperation related to space electronics, 2011.
- Guest Professor of the Institute of Microelectronics, Chinese Academy of Science, Beijing, China, 2014-present
- Guest Professor of the Harbin Institute of Technology, Harbin, China, 2013-present.
- Honorary Professor of the Xinjiang Technical Institute of Physics and Chemistry, Urumqi, China, 2013-present.
- Honored Professor of the Shanghai Institute of Microsystem and Information Technology, part of the China Academy of Science, 2011-present.
- Outstanding Faculty Award presented at Vanderbilt-MTSU football game, 2002.
- Elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) in 2000 "for contributions to the understanding and the modeling of physical mechanisms governing the response of semiconductor devices to radiation exposure."
- Invited Professor, Université Montpellier II, France, 2000.
- IEEE Nuclear and Plasma Sciences Society Early Achievement Award, 1996. The purpose of the award is "to recognize outstanding contributions to any of the fields making up Nuclear and Plasma Sciences, within the first ten years of an individual's career."
- Outstanding Paper Awards, 1991, 1996, 1998, 2007, and 2013 IEEE Nuclear and Space Radiation Effects Conferences.
- Outstanding Paper Awards, 2007 and 2009 RADECS (Radiation Effects on Components and Systems) Conferences.
- Meritorious Paper Awards, 1994, 1995, 1996, 1997, 2001, and 2002 IEEE Nuclear and Space Radiation Effects Conferences.
- Outstanding Oral Presentation, 1995 IEEE Nuclear and Space Radiation Effects Conference.
- Outstanding Poster Presentation, 1995 IEEE Nuclear and Space Radiation Effects Conference.
- Outstanding Paper Award, Power Semiconductors, 1989 IEEE Industrial Applications Conference.
- American Electronics Association Faculty Development Fellowship, 1985.
- Tau Beta Pi (Elected 10/80); Eta Kappa Nu (Elected 10/79).

SELECTED PROFESSIONAL ACTIVITIES

- Chairman, IEEE Radiation Effects Steering Group, 2003-2006.
- Past Chairman, IEEE Radiation Effects Steering Group, 2006-2009.
- Executive Vice Chairman, IEEE Radiation Effects Steering Group, 2000-2003.
- RADECS Liaison, IEEE Nuclear and Plasma Sciences Society (NPSS) AdCom, 2006-2010.
- Technical Chairman representing the Radiation Effects Committee, IEEE NPSS AdCom, 2003-2006.
- Member, RADECS Board, 2005-present.
- Member, IEEE Fellows Committee, 2013-2015.
- Member, Albany Nanotech Radhard Focus Center Leadership Council, 2005-2006.
- Member, External Advisory Board, Prairie View A&M NSF Electronics Center.
- General Chairman, 1999 IEEE Nuclear and Space Radiation Effects Conference (NSREC).
- Technical Program Chairman, 1996 IEEE NSREC.
- Guest Editor, December issue of *IEEE Transactions on Nuclear Science*, 1993-95.
- Short Course presenter, 2001 NSREC, 2000 HEART (Hardened Electronics and Radiation Technology), and 2007 RADECS Conferences.
- Short Course Chairman, 2012 NSREC.
- Member, technical program committees for the 1993-94 IEEE International Electron Devices Meetings, 1988-94 IEEE Bipolar Circuits and Technology Meetings, and 2005 and 2013 RADECS Conferences.
- Member, Awards Committee for the 1990, 1992, 1997, 1998, and 2006 IEEE NSREC and 2004 and 2006 HEART Conferences.
- Awards Chairman, 2010 RADECS Conference.
- Session Chairman, 1991 IEEE NSREC.
- Member, NASA ERC review panel, 2000-02.
- Member, NASA NEPP Review Panel, 2003-04.
- Reviewer for *IEEE Transactions on Electron Devices*, *IEEE Transactions on Nuclear Science*, *IEEE Electron Device Letters*, *IEEE Transactions on Semiconductor Manufacturing*, *IEEE Transactions on Device and Materials Reliability*, *Solid-State Electronics*, *Applied Physics Letters*, *Journal of Applied Physics*, *Physica Status Solidi*, *Journal of Electrostatics*, *Int. J. High Speed Electronics and Systems*, and *Journal of Radiation Effects*.

VISITING PROFESSORS HOSTED AT VANDERBILT

Jean Gasiot, Université Montpellier II

Richard Arinero, Université Montpellier II

Sorin Cristoloveanu, Institut de Microélectronique Electromagnétisme et Photonique, Grenoble

GRADUATE STUDENTS AND POST-DOCS ADVISED AT VANDERBILT

Post-Docs

Liang Wang, Jinshun Bi, Shrinivasrao Kulkarni, Antoine Touboul, Aditya Karmarkar, Matthieu Caussanel, Bongim Jun, Bo Choi, Claude Cirba, Sungchul Lee, Yuanfu Zhao, Ken Youk.

Ph.D.

Stephanie Weeden-Wright (2014), Geoff Bennett (2014), David Hughart (2012), Nathaniel Dodds (2012), Nadia Rezzak (2012), Farah El Mamouni (2012), Brian Sierawski (2011), Matt Gadlage (2010), Aditya Kalavagunta (2009), Balaji Narasimham (2008), John Hutson (2008), Alan Tipton (2008), Aditya Karmarkar (2008), Philippe Adell (2006), Abdulrahman Albadri (2005), Christopher J. Nicklaw (2003), Manish Pagey (2003), Hugh J. Barnaby (2001).

Master of Science

Nathan Ives (2015), Charles Arutt (2014), Chundong Liang (2014), Kai Ni (2013), Stephanie Weeden-Wright (2012), Geoff Bennett (2012), David Hughart (2010), Nadia Rezzak (2010), Rajan Arora (2009), Farah El Mamouni (2009), Tania Roy (2008), Aritra Dasgupta (2008), Dakai Chen (2007), Enrique Montes (2007), Martin Rodgers (2006), Alan Tipton (2006), Vishwa Ramachandran (2006), Balaji Narasimham (2005), Aaron Kobayashi (2005), Aditya Karmarkar (2005), John Hutson (2004), John Stacey (2004), Matt Gadlage (2004), Ryan Cizmarik (2004), Dennis Ball (2003), Philippe Adell (2003), Xinwen Hu (2003), Jeremy Ralston-Good (2002), Aditya Karmarkar (2001), Ajay Raparla (2001), Jinhong Liu (2000), Yanfeng Li (2000), Hugh Barnaby (1999), Prasanna Khare (1999), Sai Mukundan (1999), Jennifer Healy-McKinney (1998) (degree awarded from University of Arizona), Russell J. Graves (1998), Andrew Wu (1997).

Master of Engineering

Lydell Evans (2007), Ahmad Al-Johani (1998).

Visiting International Students Advised at Vanderbilt

Jae-Joon Song, Thiago Assis, Marco Silvestri, Renaud Durand, Nadia Rezzak, Laurent Artola, Matthieu Bellanger, Philippe Roche, Frédéric Saigné, Jérôme Boch, Gilles Gasiot, Céline Detcheverry, Christophe Chirveche, Juliette Plassat, Lionel Bonora, Philippe Rey.

SELECTED UNIVERSITY SERVICE

Member, Environmental Advisory Committee, 2011-present.

Representative for VU at Summer Send-Off Parties in San Antonio and Huntsville organized by the VU Alumni Relations Office, 2011.

Worked with Alumni Relations Office on program to involve VU alumni in the Ingram Commons, 2010-11.

Commons Council, 2007-2012.

Steering Committee, Vanderbilt Advanced Computing Center for Research and Education (ACCRE), 2003-present.

Member, Research Advisory Committee-Information Technology, 2002-05.

Member, Vanderbilt Benefits Committee, 2004-2006.

Member, Vanderbilt Research Awards Committee, 2004-2013.

Member, Vanderbilt International Affairs Committee, 2005-2010.

Lectures on the history of audio for Homecoming/Reunion (with A.B. Bonds), 2004-05.

Member, VUSE Research Institutes and Centers Council, 2005.

Member, Strategic Academic Planning Group, 2001-03.

Chairman, Electrical and Computer Engineering Graduate Committee, 1996-2002.

Chairman, Business & Non-Academic Affairs Committee, Faculty Senate, 2000-01.
VUSE representative, Faculty Senate, 1999-2001.
Member, A&S Dean Search Committee, 2000.
VUSE representative on the University Research Council, 1998-99.

PUBLICATIONS

Ron Schrimpf has edited two books and authored or co-authored more than 480 journal articles and 200 conference papers, which have been cited more than 11,500 times (Google Scholar).

BOOKS

1. D. M. Fleetwood, S. T. Pantelides, and R. D. Schrimpf, eds., *Defects in Microelectronic Materials and Devices*, Taylor & Francis, New York, 2009.
2. R. D. Schrimpf and D. M. Fleetwood, eds., *Radiation Effects and Soft Errors in Integrated Circuits and Electronic Devices*, World Scientific, Singapore, 2004.

BOOK CHAPTERS

1. R. D. Schrimpf, "Gain Degradation and Enhanced Low-Dose-Rate Sensitivity in Bipolar Junction Transistors," in *Radiation Effects and Soft Errors in Integrated Circuits and Electronic Devices*, R. D. Schrimpf and D. M. Fleetwood, Eds. Singapore: World Scientific, 2004, pp. 219-233.
2. C. R. Cirba, J. A. Felix, K. F. Galloway, R. D. Schrimpf, D. M. Fleetwood, and S. Cristoloveanu, "Space-Radiation Effects in Advanced SOI Devices and Alternative Gate Dielectrics," in *Future Trends in Microelectronics: The Nano, the Giga, and the Ultra*, S. Luryi, J. Xu, and A. Zaslavsky, Eds. Hoboken, NJ: John Wiley & Sons, 2004, pp. 115-126.
3. R. D. Schrimpf, "Radiation Effects in Microelectronics," in *Radiation Effects on Embedded Systems*, R. Velazco, P. Fouillat, and R. Reis, Eds. Dordrecht, The Netherlands: Springer, 2007, pp. 11-29.
4. D. M. Fleetwood, S. T. Pantelides, and R. D. Schrimpf, "Oxide traps, border traps, and interface traps in SiO₂," in *Defects in Microelectronic Materials and Devices*, D. M. Fleetwood, S. T. Pantelides, and R. D. Schrimpf, Eds. New York: CRC Press, 2008, pp. 215-258.
5. R. D. Schrimpf, D. M. Fleetwood, R. L. Pease, L. Tsetseris, and S. T. Pantelides, "Impact of radiation-induced defects on bipolar device operation," in *Defects in Microelectronic Materials and Devices*, D. M. Fleetwood, S. T. Pantelides, and R. D. Schrimpf, Eds. New York: CRC Press, 2008, pp. 551-574.
6. L. Tsetseris, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Defect formation and annihilation in electronic devices and the role of hydrogen," in *Defects in Microelectronic Materials and Devices*, D. M. Fleetwood, S. T. Pantelides, and R. D. Schrimpf, Eds. New York: CRC Press, 2008, pp. 381-398.
7. K. F. Galloway and R. D. Schrimpf, "Interaction of radiation with semiconductor devices," in *Extreme Environment Electronics*, J. D. Cressler and H. A. Mantooth, Eds. Boca Raton, Florida: CRC Press, 2013, pp. 79-91.

JOURNAL ARTICLES

- [1] R. D. Schrimpf and R. M. Warner, Jr., "A Precise Scaling Length for Depleted Regions," *Solid-St. Electronics*, vol. 28, pp. 779-782, 1985.
- [2] R. M. Warner, Jr., R. D. Schrimpf, and P. D. Wang, "Explaining the Saturation of Potential Drop on the High Side of a Grossly Asymmetric Junction," *J. Appl. Phys.*, vol. 57, pp. 1239-1241, 1985.
- [3] R. D. Schrimpf, D.-H. Ju, and R. M. Warner, Jr., "Subthreshold Transconductance in the Long-Channel MOSFET," *Solid-St. Electronics*, vol. 30, pp. 1043-1048, 1987.
- [4] B. Senitzky, R. D. Schrimpf, and W. J. Kerwin, "Efficiency of Photoconductive Switches," *J. Appl. Phys.*, vol. 62, pp. 4798-4805, 1987.

- [5] R. M. Warner, Jr. and R. D. Schrimpf, "BJT-MOSFET Transconductance Comparisons," *IEEE Trans. Electron Devices*, vol. ED-34, pp. 1061-1065, 1987.
- [6] R. D. Schrimpf, P. J. Wahle, R. C. Andrews, D. B. Cooper, and K. F. Galloway, "Dose-Rate Effects on the Total-Dose Threshold-Voltage Shift of Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 35, pp. 1536-1540, 1988.
- [7] R. D. Schrimpf and R. M. Warner, Jr., "An Approximate-Analytic Solution for the Forward-Biased Step Junction," *IEEE Trans. Electron Devices*, vol. 35, pp. 698-700, 1988.
- [8] K. R. Davis, R. D. Schrimpf, F. E. Cellier, K. F. Galloway, D. I. Burton, and C. F. Wheatley, Jr., "Effects of Ionizing Radiation on Power MOSFET Termination Structures," *IEEE Trans. Nucl. Sci.*, vol. 36, pp. 2104-2109, 1989.
- [9] K. F. Galloway and R. D. Schrimpf, "Overview of Space Radiation Effects on Power MOSFETs," *Annales de Physique*, vol. 14, pp. 119-128, 1989.
- [10] M. J. Martinez, R. D. Schrimpf, and K. F. Galloway, "Analysis of Current-Mirror MOSFETs for Use in Total-Dose Radiation Environments," *IEEE Trans. Nucl. Sci.*, vol. 36, pp. 2099-2103, 1989.
- [11] R. D. Schrimpf, K. F. Galloway, and P. J. Wahle, "Interface and Oxide Charge Effects on DMOS Channel Mobility," *Electronics Lett.*, vol. 25, pp. 1156-1158, 1989.
- [12] K. F. Galloway and R. D. Schrimpf, "MOS Device Degradation Due to Total-Dose Ionizing Radiation in the Natural Space Environment: A Review," *Microelectronics J.*, vol. 21, pp. 67-81, 1990.
- [13] S. L. Kosier, R. D. Schrimpf, F. E. Cellier, and K. F. Galloway, "The Effects of Ionizing Radiation on the Breakdown Voltage of P-Channel Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 37, pp. 2076-2082, 1990.
- [14] P. J. Wahle, R. D. Schrimpf, and K. F. Galloway, "Simulated Space Radiation Effects on Power MOSFETs in Switching Power Supplies," *IEEE Trans. Ind. Appl.*, vol. 26, pp. 798-802, 1990.
- [15] J. A. Babcock, J. L. Titus, R. D. Schrimpf, and K. F. Galloway, "Effects of Ionizing Radiation on the Noise Properties of DMOS Power Transistors," *IEEE Trans. Nucl. Sci.*, vol. 38, pp. 1304-1309, 1991.
- [16] E. W. Enlow, R. L. Pease, W. E. Combs, R. D. Schrimpf, and R. N. Nowlin, "Response of Advanced Bipolar Processes to Ionizing Radiation," *IEEE Trans. Nucl. Sci.*, vol. 38, pp. 1342-1351, 1991.
- [17] S. L. Kosier, R. D. Schrimpf, K. F. Galloway, and F. E. Cellier, "Predicting Worst-Case Charge Buildup in Power-Device Field Oxides," *IEEE Trans. Nucl. Sci.*, vol. 38, pp. 1383-1390, 1991.
- [18] H. Lendenmann, R. D. Schrimpf, and A. D. Bridges, "Novel Test Structure for the Measurement of Electrostatic Discharge Pulses," *IEEE Trans. Semiconductor Manufacturing*, vol. 4, pp. 213-218, 1991.
- [19] J. L. Titus, G. H. Johnson, R. D. Schrimpf, and K. F. Galloway, "Single Event Burnout of Power Bipolar Junction Transistors," *IEEE Trans. Nucl. Sci.*, vol. 38, pp. 1315-1322, 1991.
- [20] A. J. Yiin, R. D. Schrimpf, and K. F. Galloway, "Gate-Charge Measurements for Irradiated DMOS Power Transistors," *IEEE Trans. Nucl. Sci.*, vol. 38, pp. 1352-1358, 1991.
- [21] D. Zupac, K. W. Baum, S. L. Kosier, R. D. Schrimpf, and K. F. Galloway, "Comparison Between the Effects of Positive Noncatastrophic HBM ESD Stress in n-Channel and p-Channel Power MOSFETs," *IEEE Electron Device Letters*, vol. 12, pp. 546-549, 1991.
- [22] P. Augier, J. L. Todsén, D. Zupac, R. D. Schrimpf, K. F. Galloway, and J. A. Babcock, "Comparison of 1/f Noise in Irradiated Power MOSFETs Measured in the Linear and Saturation Regions," *IEEE Trans. Nucl. Sci.*, vol. 39, pp. 2012-2017, 1992.
- [23] G. H. Johnson, R. D. Schrimpf, K. F. Galloway, and R. Koga, "Temperature Dependence of Single-Event Burnout in N-Channel Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 39, pp. 1605-1612, 1992.
- [24] S. C. Lee, G. Teowee, R. D. Schrimpf, D. P. Birnie, III, D. R. Uhlmann, and K. F. Galloway, "Total-Dose Radiation Effects on Sol-Gel Derived PZT Thin Films," *IEEE Trans. Nucl. Sci.*, vol. 39, pp. 2036-2043, 1992.
- [25] R. N. Nowlin, E. W. Enlow, R. D. Schrimpf, and W. E. Combs, "Trends in the Total-Dose Response of Modern Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 39, pp. 2026-2035, 1992.
- [26] D. Zupac, K. W. Baum, R. D. Schrimpf, and K. F. Galloway, "Detection of ESD-Induced Noncatastrophic Damage in P-Channel Power MOSFETs," *J. Electrostatics*, vol. 28, pp. 241-252, 1992.
- [27] D. Zupac, K. F. Galloway, R. D. Schrimpf, and P. Augier, "Effects of Radiation-Induced Oxide-Trapped Charge on Inversion-Layer Hole Mobility at 300 and 77 K," *Appl. Phys. Lett.*, vol. 60, pp. 3156-3158, 1992.
- [28] J. R. Brews, M. Allenspach, R. D. Schrimpf, K. F. Galloway, J. L. Titus, and C. F. Wheatley, "A conceptual model of single-event gate rupture in power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 40, pp. 1959-1966, 1993.
- [29] G. H. Johnson, J. H. Hohl, R. D. Schrimpf, and K. F. Galloway, "Simulating Single-Event Burnout of N-Channel Power MOSFETs," *IEEE Trans. Electron Devices*, vol. 40, pp. 1001-1008, 1993.

- [30] S. L. Kosier, R. D. Schrimpf, R. N. Nowlin, D. M. Fleetwood, M. DeLaus, R. L. Pease, W. E. Combs, A. Wei, and F. Chai, "Charge Separation for Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 40, pp. 1276-1285, 1993.
- [31] R. N. Nowlin, D. M. Fleetwood, R. D. Schrimpf, R. L. Pease, and W. E. Combs, "Hardness-Assurance and Testing Issues for Bipolar/BiCMOS Devices," *IEEE Trans. Nucl. Sci.*, vol. 40, pp. 1686-1693, 1993.
- [32] J. L. Todsen, P. Augier, R. D. Schrimpf, and K. F. Galloway, "1/f Noise and Interface Trap Density in High Field Stressed pMOS Transistors," *Electronics Lett.*, vol. 29, pp. 696-697, 1993.
- [33] D. Zupac, K. F. Galloway, P. Khosropour, S. R. Anderson, R. D. Schrimpf, and P. Calvel, "Separation of Effects of Oxide-Trapped Charge and Interface-Trapped Charge on Mobility in Irradiated Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 40, pp. 1307-1315, 1993.
- [34] D. Zupac, K. F. Galloway, R. D. Schrimpf, and P. Augier, "Radiation-Induced Mobility Degradation in p-Channel Double-Diffused Metal-Oxide-Semiconductor Power Transistors at 300 K and 77 K," *J. Appl. Phys.*, vol. 73, pp. 2910-2915, 1993.
- [35] D. Zupac, D. Pote, R. D. Schrimpf, and K. F. Galloway, "Annealing of ESD-Induced Damage in Power MOSFETs," *J. Electrostatics*, vol. 31, pp. 131-144, 1993.
- [36] D. Zupac, R. D. Schrimpf, and K. F. Galloway, "ESD Effects in Power MOSFETs: A Review," *Microelectronics J.*, vol. 24, pp. 125-138, 1993.
- [37] M. Allenspach, J. R. Brews, I. Mouret, R. D. Schrimpf, and K. F. Galloway, "Evaluation of SEGR Threshold in Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2160-2166, 1994.
- [38] S. R. Anderson, D. Zupac, R. D. Schrimpf, and K. F. Galloway, "The Surface Generation Hump in Irradiated Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2443-2451, 1994.
- [39] D. M. Fleetwood, S. L. Kosier, R. N. Nowlin, R. D. Schrimpf, R. A. Reber, Jr., M. DeLaus, P. S. Winokur, A. Wei, W. E. Combs, and R. L. Pease, "Physical Mechanisms Contributing to Enhanced Bipolar Gain Degradation at Low Dose Rates," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 1871-1883, 1994.
- [40] S. M. Y. Hasan, S. L. Kosier, R. D. Schrimpf, and K. F. Galloway, "Effect of Neutron Irradiation on the Breakdown Voltage of Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2719-2726, 1994.
- [41] G. H. Johnson, W. T. Kemp, R. D. Schrimpf, K. F. Galloway, M. R. Ackermann, and R. D. Pugh, "The Effects of Ionizing Radiation on Commercial Power MOSFETs Operated at Cryogenic Temperatures," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2530-2535, 1994.
- [42] P. Khosropour, D. M. Fleetwood, K. F. Galloway, R. D. Schrimpf, and P. Calvel, "Evaluation of a Method for Estimating Low-Dose-Rate Irradiation Response of MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2560-2566, 1994.
- [43] P. Khosropour, K. F. Galloway, D. Zupac, R. D. Schrimpf, and P. Calvel, "Application of Test Method 1019.4 to Non-Hardened Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 555-560, 1994.
- [44] S. L. Kosier, W. E. Combs, A. Wei, R. D. Schrimpf, D. M. Fleetwood, M. DeLaus, and R. L. Pease, "Bounding the Total-Dose Response of Modern Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 1864-1870, 1994.
- [45] S. L. Kosier, A. Wei, M. A. Shibib, R. D. Schrimpf, J. C. Desko, and K. F. Galloway, "Comparison of Termination Methods for Low-Voltage, Vertical Integrated Power Devices," *Solid-State Electronics*, vol. 37, pp. 1611-1617, 1994.
- [46] S. C. Lee, G. Teowee, R. D. Schrimpf, D. P. Birnie, III, D. R. Uhlmann, and K. F. Galloway, "An I-V Measurement Method and Its Application for Characterizing Ferroelectric PZT Thin Films," *Integrated Ferroelectrics*, vol. 4, pp. 31-43, 1994.
- [47] I. Mouret, M. Allenspach, R. D. Schrimpf, J. R. Brews, K. F. Galloway, and P. Calvel, "Temperature and Angular Dependence of Substrate Response in SEGR," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2216-2221, 1994.
- [48] R. N. Nowlin, D. M. Fleetwood, and R. D. Schrimpf, "Saturation of the Dose-Rate Response of BJTs Below 10 rad(SiO₂)/s: Implications for Hardness Assurance," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2637-2641, 1994.
- [49] H. G. Parks, R. D. Schrimpf, R. Craigin, R. Jones, and P. Resnick, "Quantifying the Impact of Homogeneous Metal Contamination Using Test Structure Metrology and Device Modeling," *IEEE Trans. Semic. Manufacturing*, vol. 7, pp. 249-258, 1994.
- [50] R. L. Pease, S. L. Kosier, R. D. Schrimpf, W. E. Combs, M. Davey, M. DeLaus, and D. M. Fleetwood, "Comparison of Hot-Carrier and Radiation Induced Increases in Base Current in Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2567-2573, 1994.
- [51] M. D. Ploor, R. D. Schrimpf, and K. F. Galloway, "Investigation of Possible Sources of 1/f Noise in Irradiated n-Channel Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 1902-1906, 1994.

- [52] A. Wei, S. L. Kosier, R. D. Schrimpf, D. M. Fleetwood, and W. E. Combs, "Dose-Rate Effects on Radiation-Induced Bipolar Junction Transistor Gain Degradation," *Appl. Phys. Lett.*, vol. 65, pp. 1918-1920, 1994.
- [53] S. C. Witezak, S. L. Kosier, R. D. Schrimpf, and K. F. Galloway, "Synergetic Effects of Radiation Stress and Hot-Carrier Stress on the Current Gain of NPN Bipolar Junction Transistors," *IEEE Trans. Nucl. Sci.*, vol. 41, pp. 2412-2419, 1994.
- [54] D. Zupac, S. R. Anderson, R. D. Schrimpf, and K. F. Galloway, "Determining the Drain Doping in DMOS Transistors Using the Hump in the Leakage Current," *IEEE Trans. Electron Devices*, vol. 41, pp. 2326-2336, 1994.
- [55] M. Allenspach, I. Mouret, J. L. Titus, C. F. Wheatley, Jr., R. L. Pease, J. R. Brews, R. D. Schrimpf, and K. F. Galloway, "Single-event gate-rupture in power MOSFETs: prediction of breakdown biases and evaluation of oxide thickness dependence," *IEEE Trans. Nucl. Sci.*, vol. 42, pp. 1922-1927, 1995.
- [56] S. R. Anderson, R. D. Schrimpf, K. F. Galloway, and J. L. Titus, "Exploration of Heavy Ion Irradiation Effects on Gate Oxide Reliability in Power Devices," *Microelectron. Reliab.*, vol. 35, pp. 603-608, 1995.
- [57] F. K. Chai, J. R. Brews, R. D. Schrimpf, and D. P. Birnie, III, "Limitations of the Uniform Effective Field Approximation Due to Doping of Ferroelectric Thin Film Capacitors," *J. Appl. Phys.*, vol. 78, pp. 4766-4775, 1995.
- [58] F. K. Chai, S. L. Kosier, R. D. Schrimpf, and K. F. Galloway, "A Method for Predicting Breakdown Voltage of Power Devices with Cylindrical Diffused Junctions," *Solid-State Electronics*, vol. 38, pp. 1547-1549, 1995.
- [59] E. A. Kneer, D. P. Birnie, R. D. Schrimpf, J. C. Podlesny, and G. Teowee, "Investigation of Surface Roughness and Hillock Formation on Platinized Substrates Used for Pt/PZT/Pt Capacitor Fabrication," *Integrated Ferroelectrics*, vol. 7, p. 61, 1995.
- [60] S. L. Kosier, A. Wei, R. D. Schrimpf, D. M. Fleetwood, M. DeLaus, R. L. Pease, and W. E. Combs, "Physically Based Comparison of Hot-Carrier-Induced and Ionizing-Radiation-Induced Degradation in BJTs," *IEEE Trans. Electron Devices*, vol. 42, pp. 436-444, 1995.
- [61] M. D. Ploor, R. D. Schrimpf, K. F. Galloway, and G. H. Johnson, "Evidence for Border Traps in Metal-Oxide-Semiconductor Transistors through 1/f Noise," *Applied Physics Letters*, vol. 67, pp. 691-693, 1995.
- [62] C. J. Rawn, E. A. Kneer, D. P. Birnie, III, M. N. Orr, R. D. Schrimpf, and G. Teowee, "Influence of Ti Interfacial Layers on the Electrical and Microstructural Properties of Sol-Gel Prepared PZT Films," *Integrated Ferroelectrics*, vol. 6, pp. 111-119, 1995.
- [63] C. J. Rawn, M. N. Orr, R. N. Vogt, D. P. Birnie, III, and R. D. Schrimpf, "Effect of RuOx Bottom Electrode Annealing Temperature on Sol-Gel Derived PZT Capacitors," *Integrated Ferroelectrics*, vol. 7, p. 309, 1995.
- [64] J. R. Schiffko, E. A. Kneer, D. P. Birnie, III, R. D. Schrimpf, and G. Teowee, "Passivation of Ferroelectric PZT Capacitors Using Spin-On Glass," *Integrated Ferroelectrics*, vol. 6, pp. 121-128, 1995.
- [65] D. M. Schmidt, D. M. Fleetwood, R. D. Schrimpf, R. L. Pease, R. J. Graves, G. H. Johnson, K. F. Galloway, and W. E. Combs, "Comparison of Ionizing-Radiation-Induced Gain Degradation in Lateral, Substrate, and Vertical PNP BJTs," *IEEE Trans. Nucl. Sci.*, vol. 42, pp. 1541-1549, 1995.
- [66] R. D. Schrimpf, R. J. Graves, D. M. Schmidt, D. M. Fleetwood, R. L. Pease, W. E. Combs, and M. DeLaus, "Hardness Assurance Issues for Lateral PNP Bipolar Junction Transistors," *IEEE Trans. Nucl. Sci.*, vol. 42, pp. 1641-1649, 1995.
- [67] J. L. Titus, C. F. Wheatley, D. I. Burton, I. Mouret, M. Allenspach, J. Brews, R. Schrimpf, K. Galloway, and R. L. Pease, "Impact of Oxide Thickness on SEGR Failure in Vertical Power MOSFETs; Development of a Semi-Empirical Expression," *IEEE Trans. Nucl. Sci.*, vol. 42, pp. 1928-1934, 1995.
- [68] A. Wei, S. L. Kosier, R. D. Schrimpf, W. E. Combs, and M. DeLaus, "Excess Collector Current Due to an Oxide-Trapped-Charge-Induced Emitter in Irradiated NPN BJTs," *IEEE Trans. Electron Devices*, vol. 42, pp. 923-927, 1995.
- [69] S. C. Witezak, K. F. Galloway, R. D. Schrimpf, and J. S. Suehle, "Relaxation of Si-SiO₂ Interfacial Stress in Bipolar Screen Oxides due to Ionizing Radiation," *IEEE Trans. Nucl. Sci.*, vol. 42, pp. 1689-1697, 1995.
- [70] M. Allenspach, J. R. Brews, K. F. Galloway, G. H. Johnson, R. D. Schrimpf, R. L. Pease, J. L. Titus, and C. F. Wheatley, "SEGR: A Unique Failure Mode for Power MOSFETs in Spacecraft," *Microelectron. Reliab.*, vol. 36, pp. 1871-1874, 1996.
- [71] M. Allenspach, C. Dachs, G. H. Johnson, R. D. Schrimpf, E. Lorfèvre, J. M. Palau, J. R. Brews, K. F. Galloway, J. L. Titus, and C. F. Wheatley, "SEGR and SEB in N-Channel Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 2927-2931, 1996.

