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Education: B.S. (1977), M.S. (1979), Ph.D. (1985) Electrical Engineering, Univ. of Virginia

Research at Notre Dame (1999-present): Electron devices and circuits, nanoelectronics, energy harvesting, nanofabrication, tunneling-based devices: sensors, imagers, transistors, and memory.

Raytheon/Texas Instruments (1986-1999): Developed resonant-tunneling circuit technology for digital and analog/mixed signal applications (5-100 GHz) and memory. Led group demonstrating first resonant tunneling analog-to-digital converter (4 bits, 3 GSps), demonstrated first integrated bipolar resonant tunneling transistor (RTT) full adder, co-demonstrated first room temperature current gain in tunnel-emitter hot electron transistor, co-demonstrated first bipolar quantum well RTT (BiQuaRTT), demonstrated first 9-state RT SRAM cell.

University of Texas at Dallas Visiting Lecturer: EE3301 Electrical Network Analysis (1987), EE6320 Semiconductor Device Theory (1988, 1996), EE3310 Electronic Devices (1989), EE6321 Advanced Semiconductor Device Theory (1997). Received the *Teacher of the Year* award from the student chapter of the *IEEE* 1989-1990.

National Bureau of Standards Electronics Engineer (1979-1986): NBS graduate research fellowship (1981-84). Developed electronic characterization methods and apparatus for GaAs, including resistivity, Hall-effect, deep-level transient spectroscopy, photocapacitance, and photocurrent measurement systems. Revised the ASTM standard method F76 for measuring resistivity and Hall effect.

Publications, Patents, Presentations: publications/authored and coauthored >170; 3 book chapters; 22 patents authored and coauthored, 10 foreign; 60+ invited presentations, **Ph.D. thesis (1985):** Transient photoresistance spectroscopy of deep levels in high resistivity semiconductors. **M.S. thesis (1979):** GaAs liquid phase epitaxy for millimeter wave Schottky diodes.

Awards: Outstanding Teacher Award 2001. DARPA Sustained Superior Performance award (1997) and DARPA Outstanding Performance by a Project Manager award (1998), *IEEE Computer Society Outstanding Paper Award* (coauthored, 1994). *TI Achievement Award* for

“Demonstration of the world’s first room temperature resonant tunneling integrated circuit” (1992), Teacher of the Year Award University of Texas at Dallas, student chapter of the IEEE (1989-1990). *TI Achievement Award* for “Demonstration of the world’s first pseudomorphic bipolar quantum resonant tunneling transistor” (1988). **Promotions:** Elected to Raytheon Senior Fellow (1999), Texas Instrument’s, Distinguished Member of Technical Staff (1997), and Texas Instruments’ Senior Member of Technical Staff (1991).

Teaching, University of Notre Dame: EE47008 Electrical Energy Extraction (2008), EE60542 Analog Integrated Circuit Design (2008), EE20242 Electronics I (2006-7), EE67026 Energy-Constrained Devices and Circuits (2006), EE67024 Communications Circuit Design (2005), EE486 Digital and Analog Integrated Circuits (2005), EE348 Electromagnetic Fields and Waves (2000, 2002), EE598F Analog CMOS Design (2001,03,04), EE598 RF Integrated Circuit Design (2002), EE556 Fundamentals of Semiconductor Physics (2001,03,04), EE342 Electronics II (2000-2), EE598F Advanced IC Laboratory Techniques (2000), EE598F Advanced Studies in Semiconductor Devices (1999).

