

WEI LU

Title

Assistant Professor of Electrical Engineering and Computer Science, and Applied Physics.

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Professional Preparation

Tsinghua University	Physics	B.S.	1996
Rice University	Physics	Ph. D.	2003
Harvard University	Chemistry	Postdoc	2003-05

Appointments

2005-present Assistant Professor, Electrical Engineering and Computer Science Department, and Applied Physics, University of Michigan – Ann Arbor.

Synergistic Activities

- Served as reviewer for Nature Materials, Nano Letters, Journal of the American Chemical Society, IEEE Electron Device Letters, Applied Physics Letters, Advanced Materials, Journal of Applied Physics, Nanotechnology, Small, IEEE Transactions on Microwave Theory and Techniques, IEEE Transactions on Nanotechnology, Chemical Physics Letters, New Journal of Physics, Journal of Vacuum Science and Technology, Journal of Electronic Materials, Journal of Physics, Solid State Communications, Physics Letters A, Science of Advanced Materials, Semiconductor Science and Technology, Organic Electronics Letters, Materials Today and Solid State Electronics.
- Currently advising 8 Ph.D. students and 1 postdoctoral fellow.
- Panelist of the NSF CAREER, NIRT, EMT and EPDT proposals.
- Served as reviewer for NSF, DOE and ARO proposals.
- Advised a female, minority, Master student, and three minority undergraduate students.
- Developed a new graduate level course on nanoelectronics.
- Elected board member, American Vacuum Society, Michigan chapter
- Member of American Physical Society, Materials Research Society, IEEE, SPIE, AVS
- Track Chair, Technical Program Committee, Second Integration and Commercialization of Micro and Nanosystems International Conference & Exhibition (MicroNano08).
- Program Committee, 1st IEEE International Workshop on Design and Test of Nano Devices, Circuits and Systems (NDCS).
- Program Committee, IEEE Nanotechnology Materials and Devices Conference 2009.
- Member, IEEE Emerging Technologies Committee on Nano-Scale, Molecular, and Quantum Networking

- Editorial Board, Micro and Nanosystems Journal

Professional and Academic Awards

- Marquis Who's Who in America. 2009 Edition.
- Wilson Award, to the graduate student for most outstanding Ph.D. thesis in Physics and Astronomy, Rice University. (2003)
- Chuoke Award, to the 2nd or 3rd year graduate student in Physics for outstanding academic and research performance, Rice University. (1999)
- Chuoke Award, to the 2nd or 3rd year graduate student in Physics for outstanding academic and research performance, Rice University. (1998)
- Liqing Academic Award, to the junior or senior student in Physics for most outstanding academic performance, Tsinghua University. (1995)
- Outstanding Student Award, given to undergraduate students for excellent academic performance, Tsinghua University. (1992, 1993, 1994, 1996)
- First Prize, Chinese National Physics Olympiad (1990)
- Second Prize, Chinese National Mathematics Olympiad (1990)
- Second Prize, Chinese National Chemistry Olympiad (1990)

Journal Publications (over 1500 citations to date)

- [26] “Radio Frequency Nanowire Resonators and in-situ Frequency Tuning”, W. Y. Fung, E. N. Dattoli and W. Lu, *Appl. Phys. Lett.* **94**, 203104 (2009).
- [25] “Radio Frequency Operation of Transparent Nanowire Thin-Film Transistors”, E. N. Dattoli, K.-H. Kim, W. Y. Fung, S.-Y. Choi and W. Lu, *IEEE Elec. Dev. Lett.* in press (2009).
- [24] “High-Density Crossbar Arrays Based on a Si Memristive System”, S. H. Jo, K.-H. Kim and W. Lu, *Nano Lett.* **9**, 870-874 (2009).
- [23] “Programmable Resistance Switching in Nanoscale Two-Terminal Devices”, S. H. Jo, K.-H. Kim and W. Lu, *Nano Lett.* **9**, 496-500 (2009).
- [22] “Nanowire Transistor Performance Limits and Applications,” (invited review article) W. Lu, P. Xie and C. M. Lieber, *IEEE Trans. Elec. Dev.*, **55** (11), 2859-2876 (2008).
- [21] “Semiconductor Nanowire Devices” (invited review article) O. Haydena, R. Agarwal and W. Lu, *Nano Today*, **3** (5-6) 12-22 (2008).
- [20] “Doping Dependent Electrical Characteristics of SnO₂ Nanowires,” Q. Wan, E. N. Dattoli and W. Lu, *Small*, **4** (4), 451-454 (2008).
- [19] “Branched SnO₂ Nanowires on Metallic Nanowire Backbones with Sub-ppm Sensitivity to Ethanol,”