- [72] D. M. Fleetwood, L. C. Riewe, J. R. Schwank, S. C. Witzak, and R. D. Schrimpf, "Radiation Effects at Low Electric Fields in Thermal, SIMOX, and Bipolar-Base Oxides," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 2537-2546, 1996.
- [73] J. M. Galbraith, K. F. Galloway, R. D. Schrimpf, and G. H. Johnson, "Reliability Challenges for Low Voltage/Low Power Integrated Circuits," *Quality and Reliability Engineering International*, vol. 12, pp. 271-279, 1996.
- [74] G. H. Johnson, K. F. Galloway, R. D. Schrimpf, J. L. Titus, C. F. Wheatley, M. Allenspach, and C. Dachs, "A Physical Interpretation for the Single-Event-Gate-Rupture Cross-Section of N-Channel Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 2932-2937, 1996.
- [75] G. H. Johnson, J. M. Palau, C. Dachs, K. F. Galloway, and R. D. Schrimpf, "A Review of the Techniques Used for Modeling Single-Event Effects in Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 546-560, 1996.
- [76] L. Lee, H. G. Parks, and R. D. Schrimpf, "Interpretation of Experimentally Observed C-t Responses for Copper Contaminated Devices," *Solid-State Electronics*, vol. 39, pp. 369-373, 1996.
- [77] I. Mouret, P. Calvel, M. Allenspach, J. L. Titus, C. F. Wheatley, K. A. LaBel, M.-C. Calvet, R. D. Schrimpf, and K. F. Galloway, "Measurement of a Cross-Section for Single-Event Gate Rupture in Power MOSFETs," *IEEE Electron Device Letters*, vol. 17, pp. 163-165, 1996.
- [78] I. Mouret, M.-C. Calvet, P. Calvel, P. Tastet, M. Allenspach, K. A. LaBel, J. L. Titus, C. F. Wheatley, R. D. Schrimpf, and K. F. Galloway, "Experimental Evidence of the Temperature and Angular Dependence in SEGR," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 936-943, 1996.
- [79] D. M. Schmidt, A. Wu, R. D. Schrimpf, D. M. Fleetwood, and R. L. Pease, "Modeling Ionizing-Radiation-Induced Gain Degradation of the Lateral PNP Bipolar Junction Transistor," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 3032-3039, 1996.
- [80] R. D. Schrimpf, "Recent advances in understanding total-dose effects in bipolar transistors," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 787-796, 1996.
- [81] J. L. Titus, C. F. Wheatley, M. Allenspach, R. D. Schrimpf, D. I. Burton, J. F. Brews, K. F. Galloway, and R. L. Pease, "Influence of Ion Beam Energy on SEGR Failure Thresholds of Vertical Power MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 2938-2943, 1996.
- [82] S. C. Witzak, K. F. Galloway, R. D. Schrimpf, J. L. Titus, J. R. Brews, and G. Prevost, "The Determination of Si-SiO₂ Interface Trap Density in Irradiated Four-Terminal VDMOSFETs Using Charge Pumping," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 2558-2564, 1996.
- [83] S. C. Witzak, R. D. Schrimpf, K. F. Galloway, D. M. Fleetwood, R. L. Pease, J. M. Puhl, D. M. Schmidt, W. E. Combs, and J. S. Suehle, "Accelerated Tests for Simulating Low Dose Rate Gain Degradation of Lateral and Substrate PNP Bipolar Junction Transistors," *IEEE Trans. Nucl. Sci.*, vol. 43, pp. 3151-3160, 1996.
- [84] F. K. Chai, J. R. Brews, R. D. Schrimpf, and D. P. Birnie, III, "Domain Switching and Spatial Dependence of Permittivity in Ferroelectric Thin Films," *J. Appl. Phys.*, vol. 82, pp. 2505-2516, 1997.
- [85] F. K. Chai, J. R. Brews, R. D. Schrimpf, and D. P. Birnie, III, "Profiling of Electrical Doping Concentration in Ferroelectrics," *J. Appl. Phys.*, vol. 82, pp. 2517-2527, 1997.
- [86] L. Dusseau, T. L. Randolph, R. D. Schrimpf, K. F. Galloway, F. Saigne, J. Fesquet, J. Gasiot, and R. Ecoffet, "Prediction of Low Dose-Rate Effects in Power Metal Oxide Semiconductor Field Effect Transistors Based on Isochronal Annealing Measurements," *J. Appl. Phys.*, vol. 81, pp. 2437-2441, 1997.
- [87] K. F. Galloway and R. D. Schrimpf, "A Survey of Device Reliability Concerns for LV/LP IC Technologies," *Microelectronic Engineering*, vol. 39, pp. 225-234, 1997.
- [88] X. Montagner, P. Fouillat, R. Briand, R. D. Schrimpf, A. Touboul, K. F. Galloway, M. C. Calvet, and P. Calvel, "Implementation of Total Dose Effects in the Bipolar Junction Transistor Gummel-Poon Model," *IEEE Trans. Nucl. Sci.*, vol. 44, pp. 1922-1929, 1997.
- [89] X. Montagner, P. Fouillat, A. Touboul, H. Lapuyade, R. D. Schrimpf, and K. F. Galloway, "Modélisation des effets des radiations sur les transistors bipolaires," *Revue de L'Électricité et de L'Électronique*, pp. 67-70, 1997.
- [90] F. Saigné, L. Dusseau, L. Albert, J. Fesquet, J. Gasiot, J. P. David, R. Ecoffet, R. D. Schrimpf, and K. F. Galloway, "Experimental Determination of the Frequency Factor of Thermal Annealing Processes in Metal-Oxide-Semiconductor Gate-Oxide Structures," *J. Appl. Phys.*, vol. 82, pp. 4102-4107, 1997.
- [91] F. Saigné, L. Dusseau, J. Fesquet, J. Gasiot, R. Ecoffet, J. P. David, R. D. Schrimpf, and K. F. Galloway, "Experimental Validation of an Accelerated Method of Oxide-Trap-Level Characterization for Predicting Long Term Thermal Effects in Metal Oxide Semiconductor Devices," *IEEE Trans. Nucl. Sci.*, vol. 44, pp. 2001-2006, 1997.

- [92] S. C. Witzcak, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, R. C. Laco, D. C. Mayer, J. M. Puhl, R. L. Pease, and J. S. Suehle, "Hardness Assurance Testing of Bipolar Junction Transistors at Elevated Irradiation Temperatures," *IEEE Trans. Nucl. Sci.*, vol. 44, pp. 1989-2000, 1997.
- [93] A. Wu, R. D. Schrimpf, H. J. Barnaby, D. M. Fleetwood, R. L. Pease, and S. L. Kosier, "Radiation-Induced Gain Degradation in Lateral PNP BJTs with Lightly and Heavily Doped Emitters," *IEEE Trans. Nucl. Sci.*, vol. 44, pp. 1914-1921, 1997.
- [94] Y. F. Zhao, A. R. Patwary, R. D. Schrimpf, M. A. Neifeld, and K. F. Galloway, "200 MeV Proton Damage Effects on Multi-Quantum-Well Laser Diodes," *IEEE Trans. Nucl. Sci.*, vol. 44, pp. 1898-1905, 1997.
- [95] P. Cazenave, P. Fouillat, X. Montagner, H. Barnaby, R. D. Schrimpf, L. Bonora, J. P. David, A. Touboul, M.-C. Calvet, and P. Calvel, "Total Dose Effects on Gate Controlled Lateral PNP Bipolar Junction Transistors," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 2577-2583, 1998.
- [96] R. J. Graves, C. R. Cirba, R. D. Schrimpf, R. J. Milanowski, A. Michez, D. M. Fleetwood, S. C. Witzcak, and F. Saigne, "Modeling Low-Dose-Rate Effects in Irradiated Bipolar-Base Oxides," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 2352-2360, 1998.
- [97] R. J. Milanowski, M. P. Pagey, L. W. Massengill, R. D. Schrimpf, M. E. Wood, B. W. Offord, R. J. Graves, K. F. Galloway, C. J. Nicklaw, and E. P. Kelley, "TCAD-Assisted Analysis of Back-Channel Leakage in Irradiated Mesa SOI nMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 2593-2599, 1998.
- [98] X. Montagner, R. Briand, P. Fouillat, R. D. Schrimpf, A. Touboul, K. F. Galloway, M. C. Calvet, and P. Calvel, "Dose-Rate and Irradiation Temperature Dependence of BJT SPICE Model Rad-Parameters," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 1431-1437, 1998.
- [99] J. E. Pizano, T. H. Ma, J. O. Attia, R. D. Schrimpf, K. F. Galloway, and A. F. Witulski, "Total Dose Effects on Power-MOSFET Switching Converters," *Microelectronics Reliability*, vol. 38, pp. 1935-1939, 1998.
- [100] S. C. Witzcak, R. C. Laco, D. C. Mayer, D. M. Fleetwood, R. D. Schrimpf, and K. F. Galloway, "Space Charge Limited Degradation of Bipolar Oxides at Low Electric Fields," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 2339-2351, 1998.
- [101] S. C. Witzcak, R. D. Schrimpf, H. J. Barnaby, R. C. Laco, D. C. Mayer, K. F. Galloway, R. L. Pease, and D. M. Fleetwood, "Moderated Degradation Enhancement of Lateral pnp Transistors Due to Measurement Bias," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 2644-2648, 1998.
- [102] Y. F. Zhao, R. D. Schrimpf, A. R. Patwary, M. A. Neifeld, A. W. Al-Johani, R. A. Weller, and K. F. Galloway, "Annealing Effects on Multi-Quantum Well Laser Diodes after Proton Irradiation," *IEEE Trans. Nucl. Sci.*, vol. 45, pp. 2826-2832, 1998.
- [103] H. Barnaby, C. Cirba, R. D. Schrimpf, S. Kosier, P. Fouillat, and X. Montagner, "Minimizing Gain Degradation in Lateral PNP Bipolar Junction Transistors Using Gate Control," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1652-1659, 1999.
- [104] H. J. Barnaby, R. J. Milanowski, R. D. Schrimpf, L. W. Massengill, and M. Pagey, "Modeling Ionizing Radiation Effects in Lateral PNP Bipolar Junction Transistors with Non-Uniform Trapped Charge Distributions," *J. Radiation Effects*, vol. 17, pp. 75-85, 1999.
- [105] H. J. Barnaby, R. D. Schrimpf, R. L. Pease, P. Cole, T. Turflinger, J. Krieg, J. Titus, D. Emily, M. Gehlhausen, S. C. Witzcak, M. C. Maher, and D. van Nort, "Identification of Degradation Mechanisms in a Bipolar Linear Voltage Comparator Through Correlation of Transistor and Circuit Response," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1666-1673, 1999.
- [106] P. E. Bunson, M. Di Ventura, S. T. Pantelides, R. D. Schrimpf, and K. F. Galloway, "Ab Initio Calculations of H⁺ Energetics in SiO₂: Implications for Transport," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1568-1573, 1999.
- [107] S. Kerns, D. Jiang, M. de la Bardonnie, F. Pelanchon, H. Barnaby, D. V. Kerns, Jr., R. D. Schrimpf, B. L. Bhuvu, P. Mialhe, A. Hoffmann, and J.-P. Charles, "Light Emission Studies of Total Dose and Hot Carrier Effects on Silicon Junctions," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1804-1808, 1999.
- [108] J. Krieg, T. Turflinger, J. Titus, P. Cole, P. Baker, M. Gehlhausen, D. Emily, L. Yang, R. L. Pease, H. Barnaby, R. Schrimpf, and M. C. Maher, "Hardness Assurance Implications of Bimodal Total Dose Response in a Bipolar Linear Voltage Comparator," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1627-1632, 1999.
- [109] S. C. Lee, Y. F. Zhao, R. D. Schrimpf, M. A. Neifeld, and K. F. Galloway, "Comparison of Lifetime and Threshold Current Damage Factors for Multi-Quantum-Well (MQW) GaAs/GaAlAs Laser Diodes Irradiated at Different Proton Energies," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1797-1803, 1999.
- [110] R. Milanowski, L. Massengill, R. Schrimpf, R. Graves, H. Barnaby, K. Galloway, M. Pagey, C. Nicklaw, E. Kelley, M. Wood, B. Offord, and J. Johann, "Radiation Hardened Semiconductor Technology Computer Aided Design," *J. Radiation Effects*, vol. 17, pp. 50-57, 1999.

- [111] R. Milanowski, L. Massengill, R. Schrimpf, M. Pagey, and C. Nicklaw, "Computational Split-Lot Study of the Effect of Implant Parameters on Total-Dose-Induced Leakage," *J. Radiation Effects*, vol. 17, pp. 66-74, 1999.
- [112] K. Warren, L. Massengill, R. Schrimpf, and H. Barnaby, "Analysis of the Influence of MOS Device Geometry on Predicted SEU Cross Sections," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1363-1369, 1999.
- [113] G. U. Youk, P. S. Khare, R. D. Schrimpf, L. W. Massengill, and K. F. Galloway, "Radiation-enhanced short channel effects due to multi-dimensional influence from charges at trench isolation oxides," *IEEE Trans. Nucl. Sci.*, vol. 46, pp. 1830-1835, 1999.
- [114] P. Adell, R. D. Schrimpf, H. J. Barnaby, R. Marec, C. Chatry, P. Calvel, C. Barillot, and O. Mion, "Analysis of Single-Event Transients in Analog Circuits," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2616-2623, 2000.
- [115] H. J. Barnaby, C. Cirba, R. D. Schrimpf, D. M. Fleetwood, R. L. Pease, M. R. Shaneyfelt, T. Turflinger, J. Krieg, and M. C. Maher, "Origins of Total-Dose Response Variability in Linear Bipolar Microcircuits," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2342-2349, 2000.
- [116] H. J. Barnaby, C. Cirba, R. D. Schrimpf, S. L. Kosier, P. Fouillat, and X. Montagner, "Modeling BJT Radiation Response with Non-Uniform Energy Distributions of Interface Traps," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 514-518, 2000.
- [117] P. E. Bunson, M. Di Ventura, S. T. Pantelides, D. M. Fleetwood, and R. D. Schrimpf, "Hydrogen-Related Defects in Irradiated SiO₂," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2289-2296, 2000.
- [118] S. J. Cai, Y. S. Tang, R. Li, Y. Y. Wei, L. Wong, Y. L. Chen, K. L. Wang, M. Chen, Y. F. Zhao, R. D. Schrimpf, J. C. Keay, and K. F. Galloway, "Annealing Behavior of a Proton Irradiated Al_xGa_{1-x}N/GaN High Electron Mobility Transistor Grown by MBE," *IEEE Trans. Electron Devices*, vol. 47, pp. 304-307, 2000.
- [119] S. C. Lee, A. Raparla, Y. F. Li, G. Gasiot, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, M. Featherby, and D. Johnson, "Total Dose Effects in Composite Nitride-Oxide Films," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2297-2304, 2000.
- [120] Z. Marka, S. K. Singh, W. Wang, S. C. Lee, J. Kavich, B. Glebov, S. N. Rashkeev, A. D. Karmarkar, R. G. Albridge, S. T. Pantelides, R. D. Schrimpf, D. M. Fleetwood, and N. H. Tolk, "Characterization of X-ray Radiation Damage in Si/SiO₂ Structures Using Second Harmonic Generation," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2256-2261, 2000.
- [121] R. J. Milanowski, M. P. Pagey, J. F. Conley, Jr., L. W. Massengill, R. D. Schrimpf, and K. F. Galloway, "Transient Simulation of Radiation-Induced Charge Trapping and Interface Trap Formation Using a Three-Carrier Transport Model for Silicon Dioxide," *J. Radiation Effects*, vol. 18, pp. 115-125, 2000.
- [122] C. J. Nicklaw, M. P. Pagey, S. T. Pantelides, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, J. E. Wittig, B. M. Howard, E. Taw, W. H. McNeil, and J. F. Conley, Jr., "Defects and Nanocrystals Generated by Si Implantation into a-SiO₂," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2269-2275, 2000.
- [123] S. T. Pantelides, S. N. Rashkeev, R. Buczko, D. M. Fleetwood, and R. D. Schrimpf, "Reactions of Hydrogen with Si-SiO₂ Interfaces," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2262-2268, 2000.
- [124] F. Saigné, L. Dusseau, J. Fesquet, J. Gasiot, R. Ecofet, R. D. Schrimpf, and K. F. Galloway, "Prediction of the One Year Thermal Annealing of Irradiated Commercial Devices Based on Experimental Isochronal Curves," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2244-2248, 2000.
- [125] F. Saigné, L. Dusseau, J. Fesquet, J. Gasiot, R. Ecofet, R. D. Schrimpf, and K. F. Galloway, "Experimental Procedure to Predict the Competition Between the Degradation Induced by Irradiation and Thermal Annealing of Oxide Trapped Charge in MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2329-2333, 2000.
- [126] B. D. White, L. J. Brillson, S. C. Lee, D. M. Fleetwood, R. D. Schrimpf, S. T. Pantelides, Y.-M. Lee, and G. Lucovsky, "Low Energy Electron-Excited Nanoscale Luminescence: A Tool to Detect Trap Activation by Ionizing Radiation," *IEEE Trans. Nucl. Sci.*, vol. 47, pp. 2276-2280, 2000.
- [127] H. J. Barnaby, R. D. Schrimpf, A. L. Sternberg, V. Berthe, C. R. Cirba, and R. L. Pease, "Proton Radiation Response Mechanisms in Bipolar Analog Circuits," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 2074-2080, 2001.
- [128] A. P. Karmarkar, B. K. Choi, R. D. Schrimpf, and D. M. Fleetwood, "Aging and Baking Effects on the Radiation Hardness of MOS Capacitors," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 2158-2163, 2001.
- [129] L. W. Massengill, B. K. Choi, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, M. R. Shaneyfelt, T. L. Meisenheimer, P. E. Dodd, J. R. Schwank, Y. M. Lee, R. S. Johnson, and G. Lucovsky, "Heavy-ion-induced breakdown in ultra-thin gate oxides and high-k dielectrics," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 1904-1912, 2001.
- [130] M. P. Pagey, R. D. Schrimpf, K. F. Galloway, C. J. Nicklaw, S. Ikeda, and S. Kamohara, "A Hydrogen-Transport-Based Interface-Trap-Generation Model for Hot-Carrier Reliability Prediction," *IEEE Electron Device Letters*, vol. 22, pp. 290-292, 2001.

- [131] R. L. Pease, A. Sternberg, L. W. Massengill, R. D. Schrimpf, S. Buchner, M. Savage, J. Titus, and T. Turflinger, "Critical Charge for Single-Event Transients (SETs) in Bipolar Linear Circuits," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 1966-1972, 2001.
- [132] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Proton-Induced Defect Generation at the Si-SiO₂ Interface," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 2086-2092, 2001.
- [133] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Defect generation by hydrogen at the Si-SiO₂ interface," *Phys. Rev. Lett.*, vol. 87, article number 165506.1-165506.4, 2001.
- [134] F. Saigné, L. Dusseau, J. Fesquet, J. Gasiot, R. Ecoffet, R. D. Schrimpf, and K. F. Galloway, "Evaluation of MOS Devices' Total Dose Response Using the Isochronal Annealing Method," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 2170-2173, 2001.
- [135] A. L. Sternberg, L. W. Massengill, R. D. Schrimpf, and P. Calvel, "Application Determinance of Single Event Transient Characteristics in the LM111 Comparator," *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 1855-1858, 2001.
- [136] D. G. Walker, T. S. Fisher, J. Liu, and R. D. Schrimpf, "Thermal modeling of single event burnout failure in semiconductor power devices," *Microelectronics Reliability*, vol. 41, pp. 571-578, 2001.
- [137] L. J. Wise, R. D. Schrimpf, H. G. Parks, and K. F. Galloway, "A generalized model for the lifetime of microelectronic components, applied to storage conditions," *Microelectronics Reliability*, vol. 41, pp. 317-322, 2001.
- [138] P. C. Adell, R. D. Schrimpf, B. K. Choi, W. T. Holman, J. P. Attwood, C. R. Cirba, and K. F. Galloway, "Total-Dose and Single-Event Effects in Switching DC/DC Power Converters," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 3217-3221, 2002.
- [139] D. R. Ball, R. D. Schrimpf, and H. J. Barnaby, "Separation of Ionization and Displacement Damage Using Gate-Controlled Lateral PNP Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 3185-3190, 2002.
- [140] H. J. Barnaby, C. Cirba, R. D. Schrimpf, K. F. Galloway, M. Pagey, and R. Milanowski, "A Two-Dimensional Engineering Model for Radiation-Induced Interface Trap Formation," *J. Rad. Effects, Research & Eng.*, vol. 19, pp. 127-133, 2002.
- [141] H. J. Barnaby, S. K. Smith, R. D. Schrimpf, D. M. Fleetwood, and R. L. Pease, "Analytical Model for Proton Radiation Effects in Bipolar Devices," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 2643-2649, 2002.
- [142] J. Boch, F. Saigné, V. Mannoni, F. Giustino, R. D. Schrimpf, L. Dusseau, K. F. Galloway, J. Fesquet, J. Gasiot, and R. Ecoffet, "Model for High-Temperature Radiation Effects in n-p-n Bipolar-Junction Transistors," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 2990-2997, 2002.
- [143] J. Boch, F. Saigné, T. Maurel, E. Giustino, L. Dusseau, R. D. Schrimpf, K. F. Galloway, J. P. David, R. Ecoffet, J. Fesquet, and J. Gasiot, "Dose and dose-rate effects on NPN bipolar junction transistors irradiated at high temperature," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 1474-1479, June 2002.
- [144] B. K. Choi, D. M. Fleetwood, L. W. Massengill, R. D. Schrimpf, K. F. Galloway, M. R. Shaneyfelt, T. L. Meisenheimer, P. E. Dodd, J. R. Schwank, Y. M. Lee, R. S. Johnson, and G. Lucovsky, "Reliability Degradation of Ultra-thin Oxynitride and Al₂O₃ Gate Dielectric Films Owing to Heavy-Ion Irradiation," *Electron. Lett.*, vol. 34, pp. 157-158, 2002.
- [145] B. K. Choi, D. M. Fleetwood, R. D. Schrimpf, L. W. Massengill, K. F. Galloway, M. R. Shaneyfelt, T. L. Meisenheimer, P. E. Dodd, J. R. Schwank, Y. M. Lee, R. S. John, and G. Lucovsky, "Long-Term Reliability Degradation of Ultrathin Dielectric Films Due to Heavy-Ion Irradiation," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 3045-3050, 2002.
- [146] Y. Deval, H. Lapuyade, P. Fouillat, H. Barnaby, F. Darracq, R. Briand, D. Lewis, and R. D. Schrimpf, "Evaluation of a design methodology dedicated to dose-rate-hardened linear integrated circuits," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 1468-1473, June 2002.
- [147] J. A. Felix, D. M. Fleetwood, R. D. Schrimpf, J. G. Hong, G. Lucovsky, J. R. Schwank, and M. R. Shaneyfelt, "Total-dose radiation response of hafnium-silicate capacitors," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 3191-3196, 2002.
- [148] D. M. Fleetwood, H. D. Xiong, Z. Y. Lu, C. J. Nicklaw, J. A. Felix, R. D. Schrimpf, and S. T. Pantelides, "Unified Model of Hole Trapping, 1/f Noise, and Thermally Stimulated Current in MOS Devices," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 2674-2683, 2002.
- [149] X. Hu, B. K. Choi, H. J. Barnaby, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, R. A. Weller, K. McDonald, U. Mishra, and R. W. Dettmer, "Proton-Induced Degradation in AlGaAs/GaAs Heterojunction Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 3213-3216, 2002.
- [150] Z.-Y. Lu, C. J. Nicklaw, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Structure, Properties, and Dynamics of Oxygen Vacancies in Amorphous SiO₂," *Phys. Rev. Lett.*, vol. 89, article number 285505, 2002.

- [151] C. J. Nicklaw, Z.-Y. Lu, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "The Structure, Properties, and Dynamics of Oxygen Vacancies in Amorphous SiO₂," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 2667-2673, 2002.
- [152] S. N. Rashkeev, C. R. Cirba, D. M. Fleetwood, R. D. Schrimpf, S. C. Witzak, A. Michez, and S. T. Pantelides, "Physical Model for Enhanced Interface-Trap Formation at Low Dose Rates," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 2650-2655, 2002.
- [153] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Dual behavior of H⁺ at Si-SiO₂ interfaces: Mobility versus trapping," *Applied Physics Letters*, vol. 81, pp. 1839-1841, SEP 2 2002.
- [154] A. L. Sternberg, L. W. Massengill, R. D. Schrimpf, Y. Boulghassoul, H. J. Barnaby, S. Buchner, R. L. Pease, and J. W. Howard, "Effect of amplifier parameters on single-event transients in an inverting operational amplifier," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 1496-1501, June 2002.
- [155] B. D. White, M. Bataiev, L. J. Brillson, B. K. Choi, D. M. Fleetwood, R. D. Schrimpf, S. T. Pantelides, R. W. Dettmer, W. J. Schaff, J. G. Champlain, and U. K. Mishra, "Characterization of 1.8-MeV Proton-Irradiated AlGaIn/GaN Field-Effect Transistor Structures by Nanoscale Depth-Resolved Luminescence Spectroscopy," *IEEE Trans. Nucl. Sci.*, vol. 49, pp. 2695-2701, 2002.
- [156] B. D. White, L. J. Brillson, M. Bataiev, L. J. Brillson, D. M. Fleetwood, R. D. Schrimpf, B. K. Choi, D. M. Fleetwood, and S. T. Pantelides, "Detection of trap activation by ionizing radiation in SiO₂ by spatially localized cathodoluminescence spectroscopy," *Journal of Applied Physics*, vol. 92, pp. 5729-5734, NOV 15 2002.
- [157] P. C. Adell, R. D. Schrimpf, W. T. Holman, J. Boch, J. Stacey, P. Ribero, A. Sternberg, and K. F. Galloway, "Total Dose and Single Event Effects in DC/DC Converter Control Circuitry," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1867-1872, 2003.
- [158] H. J. Barnaby, R. D. Schrimpf, K. F. Galloway, D. R. Ball, R. L. Pease, and P. Fouillat, "Test structures for analyzing proton radiation effects in bipolar technologies," *IEEE Trans. Semiconductor Manufacturing*, vol. 16, pp. 253-258, 2003.
- [159] J. Boch, D. M. Fleetwood, R. D. Schrimpf, R. Cizmarik, and F. Saigne, "Impact of Mechanical Stress on Total-Dose Effects in Bipolar ICs," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 2335-2340, 2003.
- [160] J. A. Felix, M. R. Shaneyfelt, D. M. Fleetwood, T. L. Meisenheimer, J. R. Schwank, R. D. Schrimpf, P. E. Dodd, E. P. Gusev, and C. D'Emic, "Radiation-induced charge trapping in thin Al₂O₃/SiO_xN_y/Si[100] gate dielectric stacks," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1910-1918, 2003.
- [161] X. Hu, A. P. Karmarkar, B. Jun, D. M. Fleetwood, R. D. Schrimpf, R. D. Geil, R. A. Weller, B. D. White, M. Bataiev, L. J. Brillson, and U. K. Mishra, "Proton-Irradiation Effects on AlGaIn/AlN/GaN High Electron Mobility Transistors," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1791-1796, 2003.
- [162] Y. Jiang, R. Pasternak, Z. Marka, Y. V. Shirokaya, J. K. Miller, S. N. Rashkeev, Y. D. Glinka, I. E. Perakis, P. K. Roy, J. Kozub, B. K. Choi, D. M. Fleetwood, R. D. Schrimpf, X. Liu, Y. Sasaki, J. K. Furdyna, and N. H. Tolk, "Spin/carrier dynamics at semiconductor interfaces using intense, tunable, ultra-fast lasers," *Physica Status Solidi B-Basic Research*, vol. 240, pp. 490-499, Dec 2003.
- [163] B. Jun, D. M. Fleetwood, R. D. Schrimpf, X. Zhou, E. J. Montes, and S. Cristoloveanu, "Charge Separation Techniques for Irradiated Pseudo-MOS SOI Transistors," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1891-1895, 2003.
- [164] A. Kalavagunta, B. Choi, M. A. Neifeld, and R. Schrimpf, "Effects of 2 MeV Proton Irradiation on Operating Wavelength and Leakage Current of Vertical Cavity Surface Emitting Lasers," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1982-1990, 2003.
- [165] Z. Marka, R. Pasternak, R. G. Albridge, S. N. Rashkeev, S. T. Pantelides, N. H. Tolk, B. K. Choi, D. M. Fleetwood, and R. D. Schrimpf, "Two-color optical technique for characterization of x-ray radiation-enhanced electron transport in SiO₂," *J. Appl. Phys.*, vol. 93, pp. 1865-1870, 2003.
- [166] R. Pasternak, A. Chatterjee, Y. V. Shirokaya, B. K. Choi, Z. Marka, J. K. Miller, R. G. Albridge, S. N. Rashkeev, S. T. Pantelides, R. D. Schrimpf, D. M. Fleetwood, and N. H. Tolk, "Contactless ultra-fast laser probing of radiation-induced leakage current in ultra-thin oxides," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1929-1933, 2003.
- [167] R. Pasternak, Y. V. Shirokaya, Z. Marka, J. K. Miller, S. N. Rashkeev, S. T. Pantelides, N. H. Tolk, B. K. Choi, R. D. Schrimpf, and D. M. Fleetwood, "Laser detection of radiation enhanced electron transport in ultra-thin oxides," *Nucl. Inst. and Meth. A*, vol. 514, pp. 150-155, 21 November 2003.
- [168] V. A. K. Raparla, S. C. Lee, R. D. Schrimpf, D. M. Fleetwood, and K. F. Galloway, "A Model of Radiation Effects in Nitride-Oxide Films for Power MOSFET Applications," *Solid-State Electronics*, vol. 47, pp. 775-783, 2003.

- [169] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Radiation-induced acceptor deactivation in bipolar devices: Effects of electric field," *Appl. Phys. Lett.*, vol. 83, pp. 4646-4648, 2003.
- [170] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Statistical modeling of radiation-induced proton transport in silicon: deactivation of dopant acceptors in bipolar devices," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1896-1900, 2003.
- [171] R. A. Weller, A. L. Sternberg, L. W. Massengill, R. D. Schrimpf, and D. M. Fleetwood, "Evaluating Average and Atypical Response in Radiation Effects Simulations," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 2265-2271, 2003.
- [172] B. D. White, M. Bataiev, S. H. Goss, X. Hu, A. Karmarkar, D. M. Fleetwood, R. D. Schrimpf, W. J. Schaff, and L. J. Brillson, "Electrical, Spectral, and Chemical Properties of 1.8 MeV Proton Irradiated AlGaIn/GaN HEMT Structures as a Function of Proton Fluence," *IEEE Trans. Nucl. Sci.*, vol. 50, pp. 1934-1941, 2003.
- [173] P. C. Adell, R. D. Schrimpf, W. T. Holman, J. L. Todd, S. Caveriviere, R. R. Cizmarik, and K. F. Galloway, "Total dose effects in a linear voltage regulator," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3816-3821, Dec 2004.
- [174] J. Boch, F. Saigne, S. Ducret, R. D. Schrimpf, D. M. Fleetwood, P. Iacconi, and L. Dusseau, "Total dose effects on bipolar integrated circuits: Characterization of the saturation region," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3225-3230, Dec 2004.
- [175] J. Boch, F. Saigne, R. D. Schrimpf, D. M. Fleetwood, R. Cizmarik, and D. Zander, "Elevated Temperature Irradiation at High Dose Rate of Commercial Linear Bipolar ICs," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 2903-2907, 2004.
- [176] J. Boch, F. Saigne, R. D. Schrimpf, D. M. Fleetwood, S. Ducret, L. Dusseau, J. P. David, J. Fesquet, J. Gasiot, and R. Ecoffet, "Effect of switching from high to low dose rate on linear bipolar technology radiation response," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 2896-2902, Oct. 2004.
- [177] J. Boch, R. Saigne, R. D. Schrimpf, D. M. Fleetwood, R. Cizmarik, and D. Zander, "Elevated temperature irradiation at high dose rate of commercial linear bipolar ICs," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 2903-2907, Oct 2004.
- [178] Y. Boulghassoul, P. C. Adell, J. D. Rowe, L. W. Massengill, R. D. Schrimpf, and A. L. Sternberg, "System-level design hardening based on worst-case ASET simulations," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 2787-2793, Oct 2004.
- [179] A. Chatterjee, B. Bhuva, and R. Schrimpf, "High-Speed Light Modulation in Avalanche Breakdown Mode for Si Diodes," *IEEE Electron Device Letters*, vol. 25, pp. 628-630, 2004.
- [180] X. J. Chen, H. J. Barnaby, R. L. Pease, R. D. Schrimpf, D. G. Platteter, and G. Dunham, "Radiation-induced base current broadening mechanisms in gated bipolar devices," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3178-3185, Dec 2004.
- [181] B. K. Choi, W. P. Kang, J. L. Davidson, M. Howell, R. D. Schrimpf, and D. M. Fleetwood, "CVD Diamond Photoconductive Devices," *Diamond and Related Materials*, vol. 13, pp. 785-790, April-August 2004.
- [182] S. Ducret, F. Saigne, J. Boch, R. D. Schrimpf, D. A. Fleetwood, J. R. Vaille, L. Dusseau, J. P. David, and R. Ecoffet, "Effect of thermal annealing on radiation-induced degradation of bipolar technologies when the dose rate is switched from high to low," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3219-3224, DEC 2004.
- [183] J. A. Felix, J. R. Schwank, C. R. Cirba, R. D. Schrimpf, M. R. Shaneyfelt, D. M. Fleetwood, and P. E. Dodd, "Influence of Total-Dose Radiation on the Electrical Characteristics of SOI MOSFETs," *Microelectronic Engineering*, vol. 72, pp. 332-341, 2004.
- [184] J. A. Felix, H. D. Xiong, D. M. Fleetwood, E. P. Gusev, R. D. Schrimpf, A. L. Sternberg, and C. D'Emic, "Interface trapping properties of Al₂O₃/SiO_xN_y/Si(100) nMOSFETS after exposure to ionizing radiation," *Microelectron. Engineering*, vol. 72, pp. 50-54, 2004.
- [185] M. J. Gadlage, R. D. Schrimpf, J. M. Benedetto, P. H. Eaton, D. G. Mavis, M. Sibley, K. Avery, and T. L. Turflinger, "Single event transient pulsewidths in digital microcircuits," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3285-3290, DEC 2004.
- [186] X. Hu, B. K. Choi, H. J. Barnaby, D. M. Fleetwood, R. D. Schrimpf, S. C. Lee, S. Shojah-Ardalan, R. Wilkins, U. K. Mishra, and R. W. Dettmer, "The Energy Dependence of Proton-Induced Degradation in AlGaIn/GaN High Electron Mobility Transistors," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 293-297, 2004.
- [187] J. M. Hutson, R. A. B. Devine, and R. D. Schrimpf, "Electrical and radiation assisted passivation of Ta₂O₅/Si interface," *J. Appl. Phys.*, vol. 95, pp. 8463-8465, June 15 2004.
- [188] B. Jun, R. D. Schrimpf, D. A. Fleetwood, Y. V. White, R. Pasternak, S. N. Rashkeev, F. Brunier, N. Bresson, M. Fouillat, S. Cristoloveanu, and N. H. Tolk, "Charge trapping in irradiated SOI wafers measured by second harmonic generation," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3231-3237, Dec 2004.