Professional Memberships and Committees: IEEE Fellow (2003) “for contributions to high speed and nanoelectronic device and circuit technology”, Member APS. IEEE EDS Nanotechnology Committee Chair (2001-2004), *Device Research Conference* General Chair (2005), Technical Program Chair (2004) technical program committee (1993-1995, 2001-2003), DRC Local Arrangements Chair (2001), *Silicon Nanoelectronics Workshop* Technical Program Chair (1996), General Chair (1998), program committee (1999-2001), *Advanced Heterostructure Transistor Workshop* (1998), *Int. Electron Dev. Mtg.* technical program committee (1999,2000). Referee for *Electronics Lett.*, *IEEE Electron Dev. Lett.*, *IEEE Trans. Electron Dev.*, *Appl. Phys. Lett.*, *J. Appl. Phys.*, *Electronics Letters*, *Nano Letters*, *J. Vacuum Society B* (~1988-present). *IEEE Proceedings* guest editor - Quantum Devices and Their Applications (1999). Patent Committee: Texas Instruments (1991-1997), Raytheon Systems Company (1997-1999). SRC Si Tunnel Diode and CMOS/HBT Integration Workshop (1999)

PUBLICATIONS CONTENTS

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1. Archival Publications

- [66] Q. Zhang, S. Sutar, T. Kosel, and A. Seabaugh, "Fully-depleted Ge interband tunnel transistor: modeling and junction formation," *Solid State Electronics* 53, 30-35 (2009).
- [65] Q. Zhang, T. Fang, H. Xing, A. Seabaugh, and D. Jena, "Graphene nanoribbon tunnel transistors," *Electron Device Letters* 29, 1344 – 1346 (2008).
- [64] I. Yoon, C. Yi, T. Kim, A. S. Brown, A. Seabaugh, "Effect of surface pretreatment and substrate orientation on the characteristics of InAs quantum dots on Si and SiO₂ substrates," *J. Vac. Sci. & Technol. B (Microelectronics and Nanometer Structures)* 25, p. 945-947 (2007).
- [63] M. Remskar, J. Kovac, M. Virsek, M. Mrak, A. Jesih, and A. Seabaugh, "W₅O₁₄ nanowires," *Advanced Functional Materials*, 17, 1974-1978 (2007).
- [62] Z. Racz and A. C. Seabaugh, "Characterization and control of unconfined lateral diffusion under stencil masks," *J. Vac. Sci. Technol. B*, 25, 857-861 (2007).
- [61] J. Zhao, A. C. Seabaugh, and T. H. Kosel, "Rapid melt growth of germanium tunnel junctions," *J. Electrochem. Soc.* 154, H536-539 (2007).
- [60] Q. Zhang, W. Zhao, and A. Seabaugh, "Low subthreshold swing transistors," *Electron Dev. Lett.* 27, 297-300 (2006).
- [59] W. Zhao, A. Seabaugh, B. Winstead, D. Jovanovich, and V. Adams, "Influence of uniaxial tensile strain on the performance of partially depleted SOI CMOS ring oscillators," *IEEE Electron Dev. Lett.* 27, 52-54 (2006).
- [58] W. Zhao, A. Seabaugh, V. Adams, D. Jovanovic, and B. Winstead, "Opposing dependence of the electron and hole gate currents in SOI MOSFETs under uniaxial strain," *IEEE Electron Device Lett.* 26, 410-412 (2005).
- [57] Q. Liu and A. Seabaugh, "Design approach using tunnel diodes for lowering power in differential amplifiers," *IEEE Trans. Circ. Sys. – II: Express Briefs*, 52, 572-575 (2005).
- [56] L.-E. Wernersson, S. Kabeer, V. Zela, E. Lind, J. Zhang, W. Seifert, T. Kosel, and A. Seabaugh, "A combined chemical vapor deposition and rapid thermal diffusion process for SiGe Esaki diodes by ultra shallow junction formation," *IEEE Trans. Nanotechnology* 4, 594-598 (2005).
- [55] W. Zhao, J. He, R. Belford, L-E Wernersson, and A. Seabaugh, "Partially-depleted SOI MOSFETs under uniaxial tensile strain," *IEEE Trans. Electron Dev.* 51, 317-323 (2004).
- [54] L.-E. Wernersson, S. Kabeer, V. Zela, E. Lind, J. Zhang, W. Seifert, T. Kosel, and A. Seabaugh, "SiGe Esaki tunnel diodes fabricated by UHV-CVD growth and proximity rapid thermal diffusion," *Electronics Letters* 40, 83-85 (2004).
- [53] Q. Liu, A. Seabaugh, P. Chahal, and F. Morris, "Unified AC model for the resonant tunneling diode," *IEEE Trans. Electron Dev.* 51, 653-657 (2004).