- Q. Wan, J. Huang, Z. Xie, T. Wang, E. N. Dattoli, and W. Lu, *App. Phys. Lett.* **92**, 102101-3 (2008) (Cover article).
- [18] “CMOS Compatible Nanoscale Nonvolatile Resistance Switching Memory,” S. Jo, and W. Lu, *Nano Lett.* **8**, 392-397 (2008).
- [17] “Si/a-Si Core/Shell Nanowires as Nonvolatile Crossbar Switches,” Y. Dong, G. Yu, M. McAlpine, W. Lu, C. M. Lieber, *Nano Lett.* **8**, 386-391 (2008).
- [16] “Nanoelectronics from the Bottom-Up”, W. Lu, and C. M. Lieber, *Nature Mater.*, **6**, 841-850 (2007).
- [15] “Nanostructured Thin Films Made by Dewetting Method of Layer-By-Layer Assembly”, B. S. Shim, P. Podsiadlo, D. G. Lilly, A. Agarwal, J. Lee, Z. Tang, S. Ho, P. Ingle, D. Paterson, W. Lu, and N. A. Kotov, *Nano Lett.*, **7**, 3266-3273 (2007).
- [14] “Fully Transparent Thin-Film Transistor Devices Based on SnO₂ Nanowires”, E. N. Dattoli, Q. Wan, W. Guo, Y. Chen, X. Pan, and W. Lu, *Nano Lett.*, **7**, 2463-2469 (2007). Highlighted in *MRS Bulletin*.
- [13] “Transparent metallic Sb-doped SnO₂ nanowires.” E. N. Dattoli, Q. Wan, and W. Lu, *Appl. Phys. Lett.*, **90**, 222107 (2007). Featured in *Nanotechweb.org* and *Virtual Journal of Nanoscale Science and Technology*.
- [12] “High-Performance Transparent Conducting Oxide Nanowires.” Q. Wan, E. N. Dattoli, W. Y. Fung, W. Guo, Y. Chen, X. Pan, and W. Lu, *Nano Lett.*, **6**, 2909-2915 (2006).
- [11] “Semiconductor Nanowires” (invited review article), W. Lu and C. M. Lieber, *J. Phys. D.: Appl. Phys.* **39** R387-R406 (2006).
- [10] “Ge/Si nanowire heterostructures as high-performance field-effect transistors”, J. Xiang*, W. Lu*, Y. Hu, Y. Wu, H. Yan, and C. M. Lieber, *Nature*. **441**, 489-493 (2006). (*contributed equally)
- [9] “One-dimensional hole gas in germanium/silicon nanowire heterostructures”, W. Lu, J. Xiang, B. P. Timko and C. M. Lieber, *Proc. Natl. Acad. Sci. USA*, **102**, 10046-10051 (2005).
- [8] “Coherent single charge transport in molecular-scale silicon nanowires”, Z. Zhong, Y. Fang, W. Lu and C. M. Lieber, *Nano Lett.* **5**, 1143-1146 (2005).
- [7] “Single-crystal metallic nanowires and metal/semiconductor nanowire heterostructures”, Y. Wu, J. Xiang, C. Yang, W. Lu and C. M. Lieber, *Nature*. **430**, 61-65 (2004).

- [6] “Synthesis and fabrication of high-performance n-type silicon nanowire transistors”, G. Zheng, W. Lu, S. Jin and C. M. Lieber, *Adv. Mater.* **16**, 1890-1893 (2004).
- [5] “Real-time detection of electron tunneling in a quantum dot”, W. Lu, Z. Ji, L. Pfeiffer, K. W. West and A. J. Rimberg, *Nature*. **423**, 422-425 (2003).
- [4] “Superconducting single-electron transistor coupled to a locally tunable electromagnetic environment”, W. Lu, K. D. Maranowski and A. J. Rimberg, *Appl. Phys. Lett.* **81**, 4976-4978 (2002).
- [3] “Charge transport processes in a superconducting single-electron transistor coupled to a microstrip transmission line”, W. Lu, K. D. Maranowski and A. J. Rimberg, *Phys. Rev. B.* **65**, 060501(R) (2002).
- [2] “Single-electron transistor strongly coupled to an electrostatically defined quantum dot”, W. Lu, A. J. Rimberg, K. D. Maranowski and A. C. Gossard, *Appl. Phys. Lett.* **77**, 2746-2478 (2000).
- [1] “Controlled deposition of individual single-walled carbon nanotubes on chemically functionalized templates”, J. Liu, M. J. Casavant, M. Cox, D. A. Walters, P. Boul, W. Lu, A. J. Rimberg, K. A. Smith, D. T. Colbert and R. E. Smalley, *Chem. Phys. Lett.* **303**, 125-129 (1999).