- [189] B. Jun, Y. V. White, R. D. Schrimpf, D. M. Fleetwood, F. Brunier, N. Bresson, S. Cristoloveanu, and N. H. Tolk, "Characterization of multiple Si/SiO₂ interfaces in silicon-on-insulator materials via second-harmonic generation," *Applied Physics Letters*, vol. 85, pp. 3095-3097, Oct 11 2004.
- [190] B. G. Jun, H. D. Xiong, A. L. Sternberg, C. R. Cirba, D. K. Chen, R. D. Schrimpf, D. M. Fleetwood, J. R. Schwank, and S. Cristoloveanu, "Total dose effects on double gate fully depleted SOI MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3767-3772, Dec 2004.
- [191] A. Kalavagunta, R. Schrimpf, and M. Neifeld, "Design considerations for optical systems in ionizing and nonionizing radiation environments," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3595-3602, Dec 2004.
- [192] A. P. Karmarkar, B. G. Jun, D. M. Fleetwood, R. D. Schrimpf, R. A. Weller, B. D. White, L. J. Brillson, and U. K. Mishra, "Proton irradiation effects on GaN-based high electron-mobility transistors with Si-doped Al_xGa_{1-x}N and thick GaN cap layers," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3801-3806, Dec. 2004.
- [193] A. S. Kobayashi, A. L. Sternberg, L. W. Massengill, R. D. Schrimpf, and R. A. Weller, "Spatial and temporal characteristics of energy deposition by protons and alpha particles in silicon," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3312-3317, DEC 2004.
- [194] R. L. Pease, D. G. Platteter, G. W. Dunham, J. E. Seiler, H. J. Barnaby, R. D. Schrimpf, M. R. Shaneyfelt, M. C. Maher, and R. N. Nowlin, "Characterization of enhanced low dose rate sensitivity (ELDRS) effects using gated lateral PNP transistor structures," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3773-3780, Dec 2004.
- [195] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Hydrogen at the Si/SiO₂ Interface: From Atomic-Scale Calculations to Engineering Models," *Int. J. High Speed Electronics and Systems*, vol. 14, pp. 575-580, 2004.
- [196] S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Effects of hydrogen motion on interface trap formation and annealing," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3158-3165, DEC 2004.
- [197] R. D. Schrimpf, "Gain degradation and enhanced low-dose-rate sensitivity in bipolar junction transistors," *Int. J. High Speed Electronics and Systems*, vol. 14, pp. 503-517, 2004.
- [198] K. Shenai, K. F. Galloway, and R. D. Schrimpf, "The Effects of Space Radiation Exposure on Power MOSFETs: A Review," *Int. J. High Speed Electronics and Systems*, vol. 14, pp. 445-463, 2004.
- [199] J. W. Stacey, R. D. Schrimpf, D. M. Fleetwood, and K. C. Holmes, "Using surface charge analysis to characterize the radiation response of Si/SiO₂ structures," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3686-3691, Dec 2004.
- [200] L. Tsetseris, X. Zhou, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Dual role of fluorine at the Si-SiO₂ interface," *Appl. Phys. Lett.*, vol. 85, pp. 4950-4952, 2004.
- [201] L. Tsetseris, X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Hole-enhanced reactions of water at the Si-SiO₂ interface," *Mat. Res. Soc. Proc.*, vol. 786, pp. 171-176, 2004.
- [202] M. Turowski, A. Raman, and R. D. Schrimpf, "Nonuniform total-dose-induced charge distribution in shallow-trench isolation oxides," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3166-3171, Dec 2004.
- [203] H. D. Xiong, B. Jun, D. M. Fleetwood, R. D. Schrimpf, and J. R. Schwank, "Charge trapping and low frequency noise in SOI buried oxides," *IEEE Trans. Nucl. Sci.*, vol. 51, pp. 3238-3242, Dec 2004.
- [204] X. J. Zhou, L. Tsetseris, S. N. Rashkeev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Negative bias-temperature instabilities in metal-oxide-silicon devices with SiO₂ and SiO_xN_y/HfO₂ gate dielectrics," *Appl. Phys. Lett.*, vol. 84, pp. 4394-4396, 2004.
- [205] P. C. Adell, O. Mion, R. D. Schrimpf, C. Chatry, P. Calvel, and M. R. Melotte, "Single Event Transient Propagation Through Digital Optocouplers," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 1136 - 1139, 2005.
- [206] P. C. Adell, R. D. Schrimpf, C. R. Cirba, W. T. Holman, X. Zhu, H. J. Barnaby, and O. Mion, "Single event transient effects in a voltage reference," *Microelectronics Reliability*, vol. 45, pp. 355-359, 2005.
- [207] A. M. Albadri, R. D. Schrimpf, D. G. Walker, and S. V. Mahajan, "Coupled Electro-Thermal Simulations of Single Event Burnout in Power Diodes," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2194-2199, 2005.
- [208] J. Boch, F. Saigné, R. D. Schrimpf, J. R. Vaillé, L. Dusseau, S. Ducret, M. Bernard, E. Lorfèvre, and C. Chatry, "Estimation of Low-Dose-Rate Degradation on Bipolar Linear Integrated Circuits Using Switching Experiments," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2616-2621, 2005.
- [209] A. Chatterjee, R. D. Schrimpf, S. Pendharkar, and K. Banerjee, "Mechanisms leading to erratic snapback behavior in bipolar junction transistors with base emitter shorted," *Journal of Applied Physics*, vol. 97, p. 084504, APR 15 2005.
- [210] X. J. Chen, H. J. Barnaby, R. L. Pease, R. D. Schrimpf, D. Platteter, M. Shaneyfelt, and B. Vermeire, "Estimation and Verification of Radiation Induced N_{ot} and N_{it} Distribution Using Combined Bipolar and MOS Characterization Methods in Gated Bipolar Devices," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2245-2251, 2005.

- [211] R. R. Cizmarik, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, D. G. Platteter, M. R. Shaneyfelt, R. L. Pease, J. Boch, D. R. Ball, J. D. Rowe, and M. C. Maher, "The Impact of Mechanical Stress on the Total-Dose Response of Linear Bipolar Transistors With Various Passivation Layers," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 1513-1517, 2005.
- [212] C. L. Howe, R. A. Weller, R. A. Reed, M. H. Mendenhall, R. D. Schrimpf, K. M. Warren, D. R. Ball, L. W. Massengill, K. A. LaBel, J. W. Howard, Jr., and N. F. Haddad, "Role of Heavy-Ion Nuclear Reactions in Determining On-Orbit Single Event Error Rates," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2182-2188, 2005.
- [213] A. P. Karmarkar, B. D. White, D. Buttari, D. M. Fleetwood, R. D. Schrimpf, R. A. Weller, L. J. Brillson, and U. K. Mishra, "Proton-Induced Damage in Gallium Nitride-Based Schottky Diodes," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2239-2244, 2005.
- [214] A. S. Kobayashi, D. R. Ball, K. M. Warren, R. A. Reed, N. Haddad, M. H. Mendenhall, R. D. Schrimpf, and R. A. Weller, "The Effect of Metallization Layers on Single Event Susceptibility," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2189-2193, 2005.
- [215] J. C. Pickel, R. A. Reed, R. Ladbury, P. W. Marshall, T. M. Jordan, G. Gee, B. Fodness, M. McKelvey, R. McMurray, K. Ennico, C. McCreight, A. Waczynski, E. Polidan, S. Johnson, R. A. Weller, M. H. Mendenhall, and R. D. Schrimpf, "Transient Radiation Effects in Ultra-Low Noise HgCdTe IR Detector Arrays for Space-Based Astronomy," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2657-2663, 2005.
- [216] M. P. Rodgers, D. M. Fleetwood, R. D. Schrimpf, I. G. Batyrev, S. Wang, and S. T. Pantelides, "The Effects of Aging on MOS Irradiation and Annealing Response," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2642-2648, 2005.
- [217] L. Tsetseris, R. D. Schrimpf, D. M. Fleetwood, R. L. Pease, and S. T. Pantelides, "Common Origin for Enhanced Low-Dose-Rate Sensitivity and Bias Temperature Instability Under Negative Bias," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2265-2271, 2005.
- [218] L. Tsetseris, X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Physical mechanisms of negative-bias temperature instability," *Applied Physics Letters*, vol. 86, article number 142103, 2005.
- [219] K. M. Warren, R. A. Weller, M. H. Mendenhall, R. A. Reed, D. R. Ball, C. L. Howe, B. D. Olson, M. L. Alles, L. W. Massengill, R. D. Schrimpf, N. F. Haddad, S. E. Doyle, D. McMorrow, J. S. Melinger, and W. T. Lotshaw, "The contributions of nuclear reactions to heavy ion single event upset cross-section measurements in a high-density SEU hardened SRAM," *IEEE Trans. Nucl. Sci.*, vol. 52, pp. 2125-2131, 2005.
- [220] P. C. Adell, A. F. Witulski, R. D. Schrimpf, R. Marec, V. Pouget, P. Calvel, and F. Bezerra, "Single Event-Induced Instability in Linear Voltage Regulators," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3506-3511, 2006.
- [221] A. M. Albadi, R. D. Schrimpf, K. F. Galloway, and D. G. Walker, "Single event burnout in power diodes: Mechanisms and models," *Microelectronics Reliability*, vol. 46, pp. 317-325, 2006.
- [222] O. A. Amusan, A. F. Witulski, L. W. Massengill, B. L. Bhuvu, P. R. Fleming, M. L. Alles, A. L. Sternberg, J. D. Black, and R. D. Schrimpf, "Charge Collection and Charge Sharing in a 130 nm CMOS Technology," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3253-3258, 2006.
- [223] I. G. Batyrev, M. P. Rodgers, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Effects of Water on the Aging and Radiation Response of MOS Devices," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3629-3635, 2006.
- [224] M. J. Beck, L. Tsetseris, M. Caussanel, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Atomic-Scale Mechanisms for Low-NIEL Dopant-Type Dependent Damage in Si," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3621-3628, 2006.
- [225] M. Bellini, B. Jun, T. Chen, J. D. Cressler, P. W. Marshall, D. Chen, R. D. Schrimpf, D. M. Fleetwood, and J. Cai, "X-Ray Irradiation and Bias Effects in Fully-Depleted and Partially-Depleted SiGe HBTs Fabricated on CMOS-Compatible SOI," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3182-3186, 2006.
- [226] M. F. Bernard, L. Dusseau, J. Boch, J. R. Vaille, F. Saigné, R. D. Schrimpf, E. Lorfevre, and J. P. David, "Analysis of Bias Effects on the Total-Dose Response of a Bipolar Voltage Comparator," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3232-3236, 2006.
- [227] J. Boch, F. Saigné, L. Dusseau, and R. D. Schrimpf, "Temperature effect on geminate recombination," *Applied Physics Letters*, vol. 89, p. 042108, JUL 24 2006.
- [228] J. Boch, F. Saigné, R. D. Schrimpf, J. R. Vaille, L. Dusseau, and E. Lorfevre, "Physical Model for the Low-Dose-Rate Effect in Bipolar Devices," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3655-3660, 2006.
- [229] J. Boch, F. Saigné, A. D. Touboul, S. Ducret, J. F. Carlotti, M. Bernard, R. D. Schrimpf, F. Wrobel, and G. Sarabayrouse, "Dose rate effects in bipolar oxides: Competition between trap filling and recombination," *Applied Physics Letters*, vol. 88, p. 232113, Jun. 5 2006.

- [230] X. J. Chen, H. J. Barnaby, R. D. Schrimpf, D. M. Fleetwood, R. L. Pease, D. G. Platteter, and G. W. Dunham, "Nature of Interface Defect Buildup in Gated Bipolar Devices Under Low Dose Rate Irradiation," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3649-3654, 2006.
- [231] S. K. Dixit, S. Dhar, J. Rozen, S. Wang, R. D. Schrimpf, D. M. Fleetwood, S. T. Pantelides, J. R. Williams, and L. C. Feldman, "Total dose radiation response of nitrided and non-nitrided SiO₂/4H-SiC MOS capacitors," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3687-3692, 2006.
- [232] L. Dusseau, M. F. Bernard, J. Boch, J. R. Vaille, F. Saigne, R. D. Schrimpf, E. Lorfèvre, and J. P. David, "Analysis of total-dose response of a bipolar voltage comparator combining radiation experiments and design data," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 1910-1916, Aug 2006.
- [233] J. M. Hutson, V. Ramachandran, B. L. Bhuvu, X. Zhu, R. D. Schrimpf, O. A. Amusan, and L. W. Massengill, "Single Event-Induced Error Propagation Through Nominally-off Transmission Gates," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3558-3562, 2006.
- [234] B. Jun, R. M. Diestelhorst, M. Bellini, G. Espinel, A. Appaswamy, A. P. G. Prakash, J. D. Cressler, D. Chen, R. D. Schrimpf, D. M. Fleetwood, M. Turowski, and A. Raman, "Temperature-Dependence of Off-State Drain Leakage in X-Ray Irradiated 130 nm CMOS Devices," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3203-3209, 2006.
- [235] G. Lucovsky, D. M. Fleetwood, S. Lee, H. Seo, R. D. Schrimpf, J. A. Felix, J. Lüning, L. B. Fleming, M. Ulrich, and D. E. Aspnes, "Differences Between Charge Trapping States in Irradiated Nano-Crystalline HfO₂ and Non-Crystalline Hf Silicates," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3644-3648, 2006.
- [236] B. Narasimham, B. L. Bhuvu, W. T. Holman, R. D. Schrimpf, L. W. Massengill, A. F. Witulski, and W. H. Robinson, "The Effect of Negative Feedback on Single Event Transient Propagation in Digital Circuits," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3285-3290, 2006.
- [237] B. Narasimham, V. Ramachandran, B. L. Bhuvu, R. D. Schrimpf, A. F. Witulski, W. T. Holman, L. W. Massengill, J. D. Black, W. H. Robinson, and D. McMorro, "On-chip characterization of single-event transient pulsewidths," *IEEE Trans. Device and Materials Reliability*, vol. 6, pp. 542-549, 2006.
- [238] J. A. Pellish, R. A. Reed, R. D. Schrimpf, M. L. Alles, M. Varadharajaperumal, G. Niu, A. K. Sutton, R. M. Diestelhorst, G. Espinel, R. Krithivasan, J. P. Comeau, J. D. Cressler, G. Vizkelethy, P. W. Marshall, R. A. Weller, M. H. Mendenhall, and E. J. Montes, "Substrate Engineering Concepts to Mitigate Charge Collection in Deep Trench Isolation Technologies," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3298-3305, 2006.
- [239] V. Ramachandran, B. Narasimham, D. M. Fleetwood, R. D. Schrimpf, W. T. Holman, A. F. Witulski, R. L. Pease, G. W. Dunham, J. E. Seiler, and D. G. Platteter, "Modeling Total-Dose Effects for a Low-Dropout Voltage Regulator," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3223-3231, 2006.
- [240] R. A. Reed, R. A. Weller, R. D. Schrimpf, M. H. Mendenhall, K. M. Warren, and L. W. Massengill, "Implications of Nuclear Reactions for Single Event Effects Test Methods and Analysis," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3356-3362, 2006.
- [241] A. K. Sutton, A. P. Gnana Prakash, B. Jun, E. Zhao, M. Bellini, J. Pellish, R. M. Diestelhorst, M. A. Carts, A. Phan, R. Ladbury, J. D. Cressler, P. W. Marshall, C. J. Marshall, R. A. Reed, R. D. Schrimpf, and D. M. Fleetwood, "An Investigation of Dose Rate and Source Dependent Effects in 200 GHz SiGe HBTs," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3166-3174, 2006.
- [242] A. D. Tipton, J. A. Pellish, R. A. Reed, R. D. Schrimpf, R. A. Weller, M. H. Mendenhall, B. Sierawski, A. K. Sutton, R. M. Diestelhorst, G. Espinel, J. D. Cressler, P. W. Marshall, and G. Vizkelethy, "Multiple-Bit Upset in 130 nm CMOS Technology," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3259-3264, 2006.
- [243] Y. V. White, X. Lu, R. Pasternak, N. H. Tolk, A. Chatterjee, R. D. Schrimpf, D. M. Fleetwood, A. Ueda, and R. Mu, "Studies of charge carrier trapping and recombination processes in Si/SiO₂/MgO structures using second-harmonic generation," *Applied Physics Letters*, vol. 88, article number 062102, 2006.
- [244] A. F. Witulski, A. Albadri, and R. D. Schrimpf, "Single-Event Effects on Electronics in Space," in *IEEE Power Electronics Society Newsletter*. vol. 18, 2006, pp. 14-16.
- [245] X. J. Zhou, D. M. Fleetwood, L. Tsetseris, R. D. Schrimpf, and S. T. Pantelides, "Effects of switched-bias annealing on charge trapping in HfO₂ gate dielectrics," *IEEE Trans. Nucl. Sci.*, vol. 53, pp. 3636-3643, 2006.
- [246] P. C. Adell, H. J. Barnaby, R. D. Schrimpf, and B. Vermeire, "Band-to-Band Tunneling (BBT) Induced Leakage Current Enhancement in Irradiated Fully Depleted SOI Devices," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2174-2180, 2007.
- [247] P. C. Adell, H. J. Barnaby, R. D. Schrimpf, and B. Vermeire, "Band-to-band tunneling (BBT) induced leakage current enhancement in irradiated fully depleted SOI devices," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2174-2180, Dec 2007.

- [248] K. Akarvardar, S. Cristoloveanu, P. Gentil, R. D. Schrimpf, and B. J. Blalock, "Depletion-All-Around Operation of the SOI Four-Gate Transistor," *IEEE Trans. Electron Devices*, vol. 54, pp. 323-331, 2007.
- [249] K. Akarvardar, R. D. Schrimpf, D. M. Fleetwood, S. Cristoloveanu, P. Gentil, and B. J. Blalock, "Evidence of radiation-induced dopant neutralization in partially-depleted SOI NMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1920-1924, Dec 2007.
- [250] M. L. Alles, R. Pasternak, X. Lu, N. H. Tolk, R. D. Schrimpf, D. M. Fleetwood, R. P. Dolan, and R. W. Standley, "Second Harmonic Generation for Noninvasive Metrology of Silicon-on-Insulator Wafers," *IEEE Trans. Semiconductor Manufacturing*, vol. 20, pp. 107-113, 2007.
- [251] D. R. Ball, R. D. Schrimpf, and H. J. Barnaby, "Experimental Analysis of Proton-Induced Displacement and Ionization Damage Using Gate-Controlled Lateral PNP Bipolar Transistors," *J. Rad. Effects., Res. and Engrg.*, vol. 21, pp. 201-206, 2007.
- [252] M. J. Beck, R. Hatcher, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Quantum mechanical description of displacement damage formation," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1906-1912, Dec 2007.
- [253] M. Bellini, B. Jun, A. K. Sutton, A. C. Appaswamy, P. Cheng, J. D. Cressler, P. W. Marshall, R. D. Schrimpf, D. M. Fleetwood, B. El-Kareh, S. Balster, P. Steinmann, and H. Yasuda, "The effects of proton and x-ray irradiation on the DC and AC performance of complementary (nnp+npn) SiGeHBTs on thick-film SOI," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2245-2250, Dec 2007.
- [254] M. F. Bernard, L. Dusseau, S. Buchner, D. McMorrow, R. Ecoffet, J. Boch, J. R. Vaille, R. D. Schrimpf, and K. LaBel, "Impact of total ionizing dose on the analog single event transient sensitivity of a linear bipolar integrated circuit," *Ieee Transactions on Nuclear Science*, vol. 54, pp. 2534-2540, Dec 2007.
- [255] M. Caussanel, A. Canals, S. K. Dixit, M. J. Beck, A. D. Touboul, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Doping-type dependence of damage in silicon diodes exposed to X-ray, proton, and He⁺ irradiations," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1925-1930, Dec 2007.
- [256] M. Caussanel, R. D. Schrimpf, L. Tsetseris, M. H. Evans, and S. T. Pantelides, "Engineering Model of a Biased Metal-Molecule-Metal Junction," *Journal of Computational Electronics*, vol. 6, pp. 425-430, 2007.
- [257] D. K. Chen, F. E. Mamouni, X. J. Zhou, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, S. Lee, H. Seo, G. Lucovsky, B. Jun, and J. D. Cressler, "Total dose and bias temperature stress effects for HfSiON on Si MOS capacitors," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1931-1937, Dec 2007.
- [258] D. K. Chen, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, S. T. Pantelides, A. Dimoulas, G. Mavrou, A. Sotiropoulos, and Y. Panayiotatos, "Total Dose Response of Ge MOS Capacitors With HfO₂Dy₂O₃ Gate Stacks," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 971-974, 2007.
- [259] P. Cheng, B. Jun, A. Sutton, A. Appaswamy, C. D. Zhu, J. D. Cressler, R. D. Schrimpf, and D. M. Fleetwood, "Understanding radiation- and hot carrier-induced damage processes in SiGe HBTs using mixed-mode electrical stress," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1938-1945, Dec 2007.
- [260] C. R. Cirba, J. M. Hutson, J. A. Felix, R. D. Schrimpf, and D. M. Fleetwood, "Predicting the long-term total-dose response of SOI MOSFETs," *J. Rad. Effects., Res. and Engrg.*, vol. 21, pp. 194-200, 2007.
- [261] S. DasGupta, A. F. Witulski, B. L. Bhuvu, M. L. Alles, R. A. Reed, O. A. Amusan, J. R. Ahlbin, R. D. Schrimpf, and L. W. Massengill, "Effect of well and substrate potential modulation on single event pulse shape in deep submicron CMOS," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2407-2412, Dec 2007.
- [262] R. M. Diestelhorst, S. Finn, B. Jun, A. K. Sutton, P. Cheng, P. W. Marshall, J. D. Cressler, R. D. Schrimpf, D. M. Fleetwood, H. Gustat, B. Heinemann, G. G. Fischer, D. Knoll, and B. Tillack, "The effects of X-ray and proton irradiation on a 200 GHz/90 GHz complementary (nnp+npn) SiGe : C HBT technology," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2190-2195, Dec 2007.
- [263] S. K. Dixit, X. J. Zhou, R. D. Schrimpf, D. M. Fleetwood, S. T. Pantelide, R. Choi, G. Bersuker, and L. C. Feldman, "Radiation induced charge trapping in ultrathin HfO₂-based MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1883-1890, Dec 2007.
- [264] P. E. Dodd, J. R. Schwank, M. R. Shaneyfelt, J. A. Felix, P. Paillet, V. Ferlet-Cavrois, J. Baggio, R. A. Reed, K. M. Warren, R. A. Weller, R. D. Schrimpf, G. L. Hash, S. M. Dalton, K. Hirose, and H. Saito, "Impact of heavy ion energy and nuclear interactions on single-event upset and latchup in integrated circuits," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2303-2311, Dec 2007.
- [265] M. H. Evans, M. Caussanel, R. D. Schrimpf, and S. T. Pantelides, "First-principles calculations of mobilities in ultrathin double-gate MOSFETs," *J. Computational Electronics*, vol. 6, pp. 85-88, 2007.
- [266] D. M. Fleetwood, M. P. Rodgers, L. Tsetseris, X. J. Zhou, I. Batyrev, S. Wang, R. D. Schrimpf, and S. T. Pantelides, "Effects of device aging on microelectronics radiation response and reliability," *Microelectronics Reliability*, vol. 47, pp. 1075-1085, 2007.

- [267] M. J. Gadlage, R. D. Schrimpf, B. Narasimham, B. L. Bhuvva, P. H. Eaton, and J. M. Benedetto, "Effect of voltage fluctuations on the single event transient response of deep submicron digital circuits," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2495-2499, Dec 2007.
- [268] C. L. Howe, R. A. Weller, R. A. Reed, B. D. Sierawski, P. W. Marshall, C. J. Marshall, M. H. Mendenhall, R. D. Schrimpf, and J. E. Hubbs, "Distribution of Proton-Induced Transients in Silicon Focal Plane Arrays," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2444-2449, 2007.
- [269] C. L. Howe, R. A. Weller, R. A. Reed, B. D. Sierawski, P. W. Marshall, C. J. Marshall, M. H. Mendenhall, R. D. Schrimpf, and J. E. Hubbs, "Distribution of proton-induced transients in silicon focal plane arrays," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2444-2449, Dec 2007.
- [270] J. M. Hutson, J. D. Pellish, G. Boselli, R. Baumann, R. A. Reed, R. D. Schrimpf, R. A. Weller, and L. W. Massengill, "The effects of angle of incidence and temperature on latchup in 65 nm technology," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2541-2546, Dec 2007.
- [271] B. Jun, A. K. Sutton, R. M. Diestelhorst, G. J. Duperon, J. D. Cressler, J. D. Black, T. Haeffner, R. A. Reed, M. L. Alles, R. D. Schrimpf, D. M. Fleetwood, and P. W. Marshall, "The application of RHBD to n-MOSFETs intended for use in cryogenic-temperature radiation environments," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2100-2105, Dec 2007.
- [272] A. T. Kelly, P. C. Adell, A. F. Witulski, W. T. Holman, R. D. Schrimpf, and V. Pouget, "Total Dose and Single Event Transients in Linear Voltage Regulators," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 1327-1334, 2007.
- [273] A. Madan, B. Jun, R. M. Diestelhorst, A. Appaswamy, J. D. Cressler, R. D. Schrimpf, D. M. Fleetwood, P. W. Marshall, T. Isaacs-Smith, J. R. Williams, and S. J. Koester, "The radiation tolerance of strained Si/SiGe n-MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2251-2256, Dec 2007.
- [274] A. G. Marinopoulos, I. Batyrev, X. J. Zhou, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Hydrogen shuttling near Hf-defect complexes in Si/SiO₂/HfO₂ structures," *Appl. Phys. Lett.*, vol. 91, article number 233503, 2007.
- [275] M. McLain, H. J. Bamaby, K. E. Holbert, R. D. Schrimpf, H. Shah, A. Amort, M. Baze, and J. Wert, "Enhanced TID susceptibility in sub-100 nm bulk CMOS I/O transistors and circuits," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2210-2217, Dec 2007.
- [276] E. J. Montes, R. A. Reed, J. A. Pellish, M. L. Alles, R. D. Schrimpf, R. A. Weller, M. Varadharajaperumal, G. Niu, A. K. Sutton, R. Diestelhorst, G. Espinel, R. Krithivasan, J. P. Comeau, J. D. Cressler, P. W. Marshall, and G. Vizkelethy, "Single Event Upset Mechanisms for Low-Energy-Deposition Events in SiGe HBTs," *IEEE Trans. Nucl. Sci.*, p. to be published, 2007.
- [277] B. Narasimham, B. L. Bhuvva, R. D. Schrimpf, L. W. Massengill, M. J. Gadlage, O. A. Amusan, W. T. Holman, A. F. Witulski, W. H. Robinson, J. D. Black, J. M. Benedetto, and P. H. Eaton, "Characterization of digital single event transient pulse-widths in 130-nm and 90-nm CMOS technologies," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2506-2511, Dec 2007.
- [278] S. T. Pantelides, L. Tsetseris, S. N. Rashkeev, X. J. Zhou, D. M. Fleetwood, and R. D. Schrimpf, "Hydrogen in MOSFETs – A primary agent of reliability issues " *Microelectronics Reliability*, vol. 47, pp. 903-911, 2007.
- [279] J. A. Pellish, R. A. Reed, A. K. Sutton, R. A. Weller, M. A. Carts, P. W. Marshall, C. J. Marshall, R. Krithivasan, J. D. Cressler, M. H. Mendenhall, R. D. Schrimpf, K. M. Warren, B. D. Sierawski, and G. F. Niu, "A generalized SiGe HBT single-event effects model for on-orbit event rate calculations," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2322-2329, Dec 2007.
- [280] R. A. Reed, J. A. Pellish, R. A. Weller, M. Porter, J. Wilkinson, K. M. Warren, B. Sierawski, P. W. Marshall, and R. D. Schrimpf, "Applications of Heavy Ion Microprobe for Single Event Effects Analysis," *Nucl. Instr. and Meth. B*, vol. 261, pp. 443-446, 2007.
- [281] R. A. Reed, R. A. Weller, M. H. Mendenhall, J. M. Lauenstein, K. M. Warren, J. A. Pellish, R. D. Schrimpf, B. D. Sierawski, L. W. Massengill, P. E. Dodd, M. R. Shaneyfelt, J. A. Felix, J. R. Schwank, N. F. Haddad, R. K. Lawrence, J. H. Bowman, and R. Conde, "Impact of ion energy and species on single event effects analysis," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2312-2321, Dec 2007.
- [282] R. D. Schrimpf, R. A. Weller, M. H. Mendenhall, R. A. Reed, and L. W. Massengill, "Physical mechanisms of single-event effects in advanced microelectronics," *Nucl. Instr. and Meth. B*, vol. 261, pp. 1133-1136, 2007.
- [283] N. H. Tolk, M. L. Alles, R. Pasternak, X. Lu, R. D. Schrimpf, D. M. Fleetwood, R. P. Dolan, and R. W. Standley, "Oxide interface studies using second harmonic generation," *Microelectronic Engineering*, vol. 84, pp. 2089-2092, 2007.