- [52] Z. Racz, J. He, S. Srinivasan, W. Zhao, A. Seabaugh, K. Han, P. Ruchhoeft, and J. Wolfe, "Nanofabrication using nanotranslated stencil masks and lift off," *J. Vac. Sci. Technol. B* 22, 74-76 (2004).
- [51] J. Wang, D. Wheeler, Y. Yan, J. Zhao, S. Howard, and A. Seabaugh, "Silicon tunnel diodes formed by proximity rapid thermal diffusion," *IEEE Electron Device Lett.* 24, 93-95 (2003).
- [50] E. M. Jackson, B. D. Weaver, S. Shojah-Ardalan, R. Wilkins, A. C. Seabaugh, and B. Brar, Irradiation effects in InGaAs/InAlAs high electron mobility transistors, *Appl. Phys. Lett.* 79, 2279-2281 (2001).
- [49] B. D. Weaver, E. M. Jackson, G. P. Summers, and A. C. Seabaugh, "Disorder-effects in reduced dimension: InP resonant tunneling diodes," *J. Appl. Phys.* 88, 6951 (2000).
- [48] B. D. Weaver, E. M. Jackson, A. C. Seabaugh, and P. van der Wagt, "MeV ion-induced suppression of resonance current in InP-based resonant tunneling diodes, *Appl. Phys. Lett.* 76 2562-2564 (2000).
- [47] M. W. Dashiell, R. T. Troeger, S. L. Rommel, T. N. Adam, P. R. Berger, J. Kolodzey, A. C. Seabaugh, and R. Lake, "Current voltage characteristics of high current density silicon Esaki diodes grown by molecular beam epitaxy and the influence of thermal annealing," *IEEE Trans. Electron Dev.* 47 1707-1714 (2000).
- [46] P. E. Thompson, K. D. Hobart, M. E. Twigg, S. L. Rommel, N. Jin, P. R. Berger, R. Lake, A. C. Seabaugh, P. H. Chi and D. S. Simons, "Epitaxial Si-Based Tunnel Diodes," *Thin Solid Films*, 380, pp. 145-150, (2000).
- [45] A. Seabaugh, B. Brar, T. Broekaert, F. Morris, and G. Frazier, "Resonant tunneling mixed signal circuit technology," *Solid-State Electronics* 43 1355-1365 (1999).
- [44] T. P. E. Broekaert, B. Brar, J. P. A. van der Wagt, A. C. Seabaugh, T. S. Moise, F. J. Morris, E. A. Beam III, and G. A. Frazier, "A monolithic 4-bit 2-Gbps resonant tunneling analog-to-digital converter," *IEEE J. Solid State Circ.* 33, 1342-1349 (1998).
- [43] P. E. Thompson, K. D. Hobart, M. Twigg, G. Jernigan, T. E. Dillon, S. L. Rommel, P. R. Berger, D. S. Simons, P. H. Chi, R. Lake, and A. C. Seabaugh, "Si resonant interband tunnel diodes grown by low temperature molecular beam epitaxy," *Appl. Phys. Lett.* 75 1308-1310 (1999).
- [42] R. Wilkins, S. Shojah-Ardalan, W. P. Kirk, G. F. Spencer, R. T. Bate, A. C. Seabaugh, R. Lake, P. Stelmaszyk, A. D. Wieck, and T. N. Fogarty, "Ionization and displacement damage irradiation studies of quantum devices: resonant tunneling diodes and two dimensional electron gas transistors," *IEEE Trans. on Nuclear Science*, 46, pp. 1702-1707 (1999).
- [41] E. M. Jackson, B. D. Weaver, A. C. Seabaugh, J. P. A. van der Wagt, and E. Beam III, "Proton-induced disorder in InP-based resonant tunneling diodes," *Appl. Phys. Lett.* 75 280-282 (1999).
- [40] J. P. A. van der Wagt, H. Tang, T. P. E. Broekaert, A. C. Seabaugh, and Y.-C. Kao, "Multibit resonant tunneling diode SRAM cell based on slew-rate addressing," *IEEE Trans. Electron Dev.* 46, pp. 55-62 (1999).
- [39] S. L. Rommel, T. E. Dillon, P. R. Berger, P. E. Thompson, K. D. Hobart, R. Lake, and A. C. Seabaugh, "Epitaxially grown Si resonant interband tunnel diodes exhibiting high current densities," *Electron Dev. Lett.* 20, pp.329-331 (1999).
- [38] S. L. Rommel, T. E. Dillon III, M. W. Dashiell, H. Feng, J. Kolodzey, P. Berger, P. E. Thompson, K. D. Hobart, R. Lake, A. C. Seabaugh, G. Klimeck, and D. K. Blanks, "Room temperature operation of epitaxially grown Si/Si_{0.5}Ge_{0.5}/Si resonant interband tunneling diodes," *Appl. Phys. Lett.* 73, 2191-2193 (1998).