- [284] L. Tsetseris, D. M. Fleetwood, R. D. Schrimpf, X. J. Zhou, I. G. Batyrev, and S. T. Pantelides, "Hydrogen effects in MOS devices," *Microelectronic Engineering*, vol. 84, pp. 2344-2349, 2007.
- [285] L. Tsetseris, X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Hydrogen-related instabilities in MOS devices under bias temperature stress," *IEEE Trans. Device and Materials Reliability*, vol. 7, pp. 502-508, Dec 2007.
- [286] K. M. Warren, B. D. Sierawski, R. A. Reed, R. A. Weller, C. Carmichael, A. Lesea, M. H. Mendenhall, P. E. Dodd, R. D. Schrimpf, L. W. Massengill, T. Hoang, H. Wan, J. L. De Jong, R. Padovani, and J. J. Fabula, "Monte-Carlo based on-orbit single event upset rate prediction for a radiation hardened by design latch," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 2419-2425, Dec 2007.
- [287] K. M. Warren, B. D. Sierawski, R. A. Weller, R. A. Reed, M. H. Mendenhall, J. A. Pellish, R. D. Schrimpf, L. W. Massengill, M. E. Porter, and J. D. Wilkinson, "Predicting Thermal Neutron-Induced Soft Errors in Static Memories Using TCAD and Physics-Based Monte Carlo Simulation Tools," *IEEE Electron Device Letters*, vol. 28, pp. 180-182, 2007.
- [288] K. M. Warren, R. A. Weller, B. D. Sierawski, R. A. Reed, M. H. Mendenhall, R. D. Schrimpf, L. W. Massengill, M. E. Porter, J. D. Wilkinson, K. A. LaBel, and J. H. Adams, "Application of RADSAFE to Model the Single Event Upset Response of a 0.25 μm CMOS SRAM," *IEEE Trans. Nucl. Sci.*, vol. 54, pp. 898-903, 2007.
- [289] R. A. Weller, R. D. Schrimpf, R. A. Reed, A. L. Sternberg, A. S. Kobayashi, M. H. Mendenhall, L. W. Massengill, and D. M. Fleetwood, "Modeling semiconductor device response using detailed radiation event simulations," *J. Rad. Effects: Research and Engineering*, vol. 23, pp. 129-137, 2007.
- [290] M. A. Alles, L. W. Massengill, R. D. Schrimpf, R. A. Weller, and K. F. Galloway, "Single event effects in the nano era," *Int. J. of High Speed Electronics*, vol. 18, pp. 815-824, 2008.
- [291] I. G. Batyrev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "The Role of Water in the Radiation Response of Wet and Dry Oxides," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2085-2089, 2008.
- [292] I. G. Batyrev, D. Hughart, R. Durand, M. Bounasser, B. R. Tuttle, D. M. Fleetwood, R. D. Schrimpf, S. N. Rashkeev, G. W. Dunham, M. Law, and S. T. Pantelides, "Effects of Hydrogen Soaking on the Radiation Response of Bipolar Transistors: Experiment and Modeling," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 3039-3045, 2008.
- [293] I. G. Batyrev, B. Tuttle, D. M. Fleetwood, R. D. Schrimpf, L. Tsetseris, and S. T. Pantelides, "Reactions of Water Molecules in Silica-Based Network Glasses," *Phys. Rev. Lett.*, vol. 100, article number 105503, 2008.
- [294] M. J. Beck, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Disorder-Recrystallization Effects in Low-Energy Beam-Solid Interactions," *Phys. Rev. Lett.*, vol. 100, article number 185502, 2008.
- [295] M. J. Beck, B. R. Tuttle, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Atomic Displacement Effects in Single-Event Gate Rupture," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 3025-3031, 2008.
- [296] J. D. Black, D. R. Ball II, W. H. Robinson, D. M. Fleetwood, R. D. Schrimpf, R. A. Reed, D. A. Black, K. M. Warren, A. D. Tipton, P. E. Dodd, N. F. Haddad, M. A. Xapsos, H. S. Kim, and M. Friendlich, "Characterizing SRAM Single Event Upset in Terms of Single and Multiple Node Charge Collection," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2943-2947, 2008.
- [297] X. J. Chen, H. J. Barnaby, K. E. Holbert, R. L. Pease, R. D. Schrimpf, D. M. Fleetwood, S. T. Pantelides, M. R. Shaneyfelt, and P. Adell, "Post-Irradiation Annealing Mechanisms of Defects Generated in Hydrogenated Bipolar Oxides," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 3032-3038, 2008.
- [298] F. El Mamouni, S. K. Dixit, R. D. Schrimpf, P. C. Adell, I. S. Esqueda, M. L. McLain, H. J. Barnaby, S. Cristoloveanu, and W. Xiong, "Gate-length and drain-bias dependence of band-to-band tunneling-induced drain leakage in irradiated fully depleted SOI devices," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 3259-3264, 2008.
- [299] F. Faccio, H. J. Barnaby, X. J. Chen, D. M. Fleetwood, L. Gonella, M. McLain, and R. D. Schrimpf, "Total ionizing dose effects in shallow trench isolation oxides," *Microelectronics Reliability*, vol. 48, pp. 1000-1007, Jul 2008.
- [300] D. M. Fleetwood, R. D. Schrimpf, S. T. Pantelides, R. L. Pease, and G. W. Dunham, "Electron Capture, Hydrogen Release, and Enhanced Gain Degradation in Linear Bipolar Devices," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2986-2991, 2008.
- [301] M. J. Gadlage, R. D. Schrimpf, B. Narasimham, J. A. Pellish, K. M. Warren, R. A. Reed, R. A. Weller, B. L. Bhuvu, L. W. Massengill, and X. W. Zhu, "Assessing alpha particle-induced single event transient vulnerability in a 90-nm CMOS technology," *IEEE Electron Device Letters*, vol. 29, pp. 638-640, Jun 2008.
- [302] A. Kalavagunta, A. Touboul, L. Shen, R. D. Schrimpf, R. A. Reed, D. M. Fleetwood, R. K. Jain, and U. K. Mishra, "Electrostatic Mechanisms Responsible for Device Degradation in Proton Irradiated AlGaIn/AlIn/GaN HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2106-2112, Aug 2008.

- [303] X. Lu, R. Pasternak, H. Park, J. B. Qi, N. H. Tolk, A. Chatterjee, R. D. Schrimpf, and D. M. Fleetwood, "Temperature-dependent second- and third-order optical nonlinear susceptibilities at the Si/SiO₂ interface," *Physical Review B*, vol. 78, article number 155311, 2008.
- [304] E. J. Montes, R. A. Reed, J. A. Pellish, M. L. Alles, R. D. Schrimpf, R. A. Weller, M. Varadharajaperumal, G. F. Niu, A. K. Sutton, R. Diestelhorst, G. Espinel, R. Krithivasan, J. P. Comeau, J. D. Cressler, P. W. Marshall, and G. Vizkelethy, "Single event upset mechanisms for low-energy-deposition events in SiGe HBTs," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 1581-1586, Jun 2008.
- [305] B. Narasimham, O. A. Amusan, B. L. Bhuvu, R. D. Schrimpf, and W. T. Holman, "Extended SET Pulses in Sequential Circuits Leading to Increased SE Vulnerability," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 3077-3081, 2008.
- [306] B. Narasimham, B. L. Bhuvu, R. D. Schrimpf, L. W. Massengill, M. J. Gadlage, W. T. Holman, A. F. Witulski, W. H. Robinson, J. D. Black, J. M. Benedetto, and P. H. Eaton, "Effects of Guard Bands and Well Contacts in Mitigating Long SETs in Advanced CMOS Processes," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 1708-1713, Jun 2008.
- [307] B. Narasimham, R. L. Shuler, J. D. Black, B. L. Bhuvu, R. D. Schrimpf, A. F. Witulski, W. T. Holman, and L. W. Massengill, "Quantifying the reduction in collected charge and soft errors in the presence of guard rings," *IEEE Trans. Device and Materials Reliability*, vol. 8, pp. 203-209, Mar 2008.
- [308] S. T. Pantelides, Z. Y. Lu, C. Nicklaw, T. Bakos, S. N. Rashkeev, D. M. Fleetwood, and R. D. Schrimpf, "The E' center and oxygen vacancies in SiO₂," *Journal of Non-Crystalline Solids*, vol. 354, pp. 217-223, Jan 15 2008.
- [309] H. Park, S. K. Dixit, Y. S. Choi, R. D. Schrimpf, D. M. Fleetwood, T. Nishida, and S. E. Thompson, "Total Ionizing Dose Effects on Strained HfO₂-Based nMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2981-2985, 2008.
- [310] J. A. Pellish, R. A. Reed, D. McMorrow, J. S. Melinger, P. Jenkins, A. K. Sutton, R. M. Diestelhorst, S. D. Phillips, J. D. Cressler, V. Pouget, N. D. Pate, J. A. Kozub, M. H. Mendenhall, R. A. Weller, R. D. Schrimpf, P. W. Marshall, A. D. Tipton, and G. Niu, "Laser-Induced Current Transients in Silicon-Germanium HBTs," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2936-2942, 2008.
- [311] T. Roy, A. F. Witulski, R. D. Schrimpf, M. L. Alles, and L. W. Massengill, "Single Event Mechanisms in 90 nm Triple-Well CMOS Devices," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2948-2956, 2008.
- [312] R. D. Schrimpf, K. M. Warren, D. R. Ball, R. A. Weller, R. A. Reed, D. M. Fleetwood, L. W. Massengill, M. H. Mendenhall, S. N. Rashkeev, S. T. Pantelides, and M. A. Alles, "Multi-Scale Simulation of Radiation Effects in Electronic Devices," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 1891-1902, Aug 2008.
- [313] J. R. Schwank, M. R. Shaneyfelt, A. Dasgupta, S. A. Francis, X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, S. T. Pantelides, J. A. Felix, P. E. Dodd, V. Ferlet-Cavrois, P. Paillet, S. M. Dalton, S. E. Swanson, G. L. Hash, S. M. Thornberg, J. M. Hochrein, and G. K. Lum, "Effects of Moisture and Hydrogen Exposure on Radiation-Induced MOS Device Degradation and Its Implications for Long-Term Aging," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 3206-3215, 2008.
- [314] A. D. Tipton, J. A. Pellish, J. M. Hutson, R. Baumann, X. Deng, A. Marshall, M. A. Xapsos, H. S. Kim, M. R. Friendlich, M. J. Campola, C. M. Seidleck, K. A. LaBel, M. H. Mendenhall, R. A. Reed, R. D. Schrimpf, R. A. Weller, and J. D. Black, "Device-Orientation Effects on Multiple-Bit Upset in 65 nm SRAMs," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2880-2885, 2008.
- [315] A. D. Tipton, X. W. Zhu, H. X. Weng, J. A. Pellish, P. R. Fleming, R. D. Schrimpf, R. A. Reed, R. A. Weller, and M. Mendenhall, "Increased Rate of Multiple-Bit Upset From Neutrons at Large Angles of Incidence," *IEEE Trans. Device and Materials Reliability*, vol. 8, pp. 565-570, Sep 2008.
- [316] K. M. Warren, A. L. Sternberg, R. A. Weller, M. P. Baze, L. W. Massengill, R. A. Reed, M. H. Mendenhall, and R. D. Schrimpf, "Integrating Circuit Level Simulation and Monte-Carlo Radiation Transport Code for Single Event Upset Analysis in SEU Hardened Circuitry," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2886-2894, 2008.
- [317] X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, F. Faccio, and L. Gonella, "Radiation Effects on the 1/f Noise of Field Oxide Field Effect Transistors," *IEEE Trans. Nucl. Sci.*, vol. 55, pp. 2975-2980, 2008.
- [318] R. Arora, J. Rozen, D. M. Fleetwood, K. F. Galloway, C. X. Zhang, J. Han, S. Dimitrijevic, F. Kong, L. C. Feldman, S. T. Pantelides, and R. D. Schrimpf, "Charge trapping properties of 3C- and 4H-SiC MOS capacitors with nitrated gate oxides," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3185-3191, 2009.
- [319] M. J. Beck, Y. S. Puzryev, N. Sergueev, K. Varga, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "The Role of Atomic Displacements in Ion-Induced Dielectric Breakdown," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3210-3217, 2009.

- [320] J. Boch, Y. Gonzalez Velo, F. Saigne, N. J. H. Roche, R. D. Schrimpf, J. R. Vaille, L. Dusseau, C. Chatry, E. Lorfevre, R. Ecoffet, and A. D. Touboul, "The Use of a Dose-Rate Switching Technique to Characterize Bipolar Devices," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3347-3353, 2009.
- [321] M. A. Clemens, N. A. Dodds, R. A. Weller, M. H. Mendenhall, R. A. Reed, R. D. Schrimpf, T. Koi, D. H. Wright, and M. Asai, "The Effects of Nuclear Fragmentation Models on Single Event Effect Prediction," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3158-3164, 2009.
- [322] S. DasGupta, O. A. Amusan, M. L. Alles, A. F. Witulski, L. W. Massengill, B. L. Bhuva, R. D. Schrimpf, and R. A. Reed, "Use of a Contacted Buried n^+ Layer for Single Event Mitigation in 90 nm CMOS," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 2008-2013, 2009.
- [323] N. A. Dodds, R. A. Reed, M. H. Mendenhall, R. A. Weller, M. A. Clemens, P. E. Dodd, M. R. Shaneyfelt, G. Vizkelethy, J. R. Schwank, V. Ferlet-Cavrois, J. H. Adams, R. D. Schrimpf, and M. P. King, "Charge Generation by Secondary Particles From Nuclear Reactions in BEOL Materials," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3172-3179, 2009.
- [324] F. El Mamouni, E. X. Zhang, R. D. Schrimpf, D. M. Fleetwood, R. A. Reed, S. Cristoloveanu, and W. Xiong, "Fin-Width Dependence of Ionizing Radiation-Induced Subthreshold-Swing Degradation in 100-nm-Gate-Length FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3250-3255, 2009.
- [325] I. S. Esqueda, H. J. Barnaby, M. L. McLain, P. C. Adell, F. El Mamouni, S. K. Dixit, R. D. Schrimpf, and W. Xiong, "Modeling the radiation response of fully-depleted SOI n-Channel MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 2247-2250, 2009.
- [326] M. J. Gadlage, J. R. Ahlbin, V. Ramachandran, P. Gouker, C. A. Dinkins, B. L. Bhuva, B. Narasimham, R. D. Schrimpf, M. W. McCurdy, M. L. Alles, R. A. Reed, M. H. Mendenhall, L. W. Massengill, R. L. Shuler, and D. McMorrow, "Temperature Dependence of Digital Single-Event Transients in Bulk and Fully-Depleted SOI Technologies," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3115-3121, 2009.
- [327] M. J. Gadlage, P. Gouker, B. L. Bhuva, B. Narasimham, and R. D. Schrimpf, "Heavy-ion-induced digital single event transients in a 180 nm fully depleted SOI process," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3483-3488, 2009.
- [328] C. L. Howe, R. A. Weller, R. A. Reed, B. D. Sierawski, P. W. Marshall, C. J. Marshall, M. H. Mendenhall, R. D. Schrimpf, and J. E. Hubbs, "Effects of Surrounding Materials on Proton-Induced Energy Deposition in Large Silicon Diode Arrays," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 2167-2170, 2009.
- [329] D. R. Hughart, R. D. Schrimpf, D. M. Fleetwood, X. J. Chen, H. J. Barnaby, K. E. Holbert, R. L. Pease, D. G. Platteter, B. R. Tuttle, and S. T. Pantelides, "The Effects of Aging and Hydrogen on the Radiation Response of Gated Lateral PNP Bipolar Transistors," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3361-3366, 2009.
- [330] J. M. Hutson, J. A. Pellish, A. D. Tipton, G. Boselli, M. A. Xapsos, H. Kim, M. Friendlich, M. Campola, S. Seidleck, K. LaBel, A. Marshall, X. Deng, R. Baumann, R. A. Reed, R. D. Schrimpf, R. A. Weller, and L. W. Massengill, "Evidence for Lateral Angle Effect on Single-Event Latchup in 65 nm SRAMs," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 208-213, 2009.
- [331] A. Kalavagunta, M. Silvestri, M. J. Beck, S. K. Dixit, R. D. Schrimpf, R. A. Reed, D. M. Fleetwood, L. Shen, and U. K. Mishra, "Impact of Proton Irradiation-Induced Bulk Defects on Gate-Lag in GaN HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3192-3195, 2009.
- [332] S. R. Kulkarni, R. D. Schrimpf, K. F. Galloway, R. Arora, C. Claeys, and E. Simoen, "Total ionizing dose effects on Ge pMOSFETs with high- κ gate stack: on/off current ratio," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 1926-1930, August 2009.
- [333] A. Madan, R. Verma, R. Arora, E. P. Wilcox, J. D. Cressler, P. W. Marshall, R. D. Schrimpf, P. F. Cheng, L. Y. Del Castillo, Q. Liang, and G. Freeman, "The Enhanced Role of Shallow-Trench Isolation in Ionizing Radiation Damage of 65 nm RF-CMOS on SOI," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3256-3261, 2009.
- [334] B. Narasimham, M. J. Gadlage, B. L. Bhuva, R. D. Schrimpf, L. W. Massengill, W. T. Holman, A. F. Witulski, and K. F. Galloway, "Test Circuit for Measuring Pulse Widths of Single-Event Transients Causing Soft Errors," *IEEE Trans. Semi. Manuf.*, vol. 22, pp. 119-125, 2009.
- [335] B. Narasimham, M. J. Gadlage, B. L. Bhuva, R. D. Schrimpf, L. W. Massengill, W. T. Holman, A. F. Witulski, R. A. Reed, R. A. Weller, and X. W. Zhu, "Characterization of Neutron- and Alpha-Particle-Induced Transients Leading to Soft Errors in 90-nm CMOS Technology," *IEEE Transactions on Device and Materials Reliability*, vol. 9, pp. 325-333, Jun 2009.
- [336] H. Park, D. J. Cummings, R. Arora, J. A. Pellish, R. Reed, R. D. Schrimpf, D. McMorrow, S. E. Armstrong, U. Roh, T. Nishida, M. E. Law, and S. E. Thompson, "Laser-Induced Current Transients in Strained-Si Diodes," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3203-3209, 2009.

- [337] R. L. Pease, R. D. Schrimpf, and D. M. Fleetwood, "ELDRS in Bipolar Linear Circuits: A Review," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 1894-1908, 2009.
- [338] J. A. Pellish, R. A. Reed, D. McMorrow, G. Vizkelethy, V. F. Cavois, J. Baggio, P. Paillet, O. Duhamel, K. A. Moen, S. D. Phillips, R. M. Diestelhorst, J. D. Cressler, A. K. Sutton, A. Raman, M. Turowski, P. E. Dodd, M. L. Alles, R. D. Schrimpf, P. W. Marshall, and K. A. LaBel, "Heavy Ion Microbeam- and Broadbeam-Induced Transients in SiGe HBTs," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3078-3084, 2009.
- [339] B. D. Sierawski, J. A. Pellish, R. A. Reed, R. D. Schrimpf, K. M. Warren, R. A. Weller, M. H. Mendenhall, J. D. Black, A. D. Tipton, M. A. Xapsos, R. C. Baumann, X. Deng, M. J. Campola, M. R. Friendlich, H. S. Kim, A. M. Phan, and C. M. Seidleck, "Impact of low-energy proton induced upsets on test methods and rate predictions," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3085-3092, 2009.
- [340] M. Silvestri, S. Gerardin, R. D. Schrimpf, D. M. Fleetwood, F. Faccio, and A. Paccagnella, "The Role of Irradiation Bias on the Time-Dependent Dielectric Breakdown of 130-nm MOSFETs Exposed to X-rays," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3244-3249, 2009.
- [341] S. L. Teich-McGoldrick, M. Bellanger, M. Caussanel, L. Tsetseris, S. T. Pantelides, S. C. Glotzer, and R. D. Schrimpf, "Design Considerations for CdTe Nanotetrapods as Electronic Devices," *Nano Letters*, vol. 9, pp. 3683-3688, 2009.
- [342] K. M. Warren, A. L. Sternberg, J. D. Black, R. A. Weller, R. A. Reed, M. H. Mendenhall, R. D. Schrimpf, and L. W. Massengill, "Heavy Ion Testing and Single Event Upset Rate Prediction Considerations for a DICE Flip-Flop," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3130-3137, 2009.
- [343] R. A. Weller, R. A. Reed, K. M. Warren, M. H. Mendenhall, B. D. Sierawski, R. D. Schrimpf, and L. W. Massengill, "General framework for single event effects rate prediction in microelectronics," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3098-3108, 2009.
- [344] F. Wrobel, F. Saigné, M. Gedion, J. Gasiot, and R. D. Schrimpf, "Radioactive nuclei induced soft errors at ground level," *IEEE Trans. Nucl. Sci.*, vol. 56, pp. 3437-3441, 2009.
- [345] P. C. Adell, A. F. Witulski, R. D. Schrimpf, F. Baronti, W. T. Holman, and K. F. Galloway, "Digital control for radiation-hardened switching converters in space," *IEEE Trans. Aerospace and Electronic Systems*, vol. 46, pp. 761-770, 2010.
- [346] R. Arora, E. Simoen, Z. En Xia, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, B. K. Choi, J. Mitard, M. Meuris, C. Claeys, A. Madan, and J. D. Cressler, "Effects of halo doping and Si capping layer thickness on total-dose effects in Ge p-MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 1933-1939, 2010.
- [347] D. J. Cummings, A. F. Witulski, P. Hyunwoo, R. D. Schrimpf, S. E. Thompson, and M. E. Law, "Mobility modeling considerations for radiation effects simulations in silicon," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 2318-2326, 2010.
- [348] S. DasGupta, D. McMorrow, R. A. Reed, R. D. Schrimpf, and J. B. Boos, "Gate bias dependence of single event charge collection in AlSb/InAs HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 1856-1860, 2010.
- [349] S. DasGupta, D. McMorrow, R. A. Reed, R. D. Schrimpf, J. B. Boos, and V. Ramachandran, "Process and contamination effects on the single-event response of AlSb/InAs HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3262-3266, 2010.
- [350] N. A. Dodds, J. M. Hutson, J. A. Pellish, R. A. Reed, H. S. Kim, M. D. Berg, M. R. Friendlich, A. M. Phan, C. M. Seidleck, M. A. Xapsos, X. Deng, R. C. Baumann, R. D. Schrimpf, M. P. King, L. W. Massengill, and R. A. Weller, "Selection of well contact densities for latchup-immune minimal-area ICs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3575-3581, 2010.
- [351] F. El-Mamouni, M. Bawedin, E. X. Zhang, R. D. Schrimpf, D. M. Fleetwood, and S. Cristoloveanu, "Total dose effects on the performance of irradiated capacitorless MSDRAM cells," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3054-3059, 2010.
- [352] M. J. Gadlage, J. R. Ahlbin, B. Narasimham, B. L. Bhuvu, L. W. Massengill, R. A. Reed, R. D. Schrimpf, and G. Vizkelethy, "Scaling trends in SET pulse widths in sub-100 nm bulk CMOS processes," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3336-3341, 2010.
- [353] M. J. Gadlage, J. R. Ahlbin, B. Narasimham, V. Ramachandran, C. A. Dinkins, N. D. Pate, B. L. Bhuvu, R. D. Schrimpf, L. W. Massengill, R. L. Shuler, and D. McMorrow, "Increased single-event transient pulsewidths in a 90-nm bulk CMOS technology operating at elevated temperatures," *IEEE Trans. Device and Materials Reliability*, vol. 10, pp. 157-163, 2010.
- [354] M. Gedion, F. Wrobel, F. Saigné, R. D. Schrimpf, and J. Mekki, "Monte Carlo simulations to evaluate the contribution of Si bulk, interconnects, and packaging to alpha-soft error rates in advanced technologies," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3121-3126, 2010.

- [355] Y. Gonzalez Velo, J. Boch, N. J. H. Roche, S. Perez, J. R. Vaille, L. Dusseau, F. Saigne, E. Lorfevre, R. D. Schrimpf, C. Chatry, and A. Canals, "Bias effects on total dose-induced degradation of bipolar linear microcircuits for switched dose-rate irradiation," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 1950-1957, 2010.
- [356] S. Jagannathan, M. J. Gadlage, B. L. Bhuva, R. D. Schrimpf, B. Narasimham, J. Chetia, J. R. Ahlbin, and L. W. Massengill, "Independent measurement of SET pulse widths from N-Hits and P-Hits in 65-nm CMOS," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3386-3391, 2010.
- [357] P. Jannaty, F. C. Sabou, M. Gadlage, R. I. Bahar, J. Mundy, W. Patterson, R. A. Reed, R. A. Weller, R. D. Schrimpf, and A. Zaslavsky, "Two-dimensional Markov chain analysis of radiation-induced soft errors in subthreshold nanoscale CMOS devices," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3768-3774, 2010.
- [358] M. P. King, R. A. Reed, R. A. Weller, M. H. Mendenhall, R. D. Schrimpf, M. L. Alles, E. C. Auden, S. E. Armstrong, and M. Asai, "The impact of delta-rays on single-event upsets in highly scaled SOI SRAMs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3169-3175, 2010.
- [359] Y. Li, N. Rezzak, E. X. Zhang, R. D. Schrimpf, D. M. Fleetwood, J. Wang, D. Wang, Y. Wu, and S. Cai, "Including the effects of process-related variability on radiation response in advanced foundry process design kits," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3570-3574, 2010.
- [360] D. McMorrow, J. Warner, S. DasGupta, V. Ramachandran, J. B. Boos, R. Reed, R. Schrimpf, P. Paillet, V. Ferlet-Cavrois, J. Baggio, S. Buchner, F. El-Mamouni, M. Raine, and O. Duhamel, "Novel energy-dependent effects revealed in GeV heavy-ion-induced transient measurements of antimony-based III-V HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3358-3365, 2010.
- [361] B. Narasimham, J. K. Wang, M. Buer, R. Gorti, K. Chandrasekharan, K. M. Warren, B. D. Sierawski, R. D. Schrimpf, R. A. Reed, and R. A. Weller, "Contribution of control logic upsets and multi-node charge collection to flip-flop SEU cross-section in 40-nm CMOS," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3176-3182, 2010.
- [362] S. T. Pantelides, L. Tsetseris, M. J. Beck, S. N. Rashkeev, G. Hadjisavvas, I. G. Batyrev, B. R. Tuttle, A. G. Marinopoulos, X. J. Zhou, D. M. Fleetwood, and R. D. Schrimpf, "Performance, reliability, radiation effects, and aging issues in microelectronics from atomic-scale physics to engineering-level modeling," *Solid-State Electronics*, vol. 54, pp. 841-848, 2010.
- [363] J. A. Pellish, M. A. Xapsos, K. A. LaBel, P. W. Marshall, D. F. Heidel, K. P. Rodbell, M. C. Hakey, P. E. Dodd, M. R. Shaneyfelt, J. R. Schwank, R. C. Baumann, D. Xiaowei, A. Marshall, B. D. Sierawski, J. D. Black, R. A. Reed, R. D. Schrimpf, H. S. Kim, M. D. Berg, M. J. Campola, M. R. Friendlich, C. E. Perez, A. M. Phan, and C. M. Seidleck, "Heavy ion testing with iron at 1 GeV/amu," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 2948-2954, 2010.
- [364] Y. S. Puzyrev, B. R. Tuttle, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Theory of hot-carrier-induced phenomena in GaN high-electron-mobility transistors," *Applied Physics Letters*, vol. 96, article number 053505, 2010.
- [365] N. Rezzak, R. D. Schrimpf, M. L. Alles, E. X. Zhang, D. M. Fleetwood, and Y. A. Li, "Layout-related stress effects on radiation-induced leakage current," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3288-3292, 2010.
- [366] T. Roy, Y. S. Puzyrev, B. R. Tuttle, D. M. Fleetwood, R. D. Schrimpf, D. F. Brown, U. K. Mishra, and S. T. Pantelides, "Electrical-stress-induced degradation in AlGaIn/GaN high electron mobility transistors grown under gallium-rich, nitrogen-rich, and ammonia-rich conditions," *Applied Physics Letters*, vol. 96, article number 133503, 2010.
- [367] T. Roy, E. X. Zhang, Y. S. Puzyrev, D. M. Fleetwood, R. D. Schrimpf, B. K. Choi, A. B. Hmelo, and S. T. Pantelides, "Process dependence of proton-induced degradation in GaN HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3060-3065, 2010.
- [368] X. Shen, S. DasGupta, R. A. Reed, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Recoverable degradation in InAs/AlSb HEMTs: The role of hot carriers and metastable defects in AlSb," *J. Appl. Phys.*, vol. 108, article number 114505, 2010.
- [369] B. D. Sierawski, M. H. Mendenhall, R. A. Reed, M. A. Clemens, R. A. Weller, R. D. Schrimpf, E. W. Blackmore, M. Trinczek, B. Hitti, J. A. Pellish, R. C. Baumann, S. J. Wen, R. Wong, and N. Tam, "Muon-induced single event upsets in deep-submicron technology," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3273-3278, 2010.
- [370] L. Tsetseris, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Hydrogen-dopant interactions in SiGe and strained Si," *Appl. Phys. Lett.*, vol. 96, article number 251905, 2010.
- [371] B. R. Tuttle, D. R. Hughart, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Defect interactions of H₂ in SiO₂: Implications for ELDRS and latent interface trap buildup," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3046-3053, 2010.

- [372] R. A. Weller, M. H. Mendenhall, R. A. Reed, R. D. Schrimpf, K. M. Warren, B. D. Sierawski, and L. W. Massengill, "Monte Carlo Simulation of Single Event Effects," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 1726-1746, 2010.
- [373] C. X. Zhang, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, E. Simoen, J. Mitard, and C. L. Claeys, "Effects of processing and radiation bias on leakage currents in Ge pMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3066-3070, 2010.
- [374] E. X. Zhang, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, F. E. Mamouni, W. Xiong, and S. Cristoloveanu, "Effects of fin width on memory windows in finFET ZRAMs," *Solid-State Electronics*, vol. 54, pp. 1155-1159, 2010.
- [375] E. X. Zhang, D. M. Fleetwood, F. E. El-Mamouni, M. L. Alles, R. D. Schrimpf, W. Xiong, C. Hobbs, K. Akarvardar, and S. Cristoloveanu, "Total ionizing dose effects on FinFET-based capacitor-less 1T-DRAMs," *IEEE Trans. Nucl. Sci.*, vol. 57, pp. 3298-3304, 2010.
- [376] Y. S. Puzyrev, T. Roy, M. Beck, B. R. Tuttle, R. D. Schrimpf, D. M. Fleetwood, and S. T. Pantelides, "Dehydrogenation of defects and hot-electron degradation in GaN high-electron-mobility transistors," *Journal of Applied Physics*, vol. 109, article number 034501, 2011.
- [377] T. Roy, E. X. Zhang, Y. S. Puzyrev, X. Shen, D. M. Fleetwood, R. D. Schrimpf, G. Koblmuehler, R. Chu, C. Poblenz, N. Fichtenbaum, C. S. Suh, U. K. Mishra, J. S. Speck, and S. T. Pantelides, "Temperature-dependence and microscopic origin of low frequency $1/f$ noise in GaN/AlGaIn high electron mobility transistors," *Applied Physics Letters*, vol. 99, article number 203501, 2011.
- [378] X. Shen, E. X. Zhang, C. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, S. Dhar, S.-H. Ryu, and S. T. Pantelides, "Atomic-scale origins of bias-temperature instabilities in SiC-SiO₂ structures," *Applied Physics Letters*, vol. 98, article number 063507, 2011.
- [379] K. H. Warnick, Y. Puzyrev, T. Roy, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Room-temperature diffusive phenomena in semiconductors: The case of AlGaIn," *Physical Review B*, vol. 84, article number 214109, 2011.
- [380] R. Arinero, E. X. Zhang, N. Rezzak, R. D. Schrimpf, D. M. Fleetwood, B. K. Choi, A. B. Hmelo, J. Mekki, A. D. Touboul, and F. Saigné, "High fluence 1.8 MeV proton irradiation effects on n-type MOS capacitors," *Microelectronics Reliability*, vol. 51, pp. 2093-2096, 2011.
- [381] R. Arora, E. X. Zhang, S. Seth, J. D. Cressler, D. M. Fleetwood, R. D. Schrimpf, G. L. Rosa, A. K. Sutton, H. M. Nayfeh, and G. Freeman, "Trade-offs between RF performance and total-dose tolerance in 45-nm RF-CMOS," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2830-2837, 2011.
- [382] L. Artola, G. Hubert, K. M. Warren, M. Gaillardin, R. D. Schrimpf, R. A. Reed, R. A. Weller, J. R. Ahlbin, P. Paillet, M. Raine, S. Girard, S. Duzellier, L. W. Massengill, and F. Bezerra, "SEU prediction from SET modeling using multi-node collection in bulk transistors and SRAMs down to the 65 nm technology node," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 1338-1346, 2011.
- [383] E. C. Auden, R. A. Weller, M. H. Mendenhall, R. A. Reed, R. D. Schrimpf, M. P. King, N. A. Dodds, L. A. Arpin, and M. Asai, "High energy electron-induced transients in a shielded focal plane array," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 899-905, 2011.
- [384] J. Boch, Y. Gonzalez Velo, F. Saigne, N. J. H. Roche, S. Perez, R. D. Schrimpf, J. R. Vaille, L. Dusseau, J. Mekki, E. Lorfèvre, and R. Ecoffet, "ELDRS: optimization tools for the switched dose rate technique," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2998-3003, 2011.
- [385] I. Chatterjee, B. Narasimham, N. N. Mahatme, B. L. Bhuvana, R. D. Schrimpf, J. K. Wang, B. Bartz, E. Pitta, and M. Buer, "Single-event charge collection and upset in 40-nm dual- and triple-well bulk CMOS SRAMs," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2761-2767, 2011.
- [386] S. DasGupta, X. Shen, R. D. Schrimpf, R. A. Reed, S. T. Pantelides, D. M. Fleetwood, J. I. Bergman, and B. Brar, "Degradation in InAs-AlSb HEMTs under hot-carrier stress," *IEEE Trans. Electron Devices*, vol. 58, pp. 1499-1507, 2011.
- [387] F. El-Mamouni, E. X. Zhang, N. D. Pate, N. Hooten, R. D. Schrimpf, R. A. Reed, K. F. Galloway, D. McMorrow, J. Warner, E. Simoen, C. Claeys, A. Griffoni, D. Linten, and G. Vizkelethy, "Laser- and heavy ion-induced charge collection in bulk FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2563-2569, 2011.
- [388] I. S. Esqueda, H. J. Barnaby, K. E. Holbert, F. El-Mamouni, and R. D. Schrimpf, "Modeling of ionizing radiation-induced degradation in multiple gate field effect transistors," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 499-505, 2011.
- [389] M. J. Gadlage, J. R. Ahlbin, B. L. Bhuvana, N. C. Hooten, N. A. Dodds, R. A. Reed, L. W. Massengill, R. D. Schrimpf, and G. Vizkelethy, "Alpha-particle and focused-ion-beam-induced single-event transient measurements in a bulk 65-nm CMOS technology," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 1093-1097, 2011.

- [390] M. J. Gadlage, J. R. Ahlbin, B. Narasimham, B. L. Bhuvu, L. W. Massengill, and R. D. Schrimpf, "Single-event transient measurements in nMOS and pMOS transistors in a 65-nm bulk CMOS technology at elevated temperatures," *IEEE Trans. Device and Materials Reliability*, vol. 11, pp. 179-186, March 2011.
- [391] M. Gedion, F. Wrobel, F. Saigne, M. Portier, A. D. Touboul, and R. D. Schrimpf, "Effect of the uranium decay chain disequilibrium on alpha disintegration rate," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2793-2797, 2011.
- [392] M. Gedion, F. Wrobel, F. Saigne, and R. D. Schrimpf, "Uranium and thorium contribution to soft error rate in advanced technologies," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 1098-1103, 2011.
- [393] Y. Gonzalez-Velo, J. Boch, F. Pichot, J. Mekki, N. J. H. Roche, S. Perez, C. Deneau, J. R. Vaille, L. Dusseau, F. Saigne, E. Lorfevre, and R. D. Schrimpf, "The use of electron-beam lithography for localized micro-beam irradiations," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 1104-1111, 2011.
- [394] Y. Gonzalez-Velo, J. Boch, F. Saigne, N. J. H. Roche, S. Perez, J. R. Vaille, C. Deneau, L. Dusseau, E. Lorfevre, R. D. Schrimpf, C. Chatry, E. Legoulven, and D. G. Platteter, "Evaluation of ELDRS mechanisms using dose rate switching experiments on gated lateral PNP transistors," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2953-2960, 2011.
- [395] P. M. Gouker, B. Tyrrell, R. D'Onofrio, P. Wyatt, T. Soares, W. Hu, C. Chen, J. R. Schwank, M. R. Shaneyfelt, E. W. Blackmore, K. Delikat, M. Nelson, P. McMarr, H. Hughes, J. R. Ahlbin, S. Weeden-Wright, and R. Schrimpf, "Radiation effects in 3D integrated SOI SRAM circuits," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2845-2854, 2011.
- [396] P. M. Gouker, B. Tyrrell, M. Renzi, C. Chen, P. Wyatt, J. R. Ahlbin, S. Weeden-Wright, N. M. Atkinson, N. J. Gaspard, B. L. Bhuvu, L. W. Massengill, E. Zhang, R. Schrimpf, R. A. Weller, M. P. King, and M. J. Gadlage, "SET characterization in logic circuits fabricated in a 3DIC technology," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2555-2562, 2011.
- [397] D. R. Hughart, R. D. Schrimpf, D. M. Fleetwood, B. R. Tuttle, and S. T. Pantelides, "Mechanisms of interface trap buildup and annealing during elevated temperature irradiation," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2930-2936, 2011.
- [398] M. Li, Y. F. Li, Y. J. Wu, S. Cai, N. Y. Zhu, N. Rezzak, R. D. Schrimpf, D. M. Fleetwood, J. Q. Wang, X. X. Cheng, Y. Wang, D. L. Wang, and Y. Hao, "Including radiation effects and dependencies on process-related variability in advanced foundry SPICE models using a new physical model and parameter extraction approach," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2876-2882, 2011.
- [399] Y. S. Puzyrev, T. Roy, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Radiation-induced defect evolution and electrical degradation of AlGaIn/GaN high-electron-mobility transistors," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2918-2924, 2011.
- [400] N. Rezzak, M. L. Alles, R. D. Schrimpf, S. Kalemeris, L. W. Massengill, J. Sochacki, and H. J. Barnaby, "The sensitivity of radiation-induced leakage to STI topology and sidewall doping," *Microelectronics Reliability*, 2011.
- [401] N. L. Rowsey, M. E. Law, R. D. Schrimpf, D. M. Fleetwood, B. R. Tuttle, and S. T. Pantelides, "A quantitative model for ELDRS and H₂ degradation effects in irradiated oxides based on first principles calculations," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2937-2944, 2011.
- [402] T. Roy, Y. S. Puzyrev, E. X. Zhang, S. DasGupta, S. A. Francis, D. M. Fleetwood, R. D. Schrimpf, U. K. Mishra, J. S. Speck, and S. T. Pantelides, "1/f Noise in GaN HEMTs grown under Ga-rich, N-rich, and NH₃-rich conditions," *Microelectronics Reliability*, vol. 51, pp. 212-216, 2011.
- [403] R. D. Schrimpf, D. M. Fleetwood, M. L. Alles, R. A. Reed, G. Lucovsky, and S. T. Pantelides, "Radiation effects in new materials for nano-devices (invited)," *Microelectronic Engineering*, vol. 88, pp. 1259-1264, July 2011.
- [404] M. Silvestri, E. Tracino, M. Briccarello, M. Belluco, R. Destefanis, C. Lobascio, M. Durante, G. Santin, and R. D. Schrimpf, "Impact of spacecraft-shell composition on 1 GeV/nucleon ⁵⁶Fe ion-fragmentation and dose reduction," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 3126-3133, 2011.
- [405] J. J. Song, B. K. Choi, E. X. Zhang, R. D. Schrimpf, D. M. Fleetwood, C. H. Park, Y. H. Jeong, and O. Kim, "Fin width and bias dependence of the response of triple-gate MOSFETs to total dose irradiation," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2871-2875, 2011.
- [406] C. X. Zhang, S. A. Francis, Z. En Xia, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, E. Simoen, J. Mitard, and C. Claeys, "Effect of ionizing radiation on defects and 1/f noise in Ge pMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 764-769, 2011.

- [407] C. X. Zhang, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, S. Dhar, S. H. Ryu, X. Shen, and S. T. Pantelides, "Effects of bias on the irradiation and annealing responses of 4H-SiC MOS devices," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2925-2929, 2011.
- [408] E. X. Zhang, A. K. M. Newaz, B. Wang, S. Bhandaru, C. X. Zhang, D. M. Fleetwood, K. I. Bolotin, S. T. Pantelides, M. L. Alles, R. D. Schrimpf, S. M. Weiss, R. A. Reed, and R. A. Weller, "Low-energy x-ray and ozone-exposure induced defect formation in graphene materials and devices," *IEEE Trans. Nucl. Sci.*, vol. 58, pp. 2961-2967, 2011.
- [409] E. X. Zhang, C. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, S. Dhar, S.-H. Ryu, X. Shen, and S. T. Pantelides, "Bias-temperature instabilities in 4H-SiC metal-oxide-semiconductor capacitors," *IEEE Trans. Device and Materials Reliability*, vol. 12, pp. 391-398, June 2012.
- [410] S. T. Pantelides, Y. Puzyrev, X. Shen, T. Roy, S. DasGupta, B. R. Tuttle, D. M. Fleetwood, and R. D. Schrimpf, "Reliability of III-V devices – The defects that cause the trouble (invited)," *Microelectronic Engineering*, vol. 90, pp. 3-8, 2012.
- [411] M. P. King, R. A. Reed, R. A. Weller, M. H. Mendenhall, R. D. Schrimpf, N. D. Pate, E. A. Auden, and S. L. Weeden-Wright, "Radial characteristics of heavy-ion track structure and implications of delta-ray events for microelectronics," *Appl. Phys. Lett.*, vol. 101, article number 053509, 2012.
- [412] E. C. Auden, R. A. Weller, M. H. Mendenhall, R. A. Reed, R. D. Schrimpf, N. C. Hooten, and M. P. King, "Single particle displacement damage in silicon," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 3054-3061, 2012.
- [413] W. G. Bennett, R. D. Schrimpf, N. C. Hooten, R. A. Reed, J. S. Kauppila, R. A. Weller, K. M. Warren, and M. H. Mendenhall, "Efficient method for estimating the characteristics of radiation-induced current transients," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2704-2709, 2012.
- [414] N. A. Dodds, N. C. Hooten, R. A. Reed, R. D. Schrimpf, J. H. Warner, N. J. H. Roche, D. McMorrow, S. J. Wen, R. Wong, J. F. Salzman, S. Jordan, J. A. Pellish, C. J. Marshall, N. J. Gaspard, W. G. Bennett, E. X. Zhang, and B. L. Bhuvu, "Effectiveness of SEL hardening strategies and the latchup domino effect," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2642-2650, 2012.
- [415] F. El-Mamouni, E. X. Zhang, D. R. Ball, B. Sierawski, M. P. King, R. D. Schrimpf, R. A. Reed, M. L. Alles, D. M. Fleetwood, D. Linten, E. Simoen, and G. Vizkelethy, "Heavy-ion-induced current transients in bulk and SOI FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2674-2681, 2012.
- [416] S. A. Francis, C. X. Zhang, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, E. Simoen, J. Mitard, and C. Claeys, "Comparison of charge pumping and $1/f$ noise in irradiated Ge pMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 728-734, 2012.
- [417] N. C. Hooten, L. D. Edmonds, W. G. Bennett, J. R. Ahlbin, N. A. Dodds, R. A. Reed, R. D. Schrimpf, and R. A. Weller, "The significance of high-level carrier generation conditions for charge collection in irradiated devices," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2710-2721, 2012.
- [418] D. R. Hughart, R. D. Schrimpf, D. M. Fleetwood, N. L. Rowsey, M. E. Law, B. R. Tuttle, and S. T. Pantelides, "The effects of proton-defect interactions on radiation-induced interface-trap formation and annealing," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 3087-3092, 2012.
- [419] N. N. Mahatme, E. X. Zhang, R. A. Reed, B. L. Bhuvu, R. D. Schrimpf, D. M. Fleetwood, D. Linten, E. Simoen, A. Griffoni, M. Aoulaiche, M. Jurczak, and G. Groeseneken, "Impact of back-gate bias and device geometry on the total ionizing dose response of 1-transistor floating body RAMs," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2966-2973, 2012.
- [420] Y. S. Puzyrev, B. Wang, E. X. Zhang, C. X. Zhang, A. K. M. Newaz, K. I. Bolotin, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Surface reactions and defect formation in irradiated graphene devices," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 3039-3044, 2012.
- [421] V. Ramachandran, R. A. Reed, R. D. Schrimpf, D. McMorrow, J. Brad Boos, M. P. King, E. X. Zhang, G. Vizkelethy, X. Shen, and S. T. Pantelides, "Single-event transient sensitivity of InAlSb/InAs/AlGaSb high electron mobility transistors," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2691-2696, 2012.
- [422] N. L. Rowsey, M. E. Law, R. D. Schrimpf, D. M. Fleetwood, B. R. Tuttle, and S. T. Pantelides, "Radiation-induced oxide charge in low- and high-H₂ environments," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 755-759, Aug 2012.
- [423] N. L. Rowsey, M. E. Law, R. D. Schrimpf, D. M. Fleetwood, B. R. Tuttle, and S. T. Pantelides, "Mechanisms separating time-dependent and true dose-rate effects in irradiated bipolar oxides," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 3069-3076, 2012.
- [424] J. Yao, Z. Ye, M. Li, Y. Li, R. D. Schrimpf, D. M. Fleetwood, and Y. Wang, "Statistical analysis of soft error rate in digital logic design including process variations," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2811-2817, 2012.

- [425] C. X. Zhang, E. X. Zhang, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, E. B. Song, S. M. Kim, K. Galatsis, and K. L. W. Wang, "Electrical stress and total ionizing dose effects on graphene-based non-volatile memory devices," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 2974-2978, 2012.
- [426] E. X. Zhang, D. M. Fleetwood, G. X. Duan, C. X. Zhang, S. A. Francis, and R. D. Schrimpf, "Charge pumping measurements of radiation-induced interface-trap density in floating-body SOI FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 3062-3068, 2012.
- [427] E. X. Zhang, D. M. Fleetwood, S. A. Francis, C. X. Zhang, F. El Mamouni, and R. D. Schrimpf, "Charge pumping and DCIV currents in SOI FinFETs," *Solid State Electron.*, vol. 78, pp. 75-79, 2012.
- [428] M. Turowski, A. Raman, M. L. Alles, D. Ball, M. P. King, R. A. Reed, and R. D. Schrimpf, "Effect of carrier transport in oxides surrounding active devices on SEU in 45 nm SOI SRAM," *IEEE Trans. Nucl. Sci.*, vol. 59, pp. 728-734, Aug 2012.
- [429] E. X. Zhang, A. K. M. Newaz, B. Wang, C. X. Zhang, D. M. Fleetwood, K. I. Bolotin, R. D. Schrimpf, S. T. Pantelides, and M. L. Alles, "Ozone-exposure and annealing effects on graphene-on-SiO₂ transistors," *Applied Physics Letters*, vol. 101, article number 121601, 2012.
- [430] K. F. Galloway, R. L. Pease, R. Schrimpf, and D. W. Emily, "From Displacement Damage to ELDRS: Fifty Years of Bipolar Transistor Radiation Effects at the NSREC," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 1731-1739, 2013.
- [431] E. Simoen, M. Gaillardin, P. Paillet, R. A. Reed, R. D. Schrimpf, M. L. Alles, F. El-Mamouni, D. M. Fleetwood, A. Griffoni, and C. Claeys, "Radiation Effects in Advanced Multiple Gate and Silicon-on-Insulator Transistors," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 1970-1991, 2013.
- [432] C. X. Zhang, X. Shen, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, S. A. Francis, T. Roy, S. Dhar, S. H. Ryu, and S. T. Pantelides, "Temperature Dependence and Postirradiation Annealing Response of the 1/f Noise of 4H-SiC MOSFETs," *IEEE Trans. Electron Devices*, vol. 60, pp. 2361-2367, 2013.
- [433] C. X. Zhang, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, S. Dhar, S. H. Ryu, X. Shen, and S. T. Pantelides, "Origins of low-frequency noise and interface traps in 4H-SiC MOSFETs," *IEEE Electron Device Letters*, vol. 34, pp. 117-119, 2013.
- [434] Z. Zhang, A. R. Arehart, E. Cinkilic, J. Chen, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, B. McSkimming, J. S. Speck, and S. A. Ringel, "Impact of proton irradiation on deep level states in n-GaN," *Applied Physics Letters*, vol. 103, article number 042102, 2013.
- [435] E. C. Auden, R. A. Weller, R. D. Schrimpf, M. H. Mendenhall, R. A. Reed, N. C. Hooten, W. G. Bennett, and M. P. King, "Effects of high electric fields on the magnitudes of current steps produced by single particle displacement damage," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4094-4102, 2013.
- [436] W. G. Bennett, N. C. Hooten, R. D. Schrimpf, R. A. Reed, R. A. Weller, M. H. Mendenhall, A. F. Witulski, and D. M. Wilkes, "Experimental characterization of radiation-induced charge sharing," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4159-4165, 2013.
- [437] J. S. Bi, Z. S. Han, E. X. Zhang, M. W. McCurdy, R. A. Reed, R. D. Schrimpf, D. M. Fleetwood, M. L. Alles, R. A. Weller, D. Linten, M. Jurczak, and A. Fantini, "The impact of x-ray and proton irradiation on HfO₂/Hf-based bipolar resistive memories," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4540-4546, 2013.
- [438] I. Chatterjee, E. X. Zhang, B. L. Bhuvu, M. A. Alles, R. D. Schrimpf, D. M. Fleetwood, Y. P. Fang, and A. Oates, "Bias dependence of total-dose effects in bulk FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4476-4482, 2013.
- [439] J. Chen, Y. S. Puzyrev, C. X. Zhang, E. X. Zhang, M. W. McCurdy, D. M. Fleetwood, R. D. Schrimpf, S. T. Pantelides, S. W. Kaun, E. C. H. Kyle, and J. S. Speck, "Proton-induced dehydrogenation of defects in AlGaN/GaN HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4080-4086, 2013.
- [440] N. A. Dodds, N. C. Hooten, R. A. Reed, R. D. Schrimpf, J. H. Warner, N. J. H. Roche, D. McMorrow, S. Buchner, S. Jordan, J. A. Pellish, W. G. Bennett, N. J. Gaspard, and M. P. King, "SEL-sensitive area mapping and the effects of reflection and diffraction from metal lines on laser SEE testing," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 2550-2558, 2013.
- [441] J. D. Greenlee, J. C. Shank, M. B. Tellekamp, E. X. Zhang, J. Bi, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, and W. A. Doolittle, "Radiation effects on LiNbO₂ memristors for neuromorphic computing applications," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4555-4562, 2013.
- [442] N. C. Hooten, W. G. Bennett, L. D. Edmonds, J. A. Kozub, R. A. Reed, R. D. Schrimpf, and R. A. Weller, "The impact of depletion region potential modulation on ion-induced current transient response," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4150-4158, 2013.
- [443] S. Jagannathan, T. D. Loveless, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, T. D. Haeffner, J. S. Kauppila, N. Mahatme, B. L. Bhuvu, M. L. Alles, W. T. Holman, A. F. Witulski, and L. W. Massengill,

- "Sensitivity of high-frequency RF circuits to total ionizing dose degradation," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4498-4504, 2013.
- [444] A. Kaouache, F. Wrobel, F. Saigne, A. D. Touboul, and R. D. Schrimpf, "Analytical method to evaluate soft error rate due to alpha contamination," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4059-4066, 2013.
- [445] M. P. King, R. A. Reed, R. A. Weller, M. H. Mendenhall, R. D. Schrimpf, B. D. Sierawski, A. L. Sternberg, B. Narasimham, J. K. Wang, E. Pitta, B. Bartz, D. Reed, C. Monzel, R. C. Baumann, X. Deng, J. A. Pellish, M. D. Berg, C. M. Seidleck, E. C. Auden, S. L. Weeden-Wright, N. J. Gaspard, C. X. Zhang, and D. M. Fleetwood, "Electron-induced single-event upsets in static random access memory," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4122-4129, 2013.
- [446] N. N. Mahatme, I. Chatterjee, A. Patki, D. B. Limbrick, B. L. Bhuvu, R. D. Schrimpf, and W. Robinson, "An efficient technique to select logic nodes for single event transient pulse-width reduction," *Microelectronics Reliability*, vol. 53, pp. 114-117, 2013.
- [447] N. N. Mahatme, N. J. Gaspard, S. Jagannathan, T. D. Loveless, I. Chatterjee, B. L. Bhuvu, L. W. Massengill, and R. D. Schrimpf, "Experimental estimation of the window of vulnerability for logic circuits," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 2691-2696, Aug 2013.
- [448] S. Mukherjee, Y. Puzyrev, J. Hinckley, R. D. Schrimpf, D. M. Fleetwood, J. Singh, and S. T. Pantelides, "Role of bias conditions in the hot carrier degradation of AlGaIn/GaN high electron mobility transistors," *Physica Status Solidi C*, vol. 10, pp. 794-798, 2013.
- [449] I. K. Samsel, E. X. Zhang, N. C. Hooten, E. D. Funkhouser, W. G. Bennett, R. A. Reed, R. D. Schrimpf, M. W. McCurdy, D. M. Fleetwood, R. A. Weller, G. Vizkelethy, X. Sun, T. P. Ma, O. I. Saadat, and T. Palacios, "Charge collection mechanisms in AlGaIn/GaN MOS high electron mobility transistors," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4439-4445, 2013.
- [450] J. H. Warner, D. McMorrow, S. Buchner, J. B. Boos, N. Roche, P. Paillet, M. Gaillardin, E. Blackmore, M. Trinczek, V. Ramachandran, R. A. Reed, and R. D. Schrimpf, "Proton-induced transient charge collection in GaAs and InAlSb/InAs-based FETs," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 2651-2659, 2013.
- [451] S. L. Weeden-Wright, S. L. Gollub, R. Harl, A. B. Hmelo, D. M. Fleetwood, B. R. Rogers, R. D. Schrimpf, and D. G. Walker, "Radiation effects on the photoluminescence of rare-earth doped pyrochlore powders," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 2444-2449, 2013.
- [452] E. X. Zhang, D. M. Fleetwood, N. D. Pate, R. A. Reed, A. F. Witulski, and R. D. Schrimpf, "Time-domain reflectometry measurements of total-ionizing-dose degradation of nMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 60, pp. 4470-4475, 2013.
- [453] M. L. Alles, H. L. Hughes, D. R. Ball, P. J. McMarr, and R. D. Schrimpf, "Total-ionizing-dose response of narrow, long channel 45-nm PDSOI transistors," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2945-2950, 2014.
- [454] M. L. Alles, R. D. Schrimpf, L. W. Massengill, D. R. Ball, A. T. Kelly, N. F. Haddad, J. C. Rodgers, J. F. Ross, E. Chan, A. Raman, and M. Turowski, "State and angular dependence of single-event upsets in an asymmetric RC-hardened SRAM using deep trench capacitors," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 3068-3073, 2014.
- [455] R. Arora, Z. E. Fleetwood, E. X. Zhang, N. E. Lourenco, J. D. Cressler, D. M. Fleetwood, R. D. Schrimpf, A. K. Sutton, G. Freeman, and B. Greene, "Impact of technology scaling in sub-100-nm nMOSFETs on total-dose radiation response and hot-carrier reliability," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 1426-1432, 2014.
- [456] W. G. Bennett, N. C. Hooten, R. D. Schrimpf, R. A. Reed, M. L. Alles, E. X. Zhang, S. L. Weeden-Wright, D. Linten, M. Jurczak, and A. Fantini, "Dynamic modeling of radiation-induced state changes in HfO₂/Hf 1T1R RRAM," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 3497-3503, 2014.
- [457] W. G. Bennett, N. C. Hooten, R. D. Schrimpf, R. A. Reed, M. H. Mendenhall, M. L. Alles, J. Bi, E. X. Zhang, D. Linten, M. Jurczak, and A. Fantini, "Single- and multiple-event induced upsets in HfO₂/Hf 1T1R RRAM," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 1717-1725, 2014.
- [458] I. Chatterjee, B. Narasimham, N. N. Mahatme, B. L. Bhuvu, R. A. Reed, R. D. Schrimpf, J. K. Wang, N. Vedula, B. Bartz, and C. Monzel, "Impact of technology scaling on SRAM soft error rates," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 3512-3518, 2014.
- [459] I. Chatterjee, E. X. Zhang, B. L. Bhuvu, R. A. Reed, M. L. Alles, N. N. Mahatme, D. R. Ball, R. D. Schrimpf, D. M. Fleetwood, D. Linten, E. Simoen, J. Mitard, and C. Claeys, "Geometry dependence of total-dose effects in bulk FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2951-2958, 2014.
- [460] J. Chen, E. X. Zhang, C. X. Zhang, M. W. McCurdy, D. M. Fleetwood, R. D. Schrimpf, S. W. Kaun, E. C. H. Kyle, and J. S. Speck, "RF performance of proton-irradiated AlGaIn/GaN HEMTs," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2959-2964, 2014.

- [461] Z. Diggins, N. Mahadevan, D. Herbison, G. Karsai, E. Barth, R. Reed, R. Schrimpf, R. Weller, M. Alles, and A. Witulski, "Range-finding sensor degradation in gamma radiation environments," *IEEE Sensors Journal*, vol. PP, pp. 1-1, 2014.
- [462] Z. J. Diggins, N. Mahadevan, D. Herbison, G. Karsai, B. D. Sierawski, E. Barth, E. B. Pitt, R. A. Reed, R. D. Schrimpf, R. A. Weller, M. L. Alles, and A. Witulski, "Total-ionizing-dose induced timing window violations in CMOS microcontrollers," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2979-2984, 2014.
- [463] G. X. Duan, C. X. Zhang, E. X. Zhang, J. Hachtel, D. M. Fleetwood, R. D. Schrimpf, R. A. Reed, M. L. Alles, S. T. Pantelides, G. Bersuker, and C. D. Young, "Bias dependence of total ionizing dose effects in SiGe-SiO₂/HfO₂ pMOS FinFETs," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2834-2838, 2014.
- [464] Z. E. Fleetwood, E. W. Kenyon, N. E. Lourenco, S. Jain, E. X. Zhang, T. D. England, J. D. Cressler, R. D. Schrimpf, and D. M. Fleetwood, "Advanced SiGe BiCMOS technology for multi-Mrad electronic systems," *IEEE Trans. Device and Materials Reliability*, vol. 14, pp. 844-848, 2014.
- [465] T. D. Haeffner, T. D. Loveless, E. X. Zhang, A. L. Sternberg, S. Jagannathan, R. D. Schrimpf, J. S. Kauppila, M. L. Alles, D. M. Fleetwood, L. W. Massengill, and N. F. Haddad, "Irradiation and temperature effects for a 32-nm RF silicon-on-insulator CMOS process," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 3037-3042, 2014.
- [466] A. Kalavagunta, S. Mukherjee, R. Reed, and R. D. Schrimpf, "Comparison between trap and self-heating induced mobility degradation in AlGaIn/GaN HEMTs," *Microelectronics Reliability*, vol. 54, pp. 570-574, Mar 2014.
- [467] A. Kaouache, F. Wrobel, F. Saigné, A. D. Touboul, R. D. Schrimpf, and J. L. Autran, "An analytical model to quantify decay chain disequilibrium—application to the thorium decay chain," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 1414-1419, 2014.
- [468] K. Ni, E. X. Zhang, N. C. Hooten, W. G. Bennett, M. W. McCurdy, A. L. Sternberg, R. D. Schrimpf, R. A. Reed, D. M. Fleetwood, M. L. Alles, T. W. Kim, J. Lin, and J. A. del Alamo, "Single-event transient response of InGaAs MOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 3550-3556, 2014.
- [469] Y. Puzyrev, S. Mukherjee, C. Jin, T. Roy, M. Silvestri, R. D. Schrimpf, D. M. Fleetwood, J. Singh, J. M. Hinckley, A. Paccagnella, and S. T. Pantelides, "Gate bias dependence of defect-mediated hot-carrier degradation in GaN HEMTs," *IEEE Trans. Electron Devices*, vol. 61, pp. 1316-1320, 2014.
- [470] S. L. Weeden-Wright, W. G. Bennett, N. C. Hooten, E. X. Zhang, M. W. McCurdy, M. P. King, R. A. Weller, M. H. Mendenhall, M. L. Alles, D. Linten, M. Jurczak, R. Degraeve, A. Fantini, R. A. Reed, D. M. Fleetwood, and R. D. Schrimpf, "TID and displacement damage resilience of 1T1R HfO₂/Hf resistive memories," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2972-2978, 2014.
- [471] C. X. Zhang, E. X. Zhang, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, C. Rutherglen, and K. Galatsis, "Total-ionizing-dose effects and reliability of carbon nanotube FET devices," *Microelectronics Reliability*, vol. 54, pp. 2355-2359, 2014.
- [472] C. X. Zhang, A. Newaz, B. Wang, E. X. Zhang, G. X. Duan, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, K. I. Bolotin, and S. T. Pantelides, "Electrical Stress and Total Ionizing Dose Effects on MoS₂ Transistors," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2862-2867, 2014.
- [473] C. X. Zhang, B. Wang, G. X. Duan, E. X. Zhang, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, A. P. Rooney, E. Khestanova, G. Auton, R. V. Gorbachev, S. J. Haigh, and S. T. Pantelides, "Total ionizing dose effects on hBN encapsulated graphene devices," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 2868-2873, 2014.
- [474] E. X. Zhang, I. K. Samsel, N. C. Hooten, W. G. Bennett, E. D. Funkhouser, K. Ni, D. R. Ball, M. W. McCurdy, D. M. Fleetwood, R. A. Reed, M. L. Alles, R. D. Schrimpf, D. Linten, and J. Mitard, "Heavy-Ion and Laser Induced Charge Collection in SiGe Channel pMOSFETs," *IEEE Trans. Nucl. Sci.*, vol. 61, pp. 3187-3192, 2014.
- [475] J. S. Kauppila, J. D. Rowe, A. L. Sternberg, D. R. Herbison, A. F. Witulski, M. W. McCurdy, D. Valadez, R. D. Schrimpf, and L. W. Massengill, "Radiation-enabled model development for a library of common active discrete components," *Journal of Radiation Effects Research and Engineering*, vol. 32, pp. 39-48, 2014.
- [476] J. S. Kauppila, K. M. Warren, D. R. Ball, M. L. Alles, T. D. Haeffner, A. L. Sternberg, S. E. Armstrong, P. Cole, R. D. Schrimpf, and L. W. Massengill, "Dose rate enabled compact models for dielectrically isolated integrated circuit processes," *Journal of Radiation Effects Research and Engineering*, vol. 32, pp. 29-38, 2014.
- [477] Z. Zhang, A. R. Arehart, E. C. H. Kyle, J. Chen, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, J. S. Speck, and S. A. Ringel, "Proton irradiation effects on deep level states in Mg-doped p-type GaN grown by ammonia-based molecular beam epitaxy," *Appl. Phys. Lett.*, vol. 106, article number 022104, 2015.