- [37] J. P. A. van der Wagt, A. Seabaugh, and E. Beam, III, "RTD/HFET low standby power memory cell," *IEEE Electron Dev. Lett.* 19, 7-9 (1998).
- [36] Y. Wei, R. M. Wallace, and A. C. Seabaugh, "Controlled growth of SiO₂ tunnel barrier and crystalline Si quantum wells for Si resonant tunneling diodes," *J. Appl. Phys.* 81, 6415-6424 (1997).
- [35] T. P. E. Broekaert, J. N. Randall, E. A. Beam III, D. Jovanovic, A. C. Seabaugh, and B. D. Smith, Functional InP/InGaAs lateral double barrier heterostructure resonant tunneling diodes by using etch and regrowth," *Appl. Phys. Lett.* 69, 1918-1920 (1996).
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- [33] S. Tang, R. M. Wallace, A. Seabaugh, and D King-Smith, "Band offset of ultrathin SiO₂/Si(100) interface: a first-principles study," *J. Appl. Phys.* September, 1996.
- [32] B. Brar, G. D. Wilk, A. C. Seabaugh, "Direct extraction of the electron tunneling effective mass in ultrathin SiO₂," *Appl. Phys. Lett.* 69, 2728-2730 (1996).
- [31] K. P. Clark, W. P. Kirk, and A. C. Seabaugh "Nonparabolicity effects in the bipolar quantum well resonant tunneling transistor," *Phys. Rev. B.* 55, 7068-7072 (1997).
- [30] Y. Wei, R. M. Wallace, and A. Seabaugh, "Void formation on ultrathin thermal silicon oxide films on the Si (100) surface," *Appl. Phys. Lett.* 69, 1270-1272 (1996).
- [29] K. P. Clark, W. P. Kirk, A. C. Seabaugh, and Y.-C. Kao, "Minority carrier magneto-oscillations in the bipolar quantum well resonant tunneling transistor," *J. Appl. Phys.* 79, 2732-2737 (1996).
- [28] M. D. Taylor, G. C. Wetsel, Jr., S. E. McBride, R. C. Bowen, W. R. Frensley, A. C. Seabaugh, Y.-C. Kao, and E. A. Beam, "Nanoprobe-induced electrostatic lateral quantization in near-surface resonant-tunneling heterostructures," *Appl. Phys. Lett.* 66 3621-3623 (1995).
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- [24] A. C. Seabaugh, A. H. Taddiken, E. A. Beam III, J. N. Randall, Y.-C. Kao, and B. Newell, "Room temperature resonant tunneling bipolar transistor XNOR and XOR integrated circuits," *Electron. Lett.* 29, 1802-1803 (1993).
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- [20] E. A. Beam III, H. F. Chau, T. S. Henderson, W. Liu, and A. C. Seabaugh, "The use of organometallic group-V sources for the MOMBE of InGaP/GaAs and InGaAs/InP heterojunction bipolar device structures," *J. Cryst. Gr.* 136, 1-10 (1994).