- [478] J. C. Shank, M. B. Tellekamp, E. X. Zhang, W. G. Bennett, M. W. McCurdy, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, and W. A. Doolittle, "Self-healing of proton damage in lithium niobite (LiNbO₂)," *IEEE Trans. Nucl. Sci.*, p. accepted for publication, 2015.
- [479] J. C. Shank, M. B. Tellekamp, E. X. Zhang, W. G. Bennett, M. W. McCurdy, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, and W. A. Doolittle, "Self-healing of proton damage in lithium niobite (LiNbO₂)," *IEEE Trans. Nucl. Sci.*, vol. 62, pp. 542-547, 2015.
- [480] Z. J. Diggins, N. Mahadevan, D. Herbison, G. Karsai, E. Barth, R. A. Reed, R. D. Schrimpf, R. A. Weller, M. L. Alles, and A. Witulski, "Range-finding sensor degradation in gamma radiation environments," *IEEE Sensors Journal*, vol. 15, pp. 1864-1871, 2015.
- [481] Z. J. Diggins, N. Mahadevan, E. B. Pitt, D. Herbison, G. Karsai, B. D. Sierawski, E. J. Barth, R. A. Reed, R. D. Schrimpf, R. A. Weller, M. L. Alles, and A. F. Witulski, "System health awareness in total-ionizing dose environments," *IEEE Trans. Nucl. Sci.*, early access available online, 2015.
- [482] E. D. Funkhouser, R. A. Weller, R. A. Reed, R. D. Schrimpf, M. H. Mendenhall, and M. Asai, "Limitations of LET in predicting the radiation response of advanced devices," *IEEE Trans. Nucl. Sci.*, early access available online, 2015.
- [483] G. Duan, J. Hatchtel, X. Shen, E. Zhang, C. Zhang, B. Tuttle, D. Fleetwood, R. Schrimpf, R. Reed, J. Franco, D. Linten, J. Mitard, L. Witters, N. Collaert, M. Chisholm, and S. Pantelides, "Activation energies for oxide- and interface-trap charge generation due to negative-bias-temperature stress of Si-capped SiGe-pMOSFETs," *IEEE Trans. Device and Materials Reliability*, early access available online, 2015.

CONFERENCE PAPERS AND PRESENTATIONS

- [1] R. M. Warner, Jr. and R. D. Schrimpf, "BJT-MOSFET Transconductance Comparisons," in *Proc. 1986 IEEE Bipolar Circuits and Technology Meeting*, Minneapolis, MN, 1986, pp. 71-72.
- [2] M. J. Martinez, J. P. Retzler, S. L. Rainwater, R. D. Schrimpf, and K. F. Galloway, "Hardness Enhancement for Power DMOS," in *Government Microcircuit Applications Conference Digest of Papers*, 1989, pp. 385-387.
- [3] R. D. Schrimpf, P. W. C. Hsueh, H. Lendenmann, and J. N. Fordemwalt, "Electrostatic-Discharge Detectors," in *1989 EOS/ESD Symposium Proceedings*, New Orleans, LA, 1989, pp. 84-87.
- [4] P. J. Wahle, R. D. Schrimpf, and K. F. Galloway, "Simulated Space Radiation Effects on Power MOSFETs in Switching Power Supplies," in *Conf. Rec. of the 1989 IEEE Ind. Appl. Soc. Annual Meeting*, San Diego, CA, 1989, pp. 1221-1226.
- [5] N. V. Barbara, R. D. Schrimpf, and W. J. Kerwin, "Ionizing-Radiation-Induced Degradation in Electronic Power Amplifiers," in *Conf. Record of the 1990 IEEE Ind. Appl. Soc. Annual Meeting*, Seattle, WA, 1990, pp. 1667-1672.
- [6] K. F. Galloway and R. D. Schrimpf, "MOS Device Degradation Due to Total-Dose Ionizing Radiation in the Natural Space Environment: A Review," in *Proc. of the 18th Yugoslav Conference on Microelectronics*, Ljubljana, Yugoslavia, 1990, pp. 445-465.
- [7] S. L. Kosier, D. Zupac, R. D. Schrimpf, F. E. Cellier, K. F. Galloway, M. N. Darwish, C. A. Goodwin, and M. C. Dolly, "Optimization of a Two-Level Field-Plate Termination Structure for Integrated-Power Applications in Ionizing Radiation Environments," in *Government Microcircuit Applications Conference Digest of Papers*, Las Vegas, NV, 1990, pp. 435-438.
- [8] H. Lendenmann, R. D. Schrimpf, and A. D. Bridges, "Novel Test Structure for the Measurement of Electrostatic-Discharge Pulses," in *Proc. IEEE Int. Conf. on Microelectronic Test Structures*, 1990, pp. 149-153.
- [9] J. Schmid, R. Craigin, C. Damianou, J. Hohl, R. Schrimpf, H. Parks, J. Ramberg, N. Brown, and R. Jones, "A Simple Model for Estimating Allowable Transition Metal Contamination Levels in DRAMs," in *SRC Techcon Proc.*, 1990, pp. 263-266.
- [10] R. D. Schrimpf, S. C. Lee, K. F. Galloway, S. L. Rainwater, and J. P. Retzler, "Circumvention-Hardened Field-Effect Transistors," in *Government Microcircuit Applications Conference Digest of Papers*, Las Vegas, NV, 1990, pp. 439-442.
- [11] W. Weber, R. D. Schrimpf, R. G. Myers, A. F. Witulski, and K. F. Galloway, "Radiation-Induced Changes in Power MOSFET Gate-Charge Measurements," in *Conf. Rec. of the 1990 IEEE Ind. Appl. Soc. Annual Meeting*, Seattle, WA, 1990, pp. 1673-1678.

- [12] D. Zupac, K. W. Baum, W. Weber, R. D. Schrimpf, and K. F. Galloway, "ESD Effects on the Radiation Response of Power VDMOS Transistors," in *EOS/ESD Symp. Proc.*, Orlando, FL, 1990, pp. 137-142.
- [13] C. Damianou, R. Craigin, J. Hohl, H. G. Parks, and R. D. Schrimpf, "Characterization Techniques for Contaminated Gate Oxides," in *Proc. of Materials Research Society Symp. I: Contamination Control in Microelectronics*, Anaheim, CA, 1991.
- [14] R. N. Nowlin, R. D. Schrimpf, E. W. Enlow, W. E. Combs, and R. L. Pease, "Mechanisms of Ionizing-Radiation-Induced Gain Degradation in Modern Bipolar Devices," in *Proc. 1991 IEEE Bipolar Circuits and Tech. Mtg.*, Minneapolis, MN, 1991, pp. 174-177.
- [15] D. Zupac, K. W. Baum, R. D. Schrimpf, and K. F. Galloway, "Detection of ESD-Induced Noncatastrophic Damage in P-Channel Power MOSFETs," in *EOS/ESD Symp. Proc.*, Las Vegas, NV, 1991, pp. 151-157.
- [16] D. Zupac, K. F. Galloway, and R. D. Schrimpf, "Gamma-Radiation-Induced Inversion-Layer Hole Mobility Degradation in P-Channel Power MOSFETs at 300 K and 77 K," in *RADECS 91 Proc.*, Montpellier, France, 1991, pp. 121-127.
- [17] S. C. Lee, G. Teowee, R. D. Schrimpf, D. P. Birnie, III, D. R. Uhlmann, and K. F. Galloway, "Fatigue Effect on the I-V Characteristics of Sol-Gel Derived PZT Thin Films," in *Proc. 8th Int. Symp. on the Appl. of Ferroelectrics*, Greenville, SC, 1992, pp. 77-80.
- [18] H. G. Parks, R. Craigin, and R. D. Schrimpf, "Mapping Contamination from Process Chemicals to Device Degradation," in *Microcontamination '92 Proc.*, 1992, p. 718.
- [19] G. Teowee, J. M. Boulton, E. A. Kneer, M. N. Orr, D. P. Birnie, III, D. R. Uhlmann, S. C. Lee, K. F. Galloway, and R. D. Schrimpf, "Effect of Zr/Ti Stoichiometry Ratio on the Ferroelectric Properties of Sol-Gel Derived PZT Films," in *Proc. 8th Int. Symp. on the Appl. of Ferroelectrics*, Greenville, SC, 1992, pp. 41-44.
- [20] D. Zupac, D. Pote, R. D. Schrimpf, and K. F. Galloway, "Annealing of ESD-Induced Damage in Power MOSFETs," in *Proc. EOS/ESD Symp.*, Dallas, TX, 1992, pp. 121-128.
- [21] G. H. Johnson, J. R. Brews, R. D. Schrimpf, and K. F. Galloway, "Analysis of the Time-Dependent Turn-On Mechanism for Single-Event Burnout of N-Channel Power MOSFETs," in *RADECS 93 Proc.*, Saint-Malo, France, 1993, pp. 441-445.
- [22] P. Khosropour, K. F. Galloway, D. Zupac, R. D. Schrimpf, and P. Calvel, "Application of Test Method 1019.4 to Non-Hardened Power MOSFETs," in *RADECS 93 Proc.*, Saint-Malo, France, 1993, pp. 300-305.
- [23] S. L. Kosier, R. D. Schrimpf, A. Wei, M. DeLaus, D. M. Fleetwood, and W. E. Combs, "Effects of Oxide Charge and Surface Recombination Velocity on the Excess Base Current of BJTs," in *Proc. IEEE Bipolar/BiCMOS Circuits and Technology Meeting*, Minneapolis, 1993, pp. 211-214.
- [24] S. L. Kosier, A. Wei, M. A. Shibib, J. C. Desko, R. D. Schrimpf, K. F. Galloway, and K. C. Yau, "Combination Field Plate/Field Ring Termination Structures for Integrated Power Devices," in *IEEE Int. Symp. on Power Semiconductor Devices and ICs (ISPSD) Tech. Digest*, Monterey, CA, 1993, pp. 182-187.
- [25] H. G. Parks, R. D. Schrimpf, R. Craigin, R. Jones, and P. Resnick, "Test Structure Metrology of Homogeneous Contamination," in *Proc. IEEE Int. Conf. on Microelectronic Test Struct.*, Sitges, Spain, 1993, pp. 207-212.
- [26] R. D. Schrimpf, S. L. Kosier, B. Salik, K. F. Galloway, C. F. Wheatley, Jr., and D. I. Burton, "High-Voltage Termination-Structure Design Using a Test Chip and Two-Dimensional Simulation," in *Proc. IEEE Int. Conf. on Microelectronic Test Struct.*, Sitges, Spain, 1993, pp. 39-43.
- [27] F. K. Chai, J. R. Brews, R. D. Schrimpf, and D. P. Birnie, III, "Relating Local Electric Field in a Ferroelectric Capacitor to Externally Measurable Voltages," in *Proc. 9th IEEE Int. Symp. on Applications of Ferroelectrics*, State College, PA, 1994, pp. 83-86.
- [28] R. J. Graves, D. M. Schmidt, S. L. Kosier, A. Wei, R. D. Schrimpf, and K. F. Galloway, "Visualization of Ionizing-Radiation and Hot-Carrier Stress Response of Polysilicon Emitter BJTs," in *IEDM Tech. Dig.*, San Francisco, 1994, pp. 233-236.
- [29] S. L. Kosier, M. DeLaus, A. Wei, R. D. Schrimpf, and A. Martinez, "Simple Technique for Improving the Hot-Carrier Reliability of Single-Poly Bipolar Transistors," in *Proc. IEEE Bipolar/BiCMOS Circuits and Tech. Mtg.*, Minneapolis, MN, 1994, pp. 205-208.
- [30] H. G. Parks, S. L. Kosier, R. D. Schrimpf, W. B. Henley, and L. Jastrzebski, "First Order Specification of Liquid Chemical Purity Requirements Based on Contaminant Deposition and Advanced DRAM Architecture," in *Proc. Microcontamination '94*, San Jose, CA, 1994, p. 132.
- [31] H. G. Parks and R. D. Schrimpf, "Metal Deposition, Metrology, and Device Degradation from Contamination in Semiconductor Processing Fluids," in *Proc. 40th Ann. Tech. Mtg. IES (Invited)*, Chicago, IL, 1994, p. 338.

- [32] J. R. Schmid, H. G. Parks, R. Craigin, and R. D. Schrimpf, "Estimating the Effect of Contamination-Induced Leakage Current in View of DRAM Architectural Trends," in *Proc. Advanced Semiconductor Manufacturing Conference and Workshop*, Boston, MA, 1994, pp. 96-105.
- [33] A. Wei, S. L. Kosier, R. D. Schrimpf, W. E. Combs, and M. DeLaus, "Excess Collector Current Due to an Oxide-Trapped-Charge-Induced Emitter in Irradiated NPN BJTs," in *Proc. IEEE Bipolar/BiCMOS Circuits and Tech. Mtg.*, Minneapolis, MN, 1994, pp. 201-204.
- [34] F. K. Chai, M. N. Orr, R. D. Schrimpf, J. R. Brews, and D. P. Birnie, III, "Relating the Electrically-Active Doping Level of PZT Thin Films to CV Measurement," in *Proc. Int. Symp. Integrated Ferroelectrics*, Colorado Springs, CO, 1995.
- [35] F. K. Chai, M. N. Orr, R. D. Schrimpf, J. R. Brews, and D. P. Birnie, III, "The Influence of Doping on the Quasi-Static CV Behavior of Ferroelectric Thin Film Capacitors," in *Proc. Int. Symp. Integrated Ferroelectrics*, Colorado Springs, CO, 1995.
- [36] F. K. Chai, R. D. Schrimpf, J. R. Brews, D. P. Birnie, III, K. F. Galloway, R. N. Vogt, and M. N. Orr, "Effects of Scaling Thickness and Niobium Doping Level on Ferroelectric Thin Film Capacitor Memory Operation," in *IEDM Tech. Dig.*, Washington, DC, 1995, pp. 123-126.
- [37] I. Mouret, M.-C. Calvet, P. Calvel, P. Tastet, M. Allenspach, K. A. LaBel, J. L. Titus, C. F. Wheatley, R. D. Schrimpf, and K. F. Galloway, "Experimental Evidence of the Temperature and Angular Dependence in SEGR," in *RADECS 95 Proc.*, Arcachon, France, 1995, pp. 313-320.
- [38] R. D. Schrimpf, "Recent advances in understanding total-dose effects in bipolar transistors," in *RADECS 95 Proc.*, Arcachon, France, 1995, pp. 9-18.
- [39] M. Allenspach, J. R. Brews, K. F. Galloway, G. H. Johnson, R. D. Schrimpf, R. L. Pease, J. L. Titus, and C. F. Wheatley, "SEGR: A Unique Failure Mode for Power MOSFETs in Spacecraft," in *Proc. of the 7th European Symposium on Reliability of Electron Devices, Failure Physics, and Analysis*, Eindhoven, The Netherlands, 1996.
- [40] K. F. Galloway, G. H. Johnson, and R. D. Schrimpf, "Present Status of Power MOSFET Single-Event Phenomena: A Review," in *Proc. 2nd Int. Workshop on Radiation Effects of Semiconductor Devices for Space Applications*, Japan, 1996, pp. 88-98.
- [41] H. G. Parks, R. D. Schrimpf, and K. F. Galloway, "Contamination TCAD: A Tool Needed for Efficient Process Development," in *Digest of Papers 1996 GOMAC Conference*, Orlando, Florida, 1996, pp. 287-290.
- [42] J. Y. Ahn, W. T. Holman, R. D. Schrimpf, K. F. Galloway, D. A. Bryant, P. Calvel, and M.-C. Calvet, "Design Issues for a Radiation-Tolerant Digital-to-Analog Converter in a Commercial 2.0- μm BiCMOS Process," in *RADECS Proc.*, Cannes, France, 1997, pp. 120-125.
- [43] X. Montagner, R. Briand, P. Fouillat, R. D. Schrimpf, A. Touboul, K. F. Galloway, M. C. Calvet, and P. Calvel, "Dose-Rate and Irradiation Temperature Dependence of BJT SPICE Model Rad-Parameters," in *RADECS Proc.*, Cannes, France, 1997, pp. 216-222.
- [44] H. J. Barnaby, R. J. Milanowski, R. D. Schrimpf, L. W. Massengill, and M. Pagey, "Modeling Ionizing Radiation Effects in Lateral PNP BJTs with Non-Uniform Trapped Charge Distributions," in *GOMAC Dig.*, Washington, DC, 1998, pp. 585-588.
- [45] H. J. Barnaby, R. D. Schrimpf, D. M. Fleetwood, and S. L. Kosier, "The Effects of Emitter-Tied Field Plates on Lateral PNP Ionizing Radiation Response," in *IEEE BCTM Proc.*, Minneapolis, MN, 1998, pp. 35-38.
- [46] R. Milanowski, L. Massengill, R. Schrimpf, R. Graves, H. Barnaby, K. Galloway, M. Pagey, C. Nicklaw, and J. Johann, "Radiation Hardened Semiconductor Technology Computer Aided Design," in *GOMAC Dig.*, Washington, DC, 1998, pp. 573-577.
- [47] R. Milanowski, L. Massengill, R. Schrimpf, M. Pagey, and C. Nicklaw, "Computational Split-Lot Study of the Effect of Implant Parameters on Total-Dose-Induced Leakage," in *GOMAC Dig.*, Washington, DC, 1998, pp. 582-584.
- [48] F. Saigné, P. Adell, Y. Zhao, R. D. Schrimpf, K. F. Galloway, L. Dusseau, J. Fesquet, and J. Gasiot, "Utilisation des Recuits Isochrones pour la Mise en Evidence de Défauts Créés par une Irradiation aux Protons sur un Détecteur Optique Silicium du Commerce," in *OPTORAD 98*, INSTN Gif/Yvette, France, 1998, p. Session 1: Detectors.
- [49] H. J. Barnaby, C. Cirba, R. D. Schrimpf, S. Kosier, P. Fouillat, and X. Montagner, "Modeling BJT Radiation Response with Non-Uniform Energy Distributions of Interface Traps," in *RADECS Proc.*, Fontevraud, France, 1999, pp. 75-79.
- [50] P. E. Bunson, R. D. Schrimpf, M. Di Ventura, and S. T. Pantelides, "Diffusion of H in SiO₂: An Ab-Initio Study," in *APS March Meeting*, Atlanta, GA, 1999.

- [51] J. Hofmeister, H. G. Parks, B. Vermeire, Z. Murshalin, R. Graves, R. D. Schrimpf, and K. F. Galloway, "Concept and Initial Feasibility of Contamination TCAD by Integration with Commercial Software," in *Proc. 10th Annual IEEE/SEMI Advanced Semiconductor Manufacturing Conference*, Boston, MA, 1999, pp. 426-429.
- [52] J. Liu, R. D. Schrimpf, L. Massengill, K. F. Galloway, and J. O. Attia, "Circuit-Level Model for Single-Event Burnout in N-Channel Power MOSFETs," in *RADECS Proc.*, Fontevraud, France, 1999, pp. 173-179.
- [53] R. Milanowski, M. Pagey, J. Conley, L. Massengill, R. Schrimpf, and K. Galloway, "Total Dose Radiation-Effects Simulation Using Three-Carrier Transport in SiO₂," in *GOMAC Digest*, Monterey, CA, 1999, pp. 758-761.
- [54] S. K. Mukundan, M. P. Pagey, R. D. Schrimpf, and K. F. Galloway, "Simulation of hot-carrier degradation using self-consistent solution of semiconductor energy-balance equations and oxide carrier transport equations," in *Integrated Reliability Workshop Final Report*, 1999, pp. 92-97.
- [55] H. J. Barnaby, C. Cirba, R. D. Schrimpf, K. F. Galloway, M. Pagey, and R. Milanowski, "A two dimensional engineering model for radiation-induced interface trap formation," in *GOMAC Digest*, Anaheim, CA, 2000, pp. 613-616.
- [56] D. M. Fleetwood, R. D. Schrimpf, L. W. Massengill, and K. F. Galloway, "Challenges in Modeling of Radiation Effects on Microelectronics," in *Predictive Process Simulation Conference*, Wandlitz, Germany, 2000.
- [57] D. G. Walker, J. Liu, T. S. Fisher, and R. D. Schrimpf, "Thermal Characterization of Single Event Burnout Failure in Semiconductor Power Devices," in *Proc. 16th Annual IEEE Semiconductor Thermal Measurement and Management Symposium (SEMITHERM)*, San Jose, CA, 2000, pp. 213-219.
- [58] J. Boch, F. Saigné, T. Maurel, F. Giustino, L. Dusseau, R. D. Schrimpf, K.F. Galloway, J. P. David, R. Ecoffet, J. Fesquet, and J. Gasiot, "Dose and Dose Rate Effects on NPN Bipolar Junction Transistors Irradiated at High Temperature," in *RADECS Proc.*, Grenoble, France, 2001, pp. 357-362.
- [59] Y. Deval, H. Lapuyade, P. Fouillat, H. Barnaby, F. Darracq, R. Briand, D. Lewis, and R. D. Schrimpf, "Evaluation of a design methodology dedicated to dose rate hardened linear integrated circuits," in *RADECS Proc.*, Grenoble, France, 2001, pp. 237-242.
- [60] R. D. Schrimpf, "From defects to devices: Radiation effects in electronics," in *GOMAC Digest*, San Antonio, TX, 2001, pp. 137-140.
- [61] A. L. Sternberg, L. W. Massengill, R. D. Schrimpf, Y. Boulghassoul, H.J. Barnaby, S. Buchner, R. L. Pease, and J. W. Howard, "Effect of Amplifier Parameters on Single-Event Transients in an Inverting Operational Amplifier," in *RADECS Proc.*, Grenoble, France, 2001, pp. 398-404.
- [62] B. D. White, L. J. Brillson, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Detection of Trap Activation by Ionizing Radiation in SiO₂ by Spatially Localized Cathodoluminescence Spectroscopy," presented at *IEEE NSREC*, Vancouver, CA, 2001.
- [63] D. R. Ball, H. J. Barnaby, and R. D. Schrimpf, "Analysis of proton radiation damage in bipolar transistors using gate control," in *GOMAC Dig.*, Monterey, CA, 2002, pp. 500-503.
- [64] H. J. Barnaby, R. D. Schrimpf, K. F. Galloway, D. R. Ball, R. L. Pease, and P. Fouillat, "Test Structures for Analyzing Radiation Effects in Bipolar Technologies," in *Proc. Int. Conf. Microelectronic Test Structures*, Cork, Ireland, 2002, pp. 197-201.
- [65] C. R. Cirba, H. J. Barnaby, J. M. Hutson, J. A. Felix, R. D. Schrimpf, and D. M. Fleetwood, "Modeling Oxide Trapped Charge Annealing Processes In Irradiated SOI MOSFETs," in *GOMAC Dig.*, Monterey, CA, 2002, pp. 496-499.
- [66] X. Hu, B. K. Choi, H. J. Barnaby, D. M. Fleetwood, R. D. Schrimpf, S. C. Lee, S. Shojah-Ardalan, R. Wilkins, U. K. Mishra, and R. Dettmer, "The Energy Dependence of Proton-Induced Degradation in AlGaN/GaN High Electron Mobility Transistors," in *RADECS Workshop*, Padova, Italy, 2002, pp. 17-20.
- [67] P. Adell, O. Mion, R. Schrimpf, C. Chatry, and P. Calvel, "SET Risk Analyses in Digital Optocouplers," in *2003 RADECS Proc.*, Noordwijk, The Netherlands, 2003, pp. 301-304.
- [68] J. Boch, F. Saigne, R. D. Schrimpf, D. M. Fleetwood, S. Ducret, L. Dusseau, J. P. David, J. Fesquet, J. Gasiot, and R. Ecoffet, "Effect of switching from high to low dose rate on linear bipolar technology radiation response," in *RADECS 2003 Proc.*, Noordwijk, The Netherlands, 2003, pp. 537-543.
- [69] J. Boch, R. Saigne, R. D. Schrimpf, D. M. Fleetwood, R. Cizmarik, and D. Zander, "Elevated temperature irradiation at high dose rate of commercial linear bipolar ICs," in *RADECS 2003 Proc.*, Noordwijk, The Netherlands, 2003, pp. 587-592.

- [70] Y. Boulghassoul, P. Adell, J. Rowe, L. Massengill, R. Schrimpf, and A. Sternberg, "System-Level Design Hardening Based on Worst-Case ASET Simulations " in *RADECS 2003 Proc.*, Noordwijk, The Netherlands, 2003, pp. 327-333.
- [71] L. Tsetseris, X. Zhou, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Field-Induced Reactions of Water Molecules at Si-Dielectric Interfaces," in *MRS Proc. 786*, Boston, MA, 2003, p. E3.3.
- [72] R. R. Cizmarik, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, D. G. Platteter, M. R. Shaneyfelt, R. L. Pease, J. Boch, D. R. Ball, J. D. Rowe, and M. C. Maher, "The Impact of Mechanical Stress on the Total-Dose Response of Linear Bipolar Transistors with Various Passivation Layers," in *RADECS 2004 Proc.*, Madrid, Spain, 2004, pp. 165-169.
- [73] M. J. Gadlage, R. D. Schrimpf, J. M. Benedetto, P. H. Eaton, and T. L. Turflinger, "Modeling and Verification of Single Event Transients in Deep Submicron Technologies," in *IEEE Int. Reliability Physics Symposium Proc.*, Phoenix, AZ, 2004, pp. 673-674.
- [74] D. Lunardini, B. Narasimham, V. Ramachandran, V. Srinivasan, R. D. Schrimpf, and W. H. Robinson, "A Performance Comparison between Hardened-by-Design and Conventional-Design Standard Cells," in *RADECS 2004 Proc.*, Madrid, Spain, 2004, pp. 229-233.
- [75] R. D. Schrimpf, R. A. Weller, and R. A. Reed, "Physically Based Simulation of Single-Event Effects in Advanced Technologies," in *Proc. 6th Int. Workshop on Radiation Effects on Semiconductor Devices for Space Application*, Tsukuba, Japan, 2004, pp. 99-104.
- [76] R. A. Weller, R. D. Schrimpf, R. A. Reed, A. L. Sternberg, A. S. Kobayashi, M. H. Mendenhall, L. W. Massengill, and D. M. Fleetwood, "Modeling Semiconductor Device Response Using Detailed Radiation Event Simulations," in *Hardened Electronics and Radiation Technology Conference*, Monterey, CA, 2004.
- [77] K. Akarvardar, S. Cristoloveanu, B. Dufrene, P. Gentil, R. D. Schrimpf, B. J. Blalock, J. A. Chroboczek, and M. M. Mojarradi, "Evidence for reduction of noise and radiation effects in G^4 -FET depletion-all-around operation," in *Proc. 35th European Solid-State Device Research Conf. (ESSDERC)*, 2005, pp. 89-92.
- [78] M. L. Alles, D. R. Ball, L. W. Massengill, R. D. Schrimpf, K. A. Warren, and R. A. Weller, "Considerations for Single Event Effects in Non-Planar Multi-Gate SOI FETs," in *Proc. IEEE SOI Conference*, Honolulu, HI, 2005, pp. 191-193
- [79] D. Ball, K. Warren, R. Weller, R. Reed, L. Massengill, R. Schrimpf, and N. Haddad, "Simulating Nuclear Events in a TCAD Model of a High-Density SEU Hardened SRAM Technology," in *RADECS*, Cap d'Agde, France, 2005.
- [80] M. Bernard, J. Boch, J.-R. Vaillé, F. Saigné, L. Dusseau, R. D. Schrimpf, E. Lorfèvre, and J. P. David, "Analysis of Total-Dose Response of Bipolar Voltage Comparator Combining Experiments and Design Data," in *RADECS*, Cap d'Agde, France, 2005.
- [81] M. H. Evans, M. Caussanel, R. D. Schrimpf, and S. T. Pantelides, "First-Principles Modeling of Double-Gate UTSOI MOSFETs," in *IEEE Int. Electron Devices Meeting Tech. Dig.*, Washington, DC, 2005, pp. 611-614.
- [82] J. M. Hutson, R. D. Schrimpf, and L. M. Massengill, "The effects of scaling and well and substrate contact placement on single event latchup in bulk CMOS technology," in *RADECS*, Cap d'Agde, France, 2005.
- [83] A. Kelly, P. C. Adell, A. F. Witulski, W. T. Holman, and R. D. Schrimpf, "Total Dose and Single Event Transients in Linear Voltage Regulators," in *RADECS*, Cap d'Agde, France, 2005.
- [84] B. Narasimham, V. Ramachandran, B. L. Bhuvan, R. D. Schrimpf, W. T. Holman, L. W. Massengill, W. H. Robinson, A. F. Witulski, J. D. Black, and D. McMorrow, "On-Chip Characterization of Single Event Transient Pulse Widths," in *IEEE Nucl. and Space Rad. Effects Conf.*, Seattle, WA, 2005.
- [85] S. T. Pantelides, M. H. Evans, D. M. Fleetwood, J. D. Joannopoulos, Z. Lu, R. D. Schrimpf, S. J. Pennycook, S. N. Rashkeev, L. Tsetseris, K. V. Benthem, X. Zhang, and X. Zhou, "Atomic-scale challenges in nano-MOSFETs: Gate dielectrics and device modeling," in *European Materials Research Society*, Strasbourg, France, 2005.
- [86] S. T. Pantelides, S. Wang, A. Franceschetti, R. Buczko, M. D. Ventra, S. N. Rashkeev, L. Tsetseris, M. H. Evans, I. G. Batyrev, L. C. Feldman, S. Dhar, K. McDonald, R. A. Weller, R. D. Schrimpf, D. M. Fleetwood, X. J. Zhou, J. R. Williams, C. C. Tin, G. Y. Chung, T. Isaacs-Smith, S. R. Wang, S. J. Pennycook, G. Duscher, K. v. Benthem, L. M. Porter, and J. A. Cooper, Jr., "Si/SiO₂ and SiC/SiO₂ interfaces for MOSFETs - challenges and advances," in *International Conference on Silicon Carbide and Related Materials 2005*, Pittsburgh, PA, 2005.
- [87] R. D. Schrimpf, "Radiation Effects in Microelectronics," in *School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA)*, Manaus, Brazil, 2005.
- [88] L. Tsetseris, X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Physical mechanisms of negative-bias temperature instability," in *MRS Spring Meeting*, San Francisco, CA, 2005.

- [89] X. J. Zhou, D. M. Fleetwood, L. Tsetseris, R. D. Schrimpf, S. T. Pantelides, J. A. Felix, E. P. Gusev, and C. D'Emic, "Effects of irradiation and bias-temperature stress on charge trapping in HfO₂ Gate Dielectrics," in IEEE Semiconductor Interface Specialists Conference, Washington, DC, 2005.
- [90] K. Akarvardar, S. Chen, J. Vandersand, B. Blalock, R. Schrimpf, B. Prothro, C. Britton, S. Cristoloveanu, P. Gentil, and M. M. Mojarradi, "Four-Gate Transistor Voltage-Controlled Negative Differential Resistance Device and Related Circuit Applications," in *IEEE Int. SOI Conference*, 2006, pp. 71-72.
- [91] M. L. Alles, R. D. Schrimpf, D. M. Fleetwood, N. H. Tolk, R. Pasternak, and R. W. Standley, "Experimental Evaluation of Second Harmonic Generation for Non-Invasive Contamination Detection in SOI Wafers," in *IEEE/SEMI Advanced Semiconductor Manufacturing Conference*, Boston, MA, 2006, pp. 1-6.
- [92] J. D. Black, B. L. Bhuvu, M. L. Alles, L. W. Massengill, D. M. Fleetwood, R. D. Schrimpf, and K. F. Galloway, "Static and Dynamic Power Comparison of HBD Transistor-Based Circuits Designed in a Commercial 130 nm Technology," in RADECS, Athens, Greece, 2006.
- [93] D. K. Chen, R. D. Schrimpf, D. M. Fleetwood, K. F. Galloway, A. Dimoulas, A. Sotiropoulos, and Y. Panayiotatos, "Total Dose Response of Ge MOS Capacitors with HfO₂/Dy₂O₃ Gate Stacks," in RADECS, Athens, Greece, 2006.
- [94] D. M. Fleetwood, M. P. Rodgers, L. Tsetseris, X. J. Zhou, I. Batyrev, S. Wang, R. D. Schrimpf, and S. T. Pantelides, "Effects of device aging on microelectronics radiation response and reliability," in *Proc. 25th International Conf. Microelectron. (MIEL 2006)*, Belgrade, Serbia and Montenegro, 2006, pp. 89-96.
- [95] N. F. Haddad, T. Bach, T. Conway, D. Lawson, J. Ross, J. Rodgers, A. Tipton, D. Ball, K. Warren, and R. Schrimpf, "Eliminating Low LET Sensitivities in Deep Sub-Micrometer SRAM through Non-intrusive Technology Features," in RADECS, Athens, Greece, 2006.
- [96] E. J. Montes, R. A. Reed, J. A. Pellish, M. L. Alles, R. D. Schrimpf, R. A. Weller, M. Varadharajaperumal, G. Niu, A. K. Sutton, R. Diestelhorst, G. Espinel, R. Krithivasan, J. P. Comeau, J. D. Cressler, G. Vizkelethy, and P. W. Marshall, "Single Event Effects Modeling in Silicon Germanium HBTs," in Single Event Effects Symposium, Long Beach, CA, 2006.
- [97] S. T. Pantelides, R. D. Schrimpf, D. M. Fleetwood, L. Tsetseris, S. N. Rashkeev, and X. J. Zhou, "Atomic scale mechanisms for radiation-induced phenomena in MOSFETs," in RADECS, Athens, Greece, 2006.
- [98] S. T. Pantelides, L. Tsetseris, S. N. Rashkeev, X. J. Zhou, D. M. Fleetwood, and R. D. Schrimpf, "Hydrogen in MOSFETs: The Good, the Bad, and the Ugly," in International Workshop on Modeling of Reliability Issues, Vienna, Austria, 2006.
- [99] J. A. Pellish, R. Reed, M. Alles, R. Schrimpf, M. Varadharajaperumal, G. Niu, A. Sutton, R. Diestelhorst, G. Espinel, R. Krithivasan, J. Comeau, J. Cressler, G. Vizkelethy, P. Marshall, R. Weller, M. Mendenhall, and E. Montes, "Monte Carlo modeling of proton events in deep trench isolation technologies using the combined capabilities of MRED and TCAD," in Single Event Effects Symposium, Long Beach, CA, 2006.
- [100] R. A. Reed, J. A. Pellish, R. A. Weller, M. Porter, J. Wilkinson, K. M. Warren, B. Sierawski, P. W. Marshall, and R. D. Schrimpf, "Applications of Heavy Ion Microprobe for Single Event Effects Analysis," in Int. Conf. on the Application of Accelerators in Research & Industry, Fort Worth, TX, 2006.
- [101] R. A. Reed, R. A. Weller, R. D. Schrimpf, L. W. Massengill, M. H. Mendenhall, B. Sierawski, K. M. Warren, D. R. Ball, M. Alles, A. Sternberg, J. A. Pellish, and C. Howe, "Applications of RADSAFE," in Geant4 Space Users' Meeting, SLAC, Palo Alto, CA, 2006.
- [102] R. A. Reed, R. A. Weller, R. D. Schrimpf, L. W. Massengill, M. H. Mendenhall, K. M. Warren, D. R. Ball, J. A. Pellish, B. D. Sierawski, C. L. Howe, M. Alles, A. L. Sternberg, A. F. Witulski, A. D. Tipton, M. A. Xapsos, and K. A. LaBel, "RADSAFE Development and Applications Overview," in Single Event Effects Symposium, Long Beach, CA, 2006.
- [103] R. A. Reed, R. A. Weller, R. D. Schrimpf, L. W. Massengill, M. H. Mendenhall, K. M. Warren, B. Sierawski, D. R. Ball, M. Alles, A. Sternberg, J. A. Pellish, C. Howe, A. Tipton, K. A. LaBel, and M. Xapsos, "Applications of RADSAFE for Single Event Effect Analysis," in Geant4 Space Users Workshop, Pasadena, CA, 2006.
- [104] R. D. Schrimpf, "Radiation Effects in Microelectronics," in School on the Effects of Radiation on Embedded Systems for Space Applications (SERESSA), Sevilla, Spain, 2006.
- [105] R. D. Schrimpf, R. A. Weller, M. H. Mendenhall, R. A. Reed, and L. W. Massengill, "Physical Mechanisms of Single Event Effects in Advanced Microelectronics," in Int. Conf. on the Applications of Accelerators in Research & Industry, Fort Worth, TX, 2006.
- [106] K. M. Warren, R. A. Weller, B. Sierawski, R. A. Reed, M. H. Mendenhall, R. D. Schrimpf, L. W. Massengill, M. Porter, J. Wilkinson, K. A. LaBel, and J. Adams, "Application of RADSAFE to Model Single Event Upset Response of a 0.25 μm CMOS SRAM," in RADECS, Athens, Greece, 2006.

- [107] R. A. Weller, M. H. Mendenhall, R. A. Reed, J. A. Pellish, B. D. Sierawski, L. W. Massengill, and R. D. Schrimpf, "mred8 – A Python controlled Geant4 Application for Space Radiation Effects," in Geant4 Space Users' Meeting, SLAC, Palo Alto, CA, 2006.
- [108] R. A. Weller, R. A. Reed, M. H. Mendenhall, K. M. Warren, D. R. Ball, J. A. Pellish, B. D. Sierawski, C. L. Howe, A. D. Tipton, R. D. Schrimpf, L. W. Massengill, M. Alles, A. L. Sternberg, A. F. Witulski, B. E. Templeton, M. A. Xapsos, K. A. LaBel, J. H. Adams, and J. W. Watts, "Geant4 and the Vanderbilt Radiation Effects Simulation Strategy, RADSAFE," in Geant4 Space Users Workshop, Pasadena, CA, 2006.
- [109] M. L. Alles, L. W. Massengill, R. D. Schrimpf, R. A. Weller, and K. F. Galloway, "Moore's Law Meets Soft Errors: A Growing Concern for the Nano-ERA," in Workshop on the Frontiers of Electronics (WOFE), Cozumel, Mexico, 2007.
- [110] I. Batyrev, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "The Role of Water in the Radiation Response of Wet and Dry Oxides," in *RADECS Proc.*, Deauville, France, 2007, pp. 1-6.
- [111] I. G. Batyrev, L. Tsetseris, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Reactions of water molecules at the Si/SiO₂ interface," in March Meeting of The American Physical Society, Denver, CO, 2007.
- [112] A. Kalavagunta, A. Touboul, R. D. Schrimpf, D. M. Fleetwood, R. Reed, R. K. Jain, L. Shen, and U. K. Mishra, "Electrostatic Mechanisms Responsible for Device Degradation in AlGaN/AlN/GaN HEMTs," in *RADECS Proc.*, Deauville, France, 2007, pp. 1-7.
- [113] B. Narasimham, B. L. Bhuvu, R. D. Schrimpf, L. W. Massengill, M. J. Gadlage, W. T. Holman, A. F. Witulski, W. H. Robinson, J. D. Black, J. M. Benedetto, and P. H. Eaton, "Effects of Guard Bands and Well Contacts in Mitigating Long SETs in Advanced CMOS Processes," in *RADECS Proc.*, Deauville, France, 2007, pp. 1-6.
- [114] B. Narasimham, R. L. Shuler, J. D. Black, B. L. Bhuvu, R. D. Schrimpf, A. F. Witulski, W. T. Holman, and L. W. Massengill, "Quantifying the Effectiveness of Guard Bands in Reducing the Collected Charge Leading to Soft Errors," in *Proc. IEEE Reliability Physics Symposium*, 2007, pp. 676-677.
- [115] S. T. Pantelides, L. Tsetseris, A. G. Marinopoulos, G. Hadjisavvas, X. J. Zhou, D. M. Fleetwood, R. D. Schrimpf, K. van Benthem, and S. J. Pennycook, "Defects and defect process at Si-dielectric interfaces," in IBM MRC Oxide Workshop, Zurich, Switzerland, 2007.
- [116] R. A. Reed, R. A. Weller, R. D. Schrimpf, L. W. Massengill, M. H. Mendenhall, K. M. Warren, B. Sierawski, D. R. Ball, M. Alles, A. Sternberg, J. A. Pellish, C. Howe, and A. Tipton, "Single Event Effect Analysis," in New Electronic Technologies Insertion into Flight Programs Workshop, NASA GSFC, 2007.
- [117] W. H. Robinson, M. L. Alles, T. A. Bapty, B. L. Bhuvu, J. D. Black, A. B. Bonds, L. W. Massengill, S. K. Neema, R. D. Schrimpf, and J. M. Scott, "Soft Error Considerations for Multicore Microprocessor Design," in *Proc. IEEE International Conference on Integrated Circuit Design and Technology*, 2007, pp. 206-209.
- [118] R. D. Schrimpf, "Single-Event Effects in Microelectronics," in SERESSA, Buenos Aires, Argentina, 2007.
- [119] A. D. Tipton, J. A. Pellish, P. R. Fleming, R. D. Schrimpf, R. A. Reed, R. A. Weller, M. H. Mendenhall, and L. W. Massengill, "High Energy Neutron Multiple-Bit Upset," in *Proc. IEEE International Conference on Integrated Circuit Design and Technology*, 2007, pp. 210-212.
- [120] K. M. Warren, J. D. Wilkinson, S. Morrison, R. A. Weller, M. E. Porter, B. D. Sierawski, R. A. Reed, M. H. Mendenhall, R. D. Schrimpf, and L. W. Massengill, "Modeling Alpha and Neutron Induced Soft Errors in Static Random Access Memories," in *Proc. IEEE International Conference on Integrated Circuit Design and Technology*, 2007, pp. 217-220.
- [121] M. L. Alles, D. R. Ball, L. W. Massengill, R. D. Schrimpf, R. A. Reed, and B. L. Bhuvu, "Scaling and soft errors: Moore of the same for SOI?," in *IEEE International SOI Conference*, 2008, pp. 129-130.
- [122] S. Binzaid, J. O. Attia, and R. D. Schrimpf, "Enclosed Layout Transistor with Active Region Cutout," in *IEEE Region 5 Conference*, 2008, pp. 1-5.
- [123] S. DasGupta, O. A. Amusan, M. L. Alles, A. F. Witulski, L. W. Massengill, B. L. Bhuvu, R. D. Schrimpf, and R. A. Reed, "Use of a Contacted Buried n+ Layer for Single Event Mitigation in 90 nm CMOS," in *RADECS Proceedings*, Jyväskylä, Finland, 2008, pp. 163-168.
- [124] M. J. Gadlage, R. D. Schrimpf, B. Narasimham, R. A. Reed, R. A. Weller, and B. L. Bhuvu, "Neutron Induced Single Event Transient Vulnerability of an Advanced CMOS Process in a Nuclear Burst Environment," in *Hardened Electronics and Radiation Technology Conference (HEART) Proceedings*, 2008, p. to be published.
- [125] C. L. Howe, R. A. Weller, R. A. Reed, B. D. Sierawski, P. W. Marshall, C. J. Marshall, M. H. Mendenhall, R. D. Schrimpf, and J. E. Hubbs, "Effects of Surrounding Materials on Proton-Induced Energy Deposition in Large Silicon Diode Arrays," in *RADECS Proceedings*, Jyväskylä, Finland, 2008, pp. 365-369.

- [126] S. R. Kulkarni, R. D. Schrimpf, K. F. Galloway, C. Claeys, and E. Simoen, "Total Ionizing Dose Effects on Depletion Mode Ge pMOSFETs with High-k Gate Stacks: On-Off Current ratio," in *RADECS Proceedings*, Jyväskylä, Finland, 2008, pp. 59-63.
- [127] B. Narasimham, M. J. Gadlage, B. L. Bhuvu, R. D. Schrimpf, L. W. Massengill, W. T. Holman, A. F. Witulski, and K. F. Galloway, "Test circuit for measuring pulse widths of single-event transients causing soft errors," in *IEEE International Conference on Microelectronic Test Structures (ICMTS 2008)* 2008, pp. 142-146.
- [128] B. Narasimham, M. J. Gadlage, B. L. Bhuvu, R. D. Schrimpf, L. W. Massengill, W. T. Holman, A. F. Witulski, Z. Xiaowei, A. Balasubramanian, and S. A. Wender, "Neutron and alpha particle-induced transients in 90 nm technology," in *IEEE International Reliability Physics Symposium (IRPS)*, 2008, pp. 478-481.
- [129] R. L. Pease, R. D. Schrimpf, and D. M. Fleetwood, "An Update on Enhanced Low Dose Rate Sensitivity in Bipolar Linear Circuits," in *RADECS Proceedings*, Jyväskylä, Finland, 2008, pp. 18-32.
- [130] I. Sanchez Esqueda, H. J. Barnaby, M. L. McLain, P. C. Adell, F. El Mamouni, S. K. Dixit, R. D. Schrimpf, and W. Xiong, "Modeling the Radiation Response of Fully-Depleted SOI n-MOSFETS," in *RADECS Proceedings*, Jyväskylä, Finland, 2008, pp. 481-484.
- [131] R. D. Schrimpf, "Radiation Effects and Soft Errors in Advanced Technologies__," in University of Padova Distinguished Lecturer Series, Padova, Italy, 2008.
- [132] R. D. Schrimpf, "The simulation of radiation effects: from atoms to circuits," in Thales Alenia Space ETCA, Charleroi, Belgium, 2008.
- [133] R. D. Schrimpf, "Single-Event Rate Prediction in Advanced Technologies," in RADFAC, SCK•CEN, Mol, Belgium, 2008.
- [134] R. D. Schrimpf, K. M. Warren, R. A. Weller, R. A. Reed, L. W. Massengill, M. L. Alles, D. M. Fleetwood, X. J. Zhou, L. Tsetseris, and S. T. Pantelides, "Reliability and radiation effects in IC technologies," in *IEEE International Reliability Physics Symposium (IRPS)*, 2008, pp. 97-106.
- [135] K. M. Warren, J. D. Wilkinson, R. A. Weller, B. D. Sierawski, R. A. Reed, M. E. Porter, M. H. Mendenhall, R. D. Schrimpf, and L. W. Massengill, "Predicting neutron induced soft error rates: Evaluation of accelerated ground based test methods," in *IEEE International Reliability Physics Symposium (IRPS)*, 2008, pp. 473-477.
- [136] R. Arora, B. W. Schmidt, D. M. Fleetwood, R. Schrimpf, K. Galloway, B. Rogers, K. B. Chung, and G. Lucovsky, "Temperature Stress Response of Germanium MOS Capacitors with HfO₂/HfSiON Gate Dielectric," in *ECS Transactions*, 2009, pp. 803-814.
- [137] D. Fleetwood, S. Francis, A. Dasgupta, X. Zhou, R. Schrimpf, M. Shaneyfelt, and J. Schwank, "Moisture Effects on the 1/f Noise of MOS Devices," in *215th ECS Conference*, 2009, pp. 363-377.
- [138] M. J. Gadlage, J. R. Ahlbin, B. Narasimham, V. Ramachandran, C. A. Dinkins, B. L. Bhuvu, R. D. Schrimpf, and R. L. Shuler, "The effect of elevated temperature on digital single event transient pulse widths in a bulk CMOS technology," in *IEEE International Reliability Physics Symposium*, Anaheim, CA, 2009, pp. 170-173.
- [139] S. Pantelides, L. Tsetseris, M. Beck, S. Rashkeev, G. Hadjisavvas, I. Batyrev, B. Tuttle, X. Zhou, D. Fleetwood, and R. Schrimpf, "Performance, reliability, radiation effects, and aging issues in microelectronics—from atomic-scale physics to engineering-level modeling," in *215th ECS Meeting*, 2009, pp. 319-337.
- [140] S. T. Pantelides, L. Tsetseris, M. J. Beck, S. N. Rashkeev, G. Hadjisavvas, I. G. Batyrev, B. R. Tuttle, A. G. Marinopoulos, X. J. Zhou, D. M. Fleetwood, and R. D. Schrimpf, "Performance, reliability, radiation effects, and aging issues in microelectronics: From atomic-scale physics to engineering-level modeling," in *Proceedings of the European Solid State Device Research Conference ESSDERC '09*, Athens, Greece, 2009, pp. 48-55.
- [141] R. Arinero, A. Touboul, F. Saigné, E. X. Zhang, N. Rezzak, R. D. Schrimpf, D. M. Fleetwood, B. K. Choi, and A. Hmelo, "1.8 MeV proton radiation effects on substrate resistivity of n-type MOS capacitors," in *RADECS Proc.*, Langenfeld, Austria, 2010.
- [142] R. Arora, K. A. Moen, A. Madan, J. D. Cressler, E. Zhang, D. M. Fleetwood, R. D. Schrimpf, A. K. Sutton, and H. M. Nayfeh, "Impact of body tie and source/drain contact spacing on the hot carrier reliability of 45-nm RF-CMOS," in *IEEE International Integrated Reliability Workshop*, S. Lake Tahoe, CA, 2010.
- [143] E. Auden, R. A. Weller, M. H. Mendenhall, R. A. Reed, and R. D. Schrimpf, "Simulations of high energy electron-induced transients in a shielded focal plane array," in *RADECS Proc.*, Langenfeld, Austria, 2010.
- [144] D. R. Ball, M. L. Alles, R. D. Schrimpf, and S. Cristoloveanu, "Comparing single event upset sensitivity of bulk vs. SOI based FinFET SRAM cells using TCAD simulations," in *IEEE International SOI Conference*, 10.1109/SOI.2010.5641058, 2010.

- [145] S. DasGupta, X. Shen, R. A. Reed, R. D. Schrimpf, S. T. Pantelides, D. M. Fleetwood, J. Bergman, and B. Brar, "Electrical stress induced degradation in InAs-AlSb HEMTs," in *Intl. Reliab. Phys. Sympos.*, Anaheim, CA, 2010, pp. 813-817.
- [146] D. M. Fleetwood, R. D. Schrimpf, R. A. Weller, and P. E. Dodd, "Total dose and single event effects in highly scaled CMOS microelectronics," in 2nd Radiation Effects and Reliability Workshop, Beijing, China, 2010.
- [147] M. J. Gadlage, J. R. Ahlbin, B. L. Bhuvu, N. C. Hooten, N. A. Dodds, R. A. Reed, L. W. Massengill, R. D. Schrimpf, and G. Vizkelethy, "Alpha-particle and focused-ion-beam-induced single-event transient measurements in a bulk 65-nm CMOS technology," in RADECS Proc., Langenfeld, Austria, 2010.
- [148] M. P. King, D. Gong, C. Liu, T. Liu, A. C. Xiang, J. Ye, R. D. Schrimpf, R. A. Reed, M. L. Alles, and D. M. Fleetwood, "Response of a 0.25 μm thin-film Si-on-sapphire CMOS technology to total ionizing dose," in *Journal of Instrumentation*, 10.1088/1748-0221/5/11/C11021, 2010.
- [149] Y. Li, N. Rezzak, R. D. Schrimpf, D. M. Fleetwood, E. Zhang, Y. Wu, S. Cai, J. Wang, and D. Wang, "Including the effects of process-related variability on radiation response using a new test chip," in *10th IEEE International Conference on Solid-State and Integrated Circuit Technology (ICSICT)*, 2010, pp. 1636-1638.
- [150] N. N. Mahatme, I. Chatterjee, A. R. Patki, D. B. Limbrick, R. D. Schrimpf, B. L. Bhuvu, and W. H. Robinson, "An efficient technique to select logic nodes for single event transient pulse-width reduction," in RADECS Proc., Langenfeld, Austria, 2010.
- [151] S. T. Pantelides, X. Shen, Y. Puzyrev, B. R. Tuttle, T. Roy, S. DasGupta, D. M. Fleetwood, and R. D. Schrimpf, "Reliability of III-V devices: The defects that cause the trouble," in International Conference on Micro- and Nano-electronics, Nanotechnologies, and MEMs, Athens, Greece, 2010.
- [152] N. Rezzak, Z. En Xia, M. L. Alles, R. D. Schrimpf, and H. Hughes, "Total-ionizing-dose radiation response of partially-depleted SOI devices," in *IEEE International SOI Conference*, 10.1109/SOI.2010.5641057, 2010.
- [153] T. Roy, E. X. Zhang, S. DasGupta, S. A. Francis, D. M. Fleetwood, and R. D. Schrimpf, "1/f noise in GaN HEMTs grown under Ga-rich, N-rich, and NH_3 -rich conditions," in *IEEE Reliability of Compound Semiconductors Workshop*, Portland, OR, 2010, pp. 69-73.
- [154] R. D. Schrimpf, M. L. Alles, D. M. Fleetwood, D. R. Ball, M. J. Gadlage, and F. El Mamouni, "Design and evaluation of SOI devices for radiation environments," in *IEEE International SOI Conference*, 10.1109/SOI.2010.5641470, 2010.
- [155] N. Sergueev, Y. Puzyrev, M. Beck, K. Varga, R. Schrimpf, D. Fleetwood, and S. Pantelides, "Ion-induced quantum transport in ultrathin amorphous silicon dioxide films," in *APS March Meeting*, Portland, OR, 2010.
- [156] B. D. Sierawski, K. M. Warren, R. A. Reed, R. A. Weller, M. M. Mendenhall, R. D. Schrimpf, R. C. Baumann, and V. Zhu, "Contribution of low-energy (<10 MeV) neutrons to upset rate in a 65 nm SRAM," in *IEEE International Reliability Physics Symposium (IRPS)*, 2010, pp. 395-399.
- [157] C. X. Zhang, S. A. Francis, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, E. Simoen, J. Mitard, and C. Claeys, "Effect of ionizing radiation on defects and 1/f noise in Ge pMOSFETs," in *RADECS Proc.*, Langenfeld, Austria, 2010.
- [158] M. L. Alles, J. L. Davidson, S. T. Pantelides, R. D. Schrimpf, D. M. Fleetwood, K. I. Bolotin, E. X. Zhang, C. X. Zhang, J. Greaving, B. Wang, A. K. M. Newaz, J. U. Lee, C. D. Cress, and W. Lu, "Radiation effects in carbon devices – It's all about the substrate," in Government Microcircuit Applications and Critical Technologies Conference, Orlando, FL, 2011.
- [159] Y. S. Puzyrev, T. Roy, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Atomic displacements in proton-irradiated AlGaIn/GaN heterostructures," in March American Physical Society Meeting, Dallas, TX, 2011.
- [160] R. A. Reed, M. P. King, B. Sierawski, A. Dasgupta, R. A. Weller, D. M. Fleetwood, M. H. Mendenhall, K. M. Warren, and R. D. Schrimpf, "Radiation response of advanced semiconductors," in Hardened Electronics and Radiation Technology Conference, Orlando, FL, 2011.
- [161] T. Roy, Y. S. Puzyrev, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, and S. T. Pantelides, "Defect energy distribution in GaN/AlGaIn heterostructures grown in Ga-rich and ammonia-rich conditions," in March American Physical Society Meeting, Dallas, TX, 2011.
- [162] T. Roy, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, Y. S. Puzyrev, and S. T. Pantelides, "Reliability limiting defects in AlGaIn/GaN HEMTs," in *Intl. Reliability Physics Symposium*, Monterey, CA, 2011, pp. 4E.4.1 - 4E.4.4.
- [163] E. X. Zhang, C. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, S. Dhar, S.-H. Ryu, X. Shen, and S. T. Pantelides, "Bias-temperature instabilities and radiation effects on SiC MOSFETs," in *Silicon Nitride, Silicon*

- Dioxide, and Emerging Dielectrics II*. vol. 35, R. Sah, Ed. Pennington, NJ: The Electrochemical Society, 2011, pp. 369-380.
- [164] M. L. Alles, R. D. Schrimpf, R. A. Reed, L. W. Massengill, R. A. Weller, M. H. Mendenhall, D. R. Ball, K. M. Warren, T. D. Loveless, J. S. Kauppila, and B. D. Sierawski, "Radiation hardness of FDSOI and FinFET technologies," in *IEEE International SOI Conference*, 2011, pp. 1-2.
- [165] F. El-Mamouni, E. X. Zhang, R. D. Schrimpf, R. A. Reed, K. F. Galloway, D. McMorrow, E. Simoen, C. Claeys, S. Cristoloveanu, and W. Xiong, "Pulsed laser-induced transient currents in bulk and silicon-on-insulator FinFETs," in *IEEE International Reliability Physics Symposium*, 2011, pp. SE.4.1-SE.4.4.
- [166] S. A. Francis, C. X. Zhang, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, K. F. Galloway, E. Simoen, J. Mitard, and C. Claeys, "Comparison of charge pumping and 1/f noise in irradiated Ge pMOSFETs," in *RADECS Proc.*, Sevilla, Spain, 2011, pp. 24-27.
- [167] M. Gedion, F. Wrobel, F. Saigné, and R. D. Schrimpf, "Alpha-soft error rate due to new generations of high-k gate oxides and metal gate electrodes in a 32 nm node," in *RADECS Proc.*, Sevilla, Spain, 2011, pp. 281-284.
- [168] Y. Gonzalez-Velo, J. Boch, F. Saigné, N. J.-H. Roche, S. Pérez, C. Deneau, J.-R. Vaile, L. Dusseau, R. D. Schrimpf, and E. Lorfèvre, "Room temperature annealing effect on biased bipolar devices during switched dose-rate experiments," in *RADECS Proc.*, Sevilla, Spain, 2011, pp. 84-87.
- [169] A. Griffoni, P. Zuber, P. Dobrovoly, P. J. Roussel, D. Linten, M. L. Alles, R. D. Schrimpf, R. A. Reed, D. Kobayashi, E. Simoen, and G. Groeseneken, "Impact of process variability on the radiation-induced soft error rate of decananometer SRAMs in hold and read conditions," in *RADECS Proc.*, Sevilla, Spain, 2011, pp. 195-201.
- [170] Y.-F. Li, M. Li, R. D. Schrimpf, D. M. Fleetwood, B. Zhang, J. Q. Wang, Y. Wang, and D. L. Wang, "Characterizing, modeling, and simulating soft error susceptibility in cell-based designs in highly scaled technologies," in *RADECS Proc.*, Sevilla, Spain, 2011, p. 353-358.
- [171] N. L. Rowsey, M. E. Law, R. D. Schrimpf, D. M. Fleetwood, B. R. Tuttle, and S. T. Pantelides, "Radiation-induced oxide charge in low- and high-H₂ environments," in *RADECS Proc.*, Sevilla, Spain, 2011, p. 51-53.
- [172] M. Turowski, A. Raman, M. L. Alles, D. Ball, M. P. King, R. A. Reed, and R. D. Schrimpf, "Effect of carrier transport in oxides surrounding active devices on SEE in 45nm SOI SRAM," in *RADECS Proc.*, Sevilla, Spain, 2011, pp. 20-23.
- [173] B. D. Sierawski, R. A. Reed, M. H. Mendenhall, R. A. Weller, R. D. Schrimpf, S. Wen, R. Wong, N. Tam, and R. C. Baumann, "Effects of scaling on muon-induced soft errors," in *IEEE International Reliability Physics Symposium*, 2011, pp. 3C.3.1-3C.3.6.
- [174] I. Chatterjee, B. L. Bhuvu, R. D. Schrimpf, B. Narasimham, J. K. Wang, B. Bartz, E. Pitta, and M. Buer, "Effects of charge confinement and angular strikes in 40 nm dual- and triple-well bulk CMOS SRAMs," in *IEEE International Reliability Physics Symposium (IRPS)*, 2012, pp. 5B.3.1-5B.3.7.
- [175] N. N. Mahatme, R. D. Schrimpf, R. A. Reed, B. L. Bhuvu, A. Griffoni, E. Simoen, M. Aoulaiche, D. Linten, M. Jurczak, and G. Groeseneken, "Total ionizing dose effects on ultra thin buried oxide floating body memories," in *IEEE International Reliability Physics Symposium (IRPS)*, 2012, pp. MY.3.1-MY.3.5.
- [176] L. Artola, G. Hubert, and R. D. Schrimpf, "Modeling of radiation-induced single event transients in SOI FinFETs," in *IEEE Int. Reliability Physics Symposium (IRPS)*, 2013, pp. SE.1.1-SE.1.6.
- [177] J. Bi, R. A. Reed, R. D. Schrimpf, D. M. Fleetwood, and Z. Han, "Neutron-induced single-event-transient effects in ultrathin-body fully-depleted silicon-on-insulator MOSFETs," in *IEEE Int. Reliability Physics Symposium (IRPS)*, 2013, pp. SE.2.1-SE.2.5.
- [178] W. Bennett, N. Hooten, R. Schrimpf, B. Jinshun, E. X. Zhang, M. Alles, R. Reed, D. Linten, M. Jurczak, and A. Fantini, "Single event induced upsets in HfO₂/Hf 1T1R RRAM," in *RADECS Proceedings*, Oxford, UK, 2013, pp. 1-8.
- [179] A. Kaouache, F. Wrobel, F. Saigné, A. Touboul, R. Schrimpf, and J. Autran, "Effect of thorium decay chain disequilibrium on alpha emissivity," in *RADECS Proceedings*, Oxford, UK, 2013, pp. 1-5.
- [180] C. X. Zhang, E. X. Zhang, D. M. Fleetwood, M. L. Alles, R. D. Schrimpf, E. B. Song, K. Galatsis, A. K. M. Newaz, and K. I. Bolotin, "Total ionizing dose effects and reliability of graphene-based non-volatile memory devices," in *IEEE Aerospace Conference*, Big Sky, MT, 2013, pp. 1-8.
- [181] Y. S. Puzyrev, R. D. Schrimpf, D. M. Fleetwood, R. A. Reed, X. Shen, J. Singh, J. M. Hinckley, U. K. Mishra, J. S. Speck, and S. T. Pantelides, "Multi-scale analysis of hot-electron-related device reliability," in *GOMACTech*, Las Vegas, NV, 2013.
- [182] M. Alles, R. Schrimpf, L. Massengill, D. Ball, R. Weller, R. Reed, and F. El-Mamouni, "Radiation Effects in Advanced FDSOI and FinFETs," in *GOMACTech*, Las Vegas, NV, 2013.