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- [18] A. Raychaudhuri, Z. X. Yan, M. J. Deen, and A. C. Seabaugh, "Hysteresis in resonant-tunneling-diode-based multiple-peak driver device for multivalued SRAM cells: analysis, simulation, and experimental results," *Can. J. Phys.* 70, 993-1000 (1992).
- [17] W. Liu, A. C. Seabaugh, A. Yuksel, T. Henderson, S.-K. Fan, and E. A. Beam III, "Observation of resonant tunneling in GaInP/GaAs/GaInP double heterojunction bipolar transistor at room temperature," *IEEE Trans. Electron Dev.* 40, 1384-1389 (1993).
- [16] A. C. Seabaugh, J. H. Luscombe, J. N. Randall, P. C. Colter, A. Dip, G. M. Eldallal, and S. M. Bedair, "Atomic layer epitaxy of quantum-well devices," *J. Thin Sol. Films* 225, 99-104 (1993).
- [15] J. N. Randall, A. C. Seabaugh, and J. H. Luscombe, "Fabrication of lateral resonant tunneling devices," *J. Vac. Sci. Technol. B*10, 2941-2944 (1992).
- [14] A. C. Seabaugh, Y. C. Kao, and H. T. Yuan, "Nine state resonant tunneling diode memory," *IEEE Electron Dev. Lett.* 13, 479-481 (1992).
- [13] E. A. Beam III, T. S. Henderson, A. C. Seabaugh, and J. Y. Yang, "The use of tertiarybutylphosphine and tertiarybutylarsine for metalorganic molecular beam epitaxy of the In_{0.53}Ga_{0.47}As/InP and In_{0.48}Ga_{0.52}P/GaAs Materials Systems, *J. Cryst. Growth* 116, 436-446 (1992).
- [12] A. C. Seabaugh, J. N. Randall, Y.-C. Kao, J. H. Luscombe, and A. M. Bouchard, "In_{0.52}Al_{0.48}As/In_{0.53}Ga_{0.47}As lateral resonant tunneling transistor," *Electron. Lett.* 27, 1832-1834 (1991).
- [11] J. N. Randall, A. C. Seabaugh, Y.-C. Kao, J. H. Luscombe, and B. L. Newell, "Electric field coupling to quantum dot diodes," *J. Vac. Sci. Technol. B*9, 2893-2897 (1991).
- [10] A. C. Seabaugh, Y.-C. Kao, W. R. Frensley, J. N. Randall, and M. A. Reed, "Resonant-transmission in the base/collector junction of a bipolar quantum-well resonant-tunneling transistor," *Appl. Phys. Lett.* 59, 3413-3415 (1991).
- [9] A. C. Seabaugh, Y.-C. Kao, H.-Y. Yiu, J. H. Luscombe, H.-L. Tsai, M. A. Reed, and W. R. Frensley, "Formation of rotation-induced superlattices and their observation by tunneling spectroscopy," *Appl. Phys. Lett.* 59, 570-572 (1991).
- [8] A. Seabaugh, Y.-C. Kao, J. Randall, W. Frensley, and A. Khatibzadeh, "Room temperature hot electron transistors with InAs-notched resonant-tunneling-diode injector," *Jpn. J. Appl. Phys.* 30, 921-925 (1991).
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- [4] M. A. Reed, W. M. Duncan, W. R. Frensley, R. J. Matyi, A. C. Seabaugh, and H. L. Tsai, "Quantitative resonant tunneling spectroscopy: current-voltage characteristics of precisely characterized RTDs," *Appl. Phys. Lett.* 54, 1256-1258 (1989).
- [3] A. C. Seabaugh, "Selective etching of GaAs on AlGaAs using CCl₂F₂ and He," *J. Vac. Sci. Tech.* B6, 77-81 (1988).

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- [1] A. C. Seabaugh and R. J. Mattauch, "Removal of the high resistivity layer at the n on $n+$ liquid phase epitaxial layer-substrate interface by controlled *in situ* etchback," *J. Appl. Phys.* 51, 6435-6437 (1980).

2. Book Contributions

- [4] Q. Liu, S. Sutar, and A. Seabaugh, "Tunnel diode/transistor differential comparator," in Selected Topics in Electronics and Systems – Vol 35 High Performance Devices, Proc. of the 2004 IEEE Lester Eastman Conference on High Performance Devices, ed. by R. E. Leoni III, (World Scientific 2005), pp. 640-645.
- [3] A. Seabaugh and R. Lake, "Tunnel Diodes," *Encyclop. Appl. Phys.* 22 (Am. Inst. Phys. VCH Pub. NY 1998) pp. 335-359.
- [2] A. C. Seabaugh and M. A. Reed, "Resonant tunneling transistors," *Heterostructures and Quantum Devices* (a volume of VLSI Electronics), eds. N. G. Einspruch and W. R. Frensley, (Academic Press, Orlando, FL 1994) pp. 351-383.
- [1] M. A. Reed and A. C. Seabaugh, "Prospects for semiconductor quantum devices," *Molecular and Biomolecular Electronics*, ed. R. Birge, Adv. Chem. Ser. 240, pp. 15-42 (Amer. Chem. Soc. NY 1994).

3. Short Courses

- [1] A. C. Seabaugh and P. Mazumder, "Nanoelectronic devices, circuits, and systems," *Government Microcircuits Applications Conference Short Course*, Arlington, VA (1998).

4. Invited Papers and Presentations

- [75] A. Seabaugh, "Nanoelectronics," Trinity College, Dublin, Ireland, July 23, 2008.
- [74] A. Seabaugh, P. Fay, D. Jena, T. Kosel, T. Vasen, Q. Xang, and G. Xing, "Low-subthreshold-swing tunnel FETs and tunnel rectifiers," Tyndall National Institute, Cork, Ireland, July 22, 2008.
- [73] A. Seabaugh, "Energy-Efficient Transistors," University of Illinois (UIUC) ECE Colloquium, Urbana, Illinois, April 24, 2008.
- [72] A. Seabaugh, "Energy-Efficient Transistors," Rochester Institute of Technology, Microelectronic Engineering Seminar, January 10, 2008.
- [71] A. Seabaugh, "Energy-Efficient Transistors," Jozef Stefan Institute, Ljubljana, Slovenia, October 25, 2007.
- [70] A. Seabaugh, "Tunneling-based nanoelectronics for power reduction," 7th Topical Workshop on Heterostructure Microelectronics, Kazusa Arc (Kazusa Akademia Center), Kisarazu, Chiba, Japan, August 21–24, 2007.
- [69] A. Seabaugh, Complementary Tunnel Transistors vs. CMOS: Lowering Transistor Power Dissipation, IEEE Electron Devices Society Dallas Section and University of Texas at Arlington Micro & Nano-Systems Distinguished Speaker Series, December 1, 2006.
- [68] A. Seabaugh, "Complementary low-subthreshold-swing tunnel transistors," DARPA Defense Sciences Research Council Workshop on Emerging Technologies for Ultra-Low Power Dissipation Circuits, Arlington, VA, June 2, 2006.
- [67] A. Seabaugh, "Tunnel Diodes and Circuits," at the Engineering Research Center for