- [183] A. Arehart, A. Sasikumar, Z. Zhang, P. Kumar, S. Ringel, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, B. Poling, G. Via, E. Heller, P. Saunier, and C. Lee, "Comparison of irradiation and electrical stressors on AlGaIn/GaN HEMT reliability," in *GOMACTech 2014*, Charleston, SC, 2014, p. 4 pages.
- [184] D. M. Fleetwood, E. X. Zhang, G. X. Duan, C. X. Zhang, I. K. Samsel, N. C. Hooten, W. G. Bennett, R. D. Schrimpf, R. A. Reed, D. Linten, and J. Mitard, "Soft errors and NBTI in SiGe pMOS transistors," in *IEEE International Conference on Solid-State and Integrated Circuit Technology*, Guilin, China, 2014, available through IEEE Explore.
- [185] S. Koester, C. Kim, R. D. Schrimpf, D. M. Fleetwood, M. L. Alles, R. A. Reed, and E. X. Zhang, "Radiation effects in 2D material/high-K dielectric interfaces," in *GOMACTech*, Charleston, SC, 2014.
- [186] S. T. Pantelides, R. D. Schrimpf, and D. M. Fleetwood, "Defect-mediated degradation of III-V HEMTs – From atomic-scale physics to engineering-level modeling," in *Technical Digest: Workshop on Defects in Wide Band Gap Semiconductors*, College Park, MD, 2014, 6 pages.
- [187] A. Sasikumar, A. R. Arehart, S. W. Kaun, J. Chen, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, J. S. Speck, and S. A. Ringel, "Defects in GaN based transistors," in *Proc. SPIE 8986*, 2014, pp. 8986C-1: 9.
- [188] J. S. Speck, Z. Zhang, A. R. Arehart, E. Cinkilic, J. Chen, E. X. Zhang, Y. S. Puzyrev, C. X. Zhang, M. W. McCurdy, S. T. Pantelides, B. McSkimming, S. W. Kaun, E. C. H. Kyle, D. M. Fleetwood, R. D. Schrimpf, and S. A. Ringel, "Proton irradiation in bulk GaN layers and nitride-based HEMT devices," in *GOMACTech*, Charleston, SC, 2014.
- [189] A. F. Witulski, E. Barth, G. Karsai, Z. Diggins, N. Mahedevan, E. B. Pitt, D. Herbison, R. Schrimpf, R. Reed, R. Weller, and B. Sierawski, "A comprehensive program for investigation of radiation effects in robots used in mitigation of nuclear disasters," in *Government Microcircuit and Critical Applications Technology Conference (GOMACTech-14)*, Charleston, South Carolina, 2014, pp. 513-516.
- [190] M. L. Alles, D. M. Fleetwood, R. D. Schrimpf, N. H. Tolk, V. Koldyaev, M. Kryger, and J. Changala, "Rapid non-destructive detection of sub-surface Cu in silicon-on-insulator wafers by optical second harmonic generation," in *SEMI Advanced Semiconductor Manufacturing Conference*, Saratoga Springs, NY, 2015.
- [191] S. Koester, C. Kim, Y. Su, R. D. Schrimpf, D. M. Fleetwood, M. L. Alles, R. A. Reed, X. Zhang, and E. X. Zhang, "Radiation effects in field-effect transistors based upon 2D materials," in *GOMACTech*, St. Louis, MO, 2015, 4 pages.
- [192] B. Narasimham, J. K. Wang, N. Vedula, S. Gupta, B. Bartz, C. Monzel, I. Chatterjee, B. L. Bhuvu, R. D. Schrimpf, and R. A. Reed, "Influence of supply voltage on the multi-cell upset soft error sensitivity of dual- and triple-well 28 nm CMOS SRAMs," in *IEEE International Reliability Physics Symposium (IRPS)*, 2015, pp. 2C.4.1-2C.4.5.
- [193] S. A. Ringel, A. R. Arehart, Z. Zhang, A. Sasikumar, D. Cardwell, E. C. H. Kyle, S. Kaun, J. Chen, E. X. Zhang, P. Saunier, C. Lee, D. M. Fleetwood, R. D. Schrimpf, and J. S. Speck, "Toward an understanding of GaN defects and device reliability using deep level trap spectroscopy methods," in *Reliability and Materials Issues of Semiconductors-Optical and Electron Devices and Materials III*, Spring Materials Research Society Meeting, San Francisco, CA, 2015.
- [194] I. K. Samsel, E. X. Zhang, K. Ni, R. A. Reed, R. D. Schrimpf, D. M. Fleetwood, R. A. Weller, M. W. McCurdy, and M. L. Alles, "Physical mechanisms for radiation-induced effects in non-silicon channel CMOS devices," in *Gomactech*, St. Louis, MO, 2015.
- [195] A. Sasikumar, Z. Zhang, P. Kumar, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, P. Saunier, C. Lee, S. A. Ringel, and A. R. Arehart, "Proton irradiation-induced traps causing V_T instabilities and RF degradation in GaN HEMTs," in *IEEE International Reliability Physics Symposium (IRPS)*, 2015, pp. 2E.3.1-2E.3.6.
- [196] A. Sasikumar, Z. Zhang, P. Kumar, E. X. Zhang, B. Poling, G. D. Via, E. Heller, D. M. Fleetwood, R. D. Schrimpf, P. Saunier, C. Lee, S. A. Ringel, and A. R. Arehart, "Comparison of radiation and electrical stressors on AlGaIn/GaN HEMT reliability," in *Gomactech 2015*, St. Louis, MO, 2015.
- [197] A. Sasikumar, Z. Zhang, P. Kumar, E. X. Zhang, B. Poling, G. D. Via, E. Heller, D. M. Fleetwood, R. D. Schrimpf, P. Saunier, C. Lee, S. A. Ringel, and A. R. Arehart, "Comparison of radiation and electrical stressors on AlGaIn/GaN HEMT reliability," in *Intl. Reliability Physics Symposium*, Monterey, CA, 2015.
- [198] R. D. Schrimpf, D. M. Fleetwood, S. T. Pantelides, Y. S. Puzyrev, S. Mukherjee, R. A. Reed, J. S. Speck, and U. K. Mishra, "Physical mechanisms affecting the reliability of GaN-based high electron mobility transistors," in *Reliability and Materials Issues of Semiconductors-Optical and Electron Devices and Materials III*, Spring Materials Research Society Meeting, San Francisco, CA, 2015.
- [199] J. S. Speck, E. C. H. Kyle, S. Kaun, Z. Zhang, A. R. Arehart, J. Chen, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, and S. A. Ringel, "GaN reliability," in *Reliability and Materials Issues of Semiconductors-Optical*

and Electron Devices and Materials III, Spring Materials Research Society Meeting, San Francisco, CA, 2015.

- [200] Z. Zhang, A. R. Arehart, E. C. H. Kyle, J. Chen, E. X. Zhang, D. M. Fleetwood, R. D. Schrimpf, J. S. Speck, and S. A. Ringel, "Proton irradiation effects on deep level states in p-type GaN," in Reliability and Materials Issues of Semiconductors-Optical and Electron Devices and Materials III, Spring Materials Research Society Meeting, San Francisco, CA, 2015.

OTHER PRESENTATIONS (SELECTED)

Ron Schrimpf has given invited presentations at numerous universities, laboratories, and organizations, including the Université Montpellier II (Montpellier, France), Université de Bordeaux I (Bordeaux, France), Institut Polytechnique de Grenoble (Grenoble, France), Università degli Studi di Padova (Padova, Italy), Universidade Federal do Rio Grande do Sul (Porto Alegre, Brazil), Institute of Microelectronics of the Chinese Academy of Science (Beijing, China), Xidian University (Xi'an, China), Harbin Institute of Technology (Harbin, China), Shanghai Institute of Microsystem and Information Technology (Shanghai, China), Xinjiang Technical Institute of Physics and Chemistry (Urumqi, China), the University of Florida, the European Organization for Nuclear Research (CERN, Geneva, Switzerland), Belgian Nuclear Research Center (SCK•CEN, Mol, Belgium), French Alternative Energies and Atomic Energy Commission (Commissariat à l'énergie atomique et aux énergies alternatives, Bruyeres le Chatel), ONERA (Office National d'Etudes et Recherches Aéropatiales, Toulouse, France), Laboratory for Analysis and Architecture of Systems: LAAS-CNRS (Toulouse, France), Japan Aerospace Exploration Agency (JAXA, Tsukuba, Japan), Alcatel Espace (Toulouse, France), Aéropatiale (now EADS, Les Mureaux, France and Cannes, France), Argentina Comisión Nacional de Energía Atómica (Buenos Aires), Institute of Electrical and Electronics Engineers (IEEE) Mid-Hudson Chapter (presented at IBM) and Silicon Valley Chapter (presented at National Semiconductor).

PATENTS

- R.M. Warner, Jr., R.D. Schrimpf, and A.A. Tuszynski, "Three-Dimensional Integrated Circuit," U.S. Patent 4,794,442, Dec. 27, 1988.
- R.M. Warner, Jr., R.D. Schrimpf, and A.A. Tuszynski, "Monocrystalline Three-Dimensional Integrated Circuit," U.S. Patent 4,885,615, Dec. 5, 1989.
- R.M. Warner, Jr., R.D. Schrimpf, and A.A. Tuszynski, "Improved Monocrystalline Three-Dimensional Integrated Circuit," U.S. Patent 5,089,862, Feb. 18, 1992.
- R.D. Schrimpf and S. Lee, "Method and Apparatus for Evaluating Electrostatic Discharge Conditions," U.S. Patent 5,376,879, issued Dec. 27, 1994.
- R.D. Schrimpf and S. Lee, "Method and Apparatus for Evaluating Electrostatic Discharge Conditions," U.S. Patent 5,557,195, Sept. 17, 1996.
- R. M. Warner, Jr. and R. D. Schrimpf, "Method for Fabricating Monolithic and Monocrystalline All-Semiconductor Three-Dimensional Integrated Circuits," U.S. Patent 5,840,589, November 24, 1998.
- M. L. Alles, N. H. Tolks, B. Jun, R. Pasternak, R. D. Schrimpf, and S. Cristoloveanu, "Apparatus and Methods of Using Second Harmonic Generation as a Non-Invasive Optical Probe for Interface Properties in Layered Structures," U.S. Patent 7,158,284 B2, January 2, 2007.

RESEARCH FUNDING AT VANDERBILT (TOTAL > \$60,000,000)

Title:	Radiation Effects in III-V MOSFETs for Sub-10 nm CMOS
Principal Investigator:	Schrimpf
Co-PIs	Alles, Fleetwood
Sponsor:	MIT/DTRA
Contract Period:	9/14 – 9/17
Total Budget:	\$742,997

Title:	Radiation Effects in Two Dimensional Material/High-k Gate Oxides
Principal Investigator:	Alles
Co-PIs	Schrimpf, Fleetwood
Sponsor:	University of Minnesota/DTRA
Contract Period:	6/14 – 6/17
Total Budget:	\$654,968

Title:	Analysis of LED Materials and Processes
Principal Investigator:	Schrimpf
Co-PIs	Reed
Sponsor:	BEI, Inc.
Contract Period:	9/14 – 6/15
Total Budget:	\$12,101

Title:	International Rectifier Master Agreement Task 1, Phases 1 and 2
Principal Investigator:	Rowe
Co-PIs	Reed, Schrimpf
Sponsor:	International Rectifier
Contract Period:	9/14 – 6/15
Total Budget:	\$18,365

Title:	Advanced Inertial Measurement Unit (AIMU) Program Support
Principal Investigator:	Schrimpf
Co-PIs	Fleetwood, Massengill
Sponsor:	Aero Thermo/DoD
Contract Period:	11/13 – 12/14
Total Budget:	\$269,981

Title:	Radiation Effects in Small Volume SOI Devices
Principal Investigator:	Alles
Co-PIs	Schrimpf, Reed, Fleetwood
Sponsor:	CFDRC/DTRA
Contract Period:	11/11 – 10/13
Total Budget:	\$150,000

Title:	Minuteman Program Support
Principal Investigator:	Schrimpf
Co-PIs	Fleetwood, Massengill
Sponsor:	Aero Thermo/Air Force
Contract Period:	1/13 – 11/13
Total Budget:	\$772,197

Title:	Role of Radiation-Induced Defects on the Acceleration of Irradiated GaN HEMT Failure Mechanisms
Principal Investigator:	Fleetwood
Co-PIs	Schrimpf
Sponsor:	Ohio State/NRO
Contract Period:	9/13 – 10/16
Total Budget:	\$126,000

Title:	Graphene Memory Device
Principal Investigator:	Alles
Co-PIs	Schrimpf, Fleetwood, Reed
Sponsor:	Aneeve LLC/AFRL
Contract Period:	7/12 – 3/13
Total Budget:	\$29,837

Title:	Analysis of Radiation Effects in Semicoa Power MOSFETs
Principal Investigator:	Witulski
Co-PIs	Alles, Fleetwood, Massengill, Schrimpf
Sponsor:	Semicoa
Contract Period:	2/13 – 4/13
Total Budget:	\$15,101

Title:	SSP D5LE Program Support
Principal Investigator:	Schrimpf
Co-PIs	Massengill, Fleetwood
Sponsor:	Aero Thermo/Navv
Contract Period:	1/13 – 12/15
Total Budget:	\$1,310,190

Title:	Analysis of Radiation-Induced Changes in Robotic Materials, Components, and Subsystems
Principal Investigator:	Witulski
Co-PIs	Alles, Reed, Schrimpf, Weller
Sponsor:	DTRA
Contract Period:	12/12 – 12/15
Total Budget:	\$1,049,623

Title:	Radiation Tolerance of New Self-Healing Crystalline Memristors for Neuromorphic Computing
Principal Investigator:	Schrimpf
Co-PIs	Alles, Reed, Weller
Sponsor:	GaTech/DTRA
Contract Period:	6/12 – 5/15
Total Budget:	\$469,944

Title:	Investigations of Physical Mechanisms for Radiation-Induced Effects in Non-Silicon Channel CMOS Devices
Principal Investigator:	Reed
Co-PIs	Alles, Schrimpf, Weller
Sponsor:	DTRA
Contract Period:	6/12 – 5/15
Total Budget:	\$1,048,823

Title:	Mountainbird Test Chip
Principal Investigator:	Schrimpf
Sponsor:	Navy
Contract Period:	4/11 – 6/11
Total Budget:	\$20,386

Title:	Minuteman Guidance Replacement Program Radiation Test Philosophy
Principal Investigator:	Schrimpf
Co-PI	Massengill
Sponsor:	URS/DoD
Contract Period:	7/11-9/11
Total Budget:	\$281,537

Title:	Radiation Studies in GaN Materials and Devices
Principal Investigator:	Schrimpf
Co-PI	Fleetwood
Sponsor:	UCSB/DoD
Contract Period:	6/11-6/16
Total Budget:	\$624,891

Title:	Physical-Mechanisms Based Reliability Analysis for Emerging Technologies
Principal Investigator:	Schrimpf
Co-PI	Fleetwood
Sponsor:	AFOSR
Contract Period:	9/11-9/16
Total Budget:	\$599,938

Title:	Single Event Transient Effects for Sub-65 nm Complementary CMOS Technology
Principal Investigator:	Alles
Co-PIs	Fleetwood, Schrimpf
Sponsor:	Robust Chip/AFRL
Contract Period:	5/11-9/11
Total Budget:	\$29,980

Title:	Radiation Effects in Carbon Based Electronic Materials
Principal Investigator:	Alles
Co-PIs	Schrimpf, Fleetwood
Sponsor:	DTRA
Contract Period:	3/10 – 8/14
Total Budget:	\$658,000

Title:	Navy/Aero Thermo
Principal Investigator:	Schrimpf/Massengill
Co-PIs	Fleetwood
Sponsor:	Aero Thermo/Navy
Contract Period:	1/2008 – 2011
Total Budget:	\$4,410, 836

Title:	Fundamental Aspects of Radiation Event Generation
Principal Investigator:	Weller
Co-PIs	Reed, Mendenhall, Schrimpf
Sponsor:	DTRA
Contract Period:	5/2008 – 7/2012
Total Budget:	\$1,246,854

Title:	AFRL Hi-Rev Program
Principal Investigator:	Schrimpf
Sponsor:	Wyle Lab/AFRL
Contract Period:	7/10 – 2/11
Total Budget:	\$99,992

Title:	Minuteman Modeling
Principal Investigator:	Barry Templeton
Co-PIs	Schrimpf, Massengill
Sponsor:	EG&G
Contract Period:	10/08 – 8/11
Total Budget:	\$640,494

Title:	Design Science For Radiation Effects Rate Prediction and Development
Principal Investigator:	Schrimpf
Co-PIs	Reed, Weller
Sponsor:	Brown University/DTRA
Contract Period:	3/10 – 3/13
Total Budget:	\$449,000

Title:	Fundamental Studies Of The Impact Of Complex Material Systems
Principal Investigator:	Reed
Co-PIs:	Weller, Mendenhall, Fleetwood, Schrimpf
Sponsor:	DTRA
Contract Period:	5/08 – 7/12
Total Budget:	\$999,660

Title:	Modeling, Simulation, And Experimentation Of Radiation Effects
Principal Investigator:	Reed
Co-PIs:	Weller, Mendenhall, Schrimpf
Sponsor:	NASA Goddard
Contract Period:	12/08 – 9/10
Total Budget:	\$359,710

Title:	Evaluation of the 0.25 μm Silicon-On-Sapphire Technology
Principal Investigator:	Schrimpf
Sponsor:	SMU/DOE
Contract Period:	5/8 – 7/11
Total Budget:	\$122,402

Title:	Mechanisms Of Ionization-Induced Carrier Transport
Principal Investigator:	Reed
Co-PIs:	Schrimpf
Sponsor:	NRL
Contract Period:	4/08 – 4/11
Total Budget:	\$250,000

Title:	DRIFT: Design For Reliability Initiative For Future Technology
Principal Investigator:	Schrimpf
Co-PIs:	Fleetwood
Sponsor:	AFOSR/UC Santa Barbra
Contract Period:	3/08 – 4/13
Total Budget:	\$1,200,000

Title:	Provide Physical Understanding of Charge Trapping in STI
Principal Investigator:	Schrimpf
Sponsor:	EG&G
Contract Period:	10/09 – 4/10
Total Budget:	\$20,073

Title	Radiation Effects on Emerging Electronic Materials and Devices (MURI FY09)
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Weller, Reed, Mendenhall
Sponsor	AFOSR/NE
Dates	5/05 – 4/10
Total Budget	\$5,514,389 – 5 year total

Title	ACCRES Computer Resource Center Remote Access
Principal Investigator	Schrimpf
Sponsor	Lockheed Martin
Dates	1/08 – 1/09
Total Budget	\$24,153

Title	Rad/Hard Analog/Mixed Signal Technology Development
Principal Investigator	Massengill
Co-PIs	Schrimpf, Reed, Holman, Bhuva, Weller
Sponsor	ATK/DTRA
Dates	7/08 – 7/09
Total Budget	\$400,000

Title	SET Effects in Hi-Speed Mixed Signal Circuits and Advanced Technology Nodes
Principal Investigator	Massengill
Co-PIs	Schrimpf, Reed, Holman, Bhuva, Weller
Sponsor	ATK/DTRA
Dates	5/06 – 8/08
Total Budget	\$1,491,000

Title	Minuteman 07
Principal Investigator	Templeton
Co-PIs	Schrimpf, Massengill
Sponsor	US Air Force
Dates	6/07 – 9/08
Total Budget	\$604,009

Title	Nanoelectronics Focus Center Design of RHFC Technology Test Chip
Principal Investigator	Alles
Co-PIs	Schrimpf, Bhuva, Holman, Massengill
Sponsor	Albany, SUNY
Dates	7/08 – 7/09
Total Budget	\$100,000

Title	X-Ray Radiation Testing of TI Provided Parts
Principal Investigator	McCurdy
Co-PI	Schrimpf
Sponsor	Texas Instruments
Dates	7/08 – 11/08
Total Budget	\$24,531

Title	Research, Development, Test, and Evaluation of ELDRS Research
Principal Investigator	Fleetwood
Co-PI	Schrimpf, Pantelides
Sponsor	ATK
Dates	6/07 – 10/2009
Total Budget	\$168,000

Title	Nanoelectronics Focus Center Design of RHFC Technology Test Chip
Principal Investigator	Alles
Co-PIs	Schrimpf, Bhuva, Holman, Massengill
Sponsor	Albany, SUNY
Dates	1/07 – 12/07
Total Budget	\$175,000

Title	ISDE FY07– Institute for Space and Defense Electronics
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Weller, Reed
Sponsor	Aero Thermo/Navv
Dates	1/07 – 12/07
Total Budget	\$2,559,359

Title	Radiation-Hardened Multi-Core Microprocessors for Satellite and Missile Systems
Principal Investigator	Robinson
Co-PIs	Schrimpf, Massengill, Bhuva, Bonds, Alles
Sponsor	Johns Hopkins Applied Physics Lab / DTRA
Dates	7/06 – 9/07
Total Budget	\$380,088

Title	Research, Development, Test, and Evaluation of ELDRS Research
Principal Investigator	Fleetwood
Co-PI	Schrimpf, Pantelides
Sponsor	ATK
Dates	6/2006 – 10/2007
Total Budget	\$351,087

Title	ISDE FY06– Institute for Space and Defense Electronics
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Weller, Reed
Sponsor	Aero Thermo/Navy
Dates	1/06 – 12/06
Total Budget	\$2,631,144

Title	ISDE FY05– Institute for Space and Defense Electronics
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Weller, Reed
Sponsor	Aero Thermo/Navy
Dates	1/05 – 12/06
Total Budget	\$2,493,559

Title	A Vanderbilt Scientific Computing Center (SCC) for Multidisciplinary Research
Principal Investigators	J. H. Moore, R. D. Schrimpf, and P. D. Sheldon
Sponsor	Vanderbilt Academic Venture Capital Fund
Dates	9/03-9/08
Amount	\$8,262,500

Title	Radiation Hardened Nanoelectronics Focus Center Design of RHFC Technology Test Chip
Principal Investigator	Alles/Black
Co-PIs	Bhuva, Holman, Schrimpf
Sponsor	Albany, State of NY
Dates	1/06-12/06
Total Budget	\$250,000

Title	TCAD Modeling of Particle Radiation Effects in GaN-Based Devices
Principal Investigator	Schrimpf
Co-PIs	Fleetwood
Sponsor	Lockheed Martin
Dates	2/06-10/07
Total Budget	\$94,516

Title	Research, Development, Test, and Evaluation of Rad Effects in Analog and Mixed Signal Technology (Air Force Minute Man)
Principal Investigator	Schrimpf/Massengill
Co-PIs	Fleetwood, Weller
Sponsor	Air Force
Dates	6/05-5/06
Total Budget	\$445,000

Title	Radiation Effects in Microelectronics
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood
Sponsor	DTRA
Dates	6/00 – 3/05
Total Budget	\$750,000

Title	Research, Development, Test, & Evaluation of Radiation Effects in Analog and Mixed Signal Technology (DTRA SET)
Principal Investigator	Massengill
Co-PIs	Bhuva, Holman, Robinson, Reed, Schrimpf
Sponsor	MRC
Dates	6/05-6/06
Total Budget	\$813,288

Title	Proposal for Radiation Effects Modeling and Simulation from ISDE for BAE Systems
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Galloway
Sponsor	BAE Systems
Dates	09/03 – 03/05
Total Budget	\$253,400

Title	Modeling Of Single Event Upsets Of Deep Sub-Micron Geometries
Principal Investigator	Warren/Templeton
Co-PI	Schrimpf
Sponsor	Medtronics
Dates	9/5 - 9/07
Total Budget	\$87,451

Title	Multidisciplinary Training in Reliability and Risk Engineering, Analysis and Management
Principal Investigator	Sankaran Mahadevan
Co-PIs	Bruce Cooil, Gabor Karsai, David Kosson, Ron Schrimpf
Sponsor	NSF IGERT program
Dates	7/01-7/06
Total Budget	\$2,700,000

Title	NASA Electronic Parts & Packaging Program
Principal Investigator	Schrimpf
Sponsor	QSS Group
Dates	7/19/04-1/21/05
Total Budget	\$24,820

Title	IPA-Dave Alexander
Principal Investigator	Schrimpf
Sponsor	AFRL
Dates	9/1/03-6/30/05
Total Budget	\$255,968

Title	Integrated Multi-scale Modeling of Molecular Computing Devices
Principal Investigator	Cummings
Co-PIs	Schrimpf, Pantelides
Sponsor	DOE
Dates	9/15/03-11/14/08
Total Budget	\$242,312

Title	Developing Digital Models of Radiation Induced Single Events in Focal Plane Array Infrared Detectors
Principal Investigator	Weller
Co-PIs	Reed, Schrimpf
Sponsor	AEDC
Dates	4/05 – 3/07
Total Budget	\$51,650

Title	DRC Student Support
Principal Investigators	Schrimpf/Massengill
Sponsor	DRC
Dates	7/98-6/06
Total Budget	\$97,654

Title	Texas Instruments Test Support
Principal Investigator	Schrimpf
Sponsor	Texas Instruments
Dates	6/04-5/06
Total Budget	\$1,125

Title	Radiation Effects in Mixed Signal Circuits, SiGe Integrated Electronics for Extreme Environments
Principal Investigator	Alles
Co-PI	Schrimpf
Sponsor	Georgia Tech/NASA
Dates	4/05 – 4/07
Total Budget	\$250,000

Title	Research, Development, Test, and Evaluation of ELDRS Research
Principal Investigator	Fleetwood
Co-PI	Schrimpf
Sponsor	MRC
Dates	2/2/04-6/30/05
Total Budget	\$156,483

Title	Research, Development, Test, and Evaluation of Transient Radiation Effects Circuit Analysis
Principal Investigator	Massengill
Co-PIs	Schrimpf, Weller, Bhuva, Holman
Sponsor	MRC
Dates	3/04-05/05
Total Budget	\$309,257

Title	Research, Development, Test, and Evaluation of Radiation Effects Phenomena
Principal Investigator	Schrimpf
Co-PIs	Fleetwood, Pantelides
Sponsor	MRC
Dates	6/1/04-5/31/05
Total Budget	\$61,414

Title	Improved Understanding of Space Radiation Effects on Exploration Electronics by Advanced Modeling of Nanoscale Devices and Novel Materials
Principal Investigator	Alles
Co-PIs	Schrimpf, Weller
Sponsor	CFDRC
Dates	3/05 – 12/05
Total Budget	\$40,000

Title	Research, Development, Test, and Evaluation of Radiation Effects Phenomena
Principal Investigator	Fleetwood
Co-PIs	Schrimpf, Pantelides
Sponsor	MRC
Dates	4/05 -12/05
Total Budget	\$179,500

Title	Semiconductor Radiation Physics: From Defects to Devices (MURI FY 99)
Principal Investigator	Schrimpf
Co-PIs	Pantelides, Galloway, Massengill, Tolk, Pennycook (Vanderbilt); Weber (UC Berkeley); Lucovsky (NC State); Brillson (Ohio State); Neifeld (Arizona)
Sponsor	AFOSR
Dates	4/99-12/04
Total Budget	\$4,175,000

Title	ISDE – Institute for Space and Defense Electronics (FY04)
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Galloway
Sponsor	Navy/Draper
Dates	10/03 - 10/04
Total Budget	\$2,498,642

Title	ISDE Radiation Effects Modeling and Simulation of Electronic Parts and Technologies (RHAP)
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Galloway, Weller, Robinson
Sponsor	Navy/Draper
Dates	6/04 - 12/04
Total Budget	\$481,800

Title	Total Ionizing Dose Research
Principal Investigator	Fleetwood
Co-PIs	Schrimpf, Massengill, Holman
Sponsor	MRC
Dates	04/03 – 04/04
Total Budget	\$45,421

Title	Transient Radiation Effects Research
Principal Investigator	Massengill
Co-PIs	Schrimpf, Fleetwood, Holman
Sponsor	MRC
Dates	04/03 – 04/04
Total Budget	\$90,902

Title	A Comprehensive Computational Workbench for Application & Development of Radiation Effects Simulation Codes
Principal Investigator	Weller
Co-PI's	Schrimpf, Fleetwood
Sponsor	Air Force/AEDC/PKP
Dates	09/01/03 – 09/30/04
Total Budget	\$50,000

Title	New Design Technology for Rad-Hard Microelectronics
Principal Investigator	Schrimpf
Co-PI	Fleetwood
Sponsor	CFDRC
Dates	07/02 – 03/04
Total Budget	\$49,981

Title	Single Event Transients in an Detector
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood
Sponsor	Hughes Electron Devices
Dates	9/00 - 10/04
Total Budget	\$10,000

Title	Modeling Semiconductor Device Response Using Detailed Radiation Event Simulations
Principal Investigator	Weller
Co-PI's	Schrimpf, Fleetwood
Sponsor	NASA Goddard
Dates	7/6/04-7/6/05
Total Budget	\$70,000

Title	Institute for Space and Defense Electronics
Principal Investigator	Schrimpf
Co-PI's	Massengill, Fleetwood
Sponsor	Draper Labs/Navy
Dates	11/1/04-12/31/04
Total Budget	\$354,047

Title	NASA GSRP for Hugh Barnaby
Principal Investigator	Schrimpf
Sponsor	NASA
Dates	7/00 - 6/03
Total Budget	\$44,000

Title	Single Event Transient Characterization
Principal Investigator	Massengill
Co-PIs	Schrimpf
Sponsor	MRC
Dates	02/02 – 02/03
Total Budget	\$93,000

Title	Radiation Hardened Circuit Design, Process & Device Modeling
Principal Investigator	Massengill
Co-PIs	Schrimpf, Galloway, Holman
Sponsor	MRC
Dates	9/00 - 09/03
Total Budget	\$1,014,252

Title	Research and Development of Strategic Weapons System Management and Technology Issues in a Declining Industrial Base
Principal Investigator	Mahaffey
Co-PIs	Schrimpf
Sponsor	Navy/MRC
Dates	11/01 – 10/03
Total Budget	\$198,865

Title	Radiation Effects in SOI Devices
Principal Investigator	Schrimpf
Sponsor	MRC
Dates	06/02 – 03/03
Total Budget	\$32,191

Title	ISDE – Institute for Space and Defense Electronics (FY03)
Principal Investigator	Schrimpf
Co-PIs	Massengill, Fleetwood, Holman, Galloway
Sponsor	Navy/Draper
Dates	01/03 - 09/03
Total Budget	\$1,182,564

Title	Testing and Analysis of Semiconductor Devices
Principal Investigator	Schrimpf
Sponsor	Kirkland & Ellis
Dates	11/03 – 11/04
Total Budget	\$3,000

Title	(DTRA ELDRS) Radiation-Hardened Microelectronics Development Support
Principal Investigator	Schrimpf
Co-PIs	Fleetwood
Sponsor	MRC
Dates	04/02 – 03/03
Total Budget	\$93,000

Title	Incorporation of Radiation Effects into TCAD
Principal Investigators	Schrimpf/Massengill/Galloway
Sponsor	MRC/Navy
Dates	10/97–12/01
Total Budget	\$2,154,993

Title	Analysis of Radiation Effects
Principal Investigator	Schrimpf
Sponsor	MRC
Dates	8/99-8/01
Total Budget	\$54,249

Title	Analysis of Bipolar Linear Circuits
Principal Investigator	Schrimpf
Sponsor	MRC
Dates	6/00 - 9/01
Total Budget	\$45,940

Title	Radiation Sources for Total-Dose Testing of Electronics (<i>DURIP</i>)
Principal Investigators	Schrimpf, Fleetwood, Weller
Sponsor	AFOSR
Dates	4/00 - 7/01
Total Budget	\$154,450

Title	Radiation Effects in BiCMOS ICs
Principal Investigators	Schrimpf/Galloway
Sponsor	Alcatel Espace
Dates	9/1/96-5/1/00
Total Budget	\$52,801

Title	Radiation Effects in Microelectronics
Principal Investigators	Schrimpf/Galloway
Sponsor	Prairie View A&M/NASA
Dates	7/1/98–6/30/99
Total Budget	\$20,000

Title	Circuit Modeling of Bipolar Degradation
Principal Investigator	Schrimpf
Sponsor	MRC
Dates	6/3/98-5/31/99
Total Budget	\$45,200

Title	Radiation Effects in MQW Photonic Devices
Principal Investigator	Schrimpf
Sponsor	AFOSR (subcontract from University of Arizona)
Dates	1/1/98-6/30/99
Total Budget	\$62,860

Title	Radiation Effects in Microelectronics
Principal Investigators	Schrimpf/Galloway
Sponsor	Prairie View A&M/NASA
Dates	7/1/97-6/30/98
Total Budget	\$24,999

Title	Radiation Effects Analysis
Principal Investigator	Schrimpf
Sponsor	NASA Goddard
Dates	2/1/97-9/30/98
Total Budget	\$20,000

Title	Virtual Wafer Fab
Principal Investigators	Schrimpf/Galloway/Massengill
Sponsor	DOD/ONR
Dates	11/1/96-9/30/98
Total Budget	\$440,406

Title	Radiation Effects in Microelectronics
Principal Investigator	Schrimpf
Sponsor	DSWA (subcontract from University of Arizona)
Dates	9/1/96-12/31/98
Total Budget	\$259,799

Title	Analysis of Bipolar Devices & Circuits for Space Applications
Principal Investigator	Schrimpf
Sponsor	MRC/Navy
Dates	3/1/97-5/31/98
Total Budget	\$70,000

Title	Low Power Electronics
Principal Investigators	Massengill/Schrimpf/Galloway
Sponsor	USAF Rome Labs
Dates	7/10/97-10/97
Total Budget	\$57,681