- Wireless Integrated Microsystems, University of Michigan, Ann Arbor on May 16, 2006.
- [66] A. C. Seabaugh, Q. Liu, S. Sutar, Q. Zhang, W. Zhao, J. Zhao, Y. Yan, B. Wu, S. Kabeer, D. Wheeler, Z. Racz, and P. Fay, "High speed, low power, and mixed signal tunneling device technology," Int. COE Workshop on Nano Processes and Devices, and their Applications, Nagoya, Japan, December 15-16, pp. 37-38, (2005).
 - [65] A. C. Seabaugh and C. S. Lent "Fundamentals of Nanotechnology and Nanocomputing" in Nanocomputing - Technology Trends, ed. by K. S. Lakshminarayanan, U. Devi, R. B. Shankar, and T.V. Gopal, Allied Publishers Limited, Chennai, India (2001).
 - [64] C. S. Lent, M. Lieberman, and A. C. Seabaugh, "Integrated Molecular Electronics" in Nanocomputing - Technology Trends, ed. by K. S. Lakshminarayanan, U. Devi, R. B. Shankar, and T.V. Gopal, Allied Publishers Limited, Chennai, India (2001).
 - [63] A. Seabaugh, "Tunnel diodes and transistors" at the Post-CMOS Deep Dive Workshop, IBM T. J. Watson Research Center, Yorktown Heights, NY, September 22, 2004.
 - [62] A. Seabaugh, "Applications of Nanoelectronics," Intel Corporation, Hillsboro, OR, May 19, 2004.
 - [61] A. Seabaugh, "Silicon tunnel diodes and integrated circuits," Sematech, Austin, TX March 26, 2004.
 - [60] A. Seabaugh, "Towards Autonomous Microsystems," Zyvex Corporation, Richardson, TX, March 25, 2004.
 - [59] A. Seabaugh, "Nanoelectronics - Evolutionary" at the National Nanotechnology Workshop on Grand Challenges in Nano-electronics, -Photonics, and -Magnetics in Arlington, VA on February 11, 2004.
 - [58] A. Seabaugh, "Nanoelectronics in Autonomous Low-Power CMOS Systems" at the DARPA Workshop on the Integration of Scalable CMOS Systems with Novel Nanostructures in McLean, VA on January 12, 2004.
 - [57] A. Seabaugh, "Emerging Technologies for Ambient Intelligence" at the Fifth International Workshop on Future Information Processing Technologies in Miyazaki, Japan on November 10, 2003
 - [56] A. Seabaugh, "Difference-defined nanofabrication" at the DARPA Workshop on Massively Reconfigurable Microfabrication Tools in Napa, California, October 29, 2003.
 - [55] A. Seabaugh, NSF IGERT (Integrative Graduate Education and Research Trainingship) Lecture, "Nanotechnology: Devices, Agents, and Swarms" at the University of Michigan, Ann Arbor, Michigan, October 10, 2003.
 - [54] A. Seabaugh, "Nanoelectromechanical Switches and Circuits," to the Sensors Directorate of the Wright Patterson Air Force Base, February 6, 2003.
 - [53] A. C. Seabaugh, "Multi-Valued Logic and the Esaki Tunnel Diode," at the 11th International Workshop on Post Binary Ultra Large Scale Integration (ULSI), University of Massachusetts, Boston, May 15, 2002.
 - [52] A. C. Seabaugh, "Fundamentals of Nanotechnology and Nanocomputing" and "Integrated Molecular Electronics," at the International Conference on Nanocomputing, SASTRA University, Thanjavur, India on December 16, 17, 2001.
 - [51] A. Seabaugh, "Tunneling Device Nanoelectronics" Ohio State University, Columbus, OH, May 29, 2001.
 - [50] A. Seabaugh, "Tunneling Device Nanoelectronics" Lund University, Sweden on May 1, 2001.
 - [49] A. Seabaugh, "Tunnel Diodes for RF and Digital Applications" IEEE International Symposium Workshop on RF and High Speed Applications of Tunnel Devices, Phoenix, Arizona, May 20, 2001.

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