Conference Proceedings

“Nanowire Devices and Their Applications to Displays”, E. N. Dattoli, K. H. Kim, and W. Lu, *15th Annual Symposium on Vehicle Displays*, D Society for Information Display, Dearborn, October 2008. (invited)

“Si-Based Two-Terminal Resistive Switching Nonvolatile Memory”, S. Jo and W. Lu, *Proceedings of IEEE-ICSICT 08*, The 9th International Conference on Solid-State and Integrated-Circuit Technology, Beijing, October 2008. 20-23 Oct. 2008 pp. 913 – 916. (invited)

“Nanowire-Based High Speed Transparent and Flexible Thin-Film Transistor Devices”, E. N. Dattoli, K. Baler, W. Lu, *Proceedings of MicroNano08*, MicroNano2008-70328, Hong Kong, June 2008.

“Nonvolatile Resistive Switching Behavior in Metal/Amorphous Silicon/Crystalline Silicon Junctions,” S. Jo, and W. Lu, *Mat. Res. Soc. Proc.*, April 2007, vol. 997, pp. 153-158.

“Versatile Metal Oxide Nanowire Devices Achieved via Controlled Doping,” E. N. Dattoli, Q. Wan and W. Lu, *Mat. Res. Soc. Proc.*, April 2007, 1018-EE11-06.

“Ag/a-Si:H/c-Si Resistive Switching Nonvolatile Memory Devices,” S. Jo, and W. Lu, *IEEE NMDC 2006: IEEE Nanotechnology Materials and Devices Conference 2006, Proceedings*, vol. 1. pp. 116-117, October 2006, Gyeongju, Korea.

“Real-Time Electron Counting Studies on Charge Fluctuations in a Semiconductor Quantum Dot”, W. Lu,

Proc. SPIE, May 2005, 5843: 124-140. (invited)

Invited Presentations

“Nanowire Based Electronics: Challenges and Prospects”, International Electronic Device Meeting (IEDM), December 2009.

“Nanowire-Based Thin-film Devices as High-Performance Transparent and Flexible Electronics”, Nanoscale One-Dimensional Electronic and Photonic Devices symposium, Vienna, October 2009.

“Nano-Devices based on One-Dimensional Wires”, IEEE Nanotechnology Technology Counsel Southeast Michigan Chapter, May 2009.

“A Si-based memristive system for nanoelectronics application”, Condensed Matter Physics Seminar, Stony Brook University, May 2009.

“Nanoscale Devices Based on One-Dimensional Wires”, Applied Physics Seminar, University of Michigan, March 2009.

“Device Applications Based on One-dimensional Nanowires”, 1st International Workshop on Functional Oxides and Applications, Ningbo Institute of Material Technology and Engineering, Chinese Academy of Sciences, December 2008.

“What Wonderful Things Small (Nano) Wires Can Do For You: From High-Density Memories To Transparent Electronics”, WIMS Seminar, University of Michigan, November 2008.

“The Principle and Applications of Radio-Frequency Single-Electron Transistors”, Center of Quantum Information Seminar, University of Science and Technology of China, October 2008.

“A Si-Based Two-Terminal Resistive Switch For Memory And Neuromorphic Computing Applications”, ECE Department Seminar, Michigan State University, October 2008.

“Nanowire Devices and Their Applications to Displays”, Society for Information Display, 15th Annual Symposium on Vehicle Displays, Dearborn, October 2008.

“Si-Based Two-Terminal Resistive Switching Nonvolatile Memory”, IEEE-ICSICT, The 9th International Conference on Solid-State and Integrated-Circuit Technology, Beijing, October 2008.

“Properties and Applications of Carbon Nanotubes and Other 1D Nanostructures”, Tutorial, Third International Conference on Nano-Networks, Boston, September 2008.

“More Moore and More Than Moore – A Few Approaches to Nanoelectronics”, Condensed Matter Physics Seminar, Tsinghua University, June 2008.

“Ultra-High Density Silicon-Based Crossbar Memory”, Sandisk Corp., Milpitas, CA, January 2008.

“Nanoelectronic Devices”, Micro/Nano Fabrication Workshop, Ann Arbor, October 2007.

“Nanowires for Nanoscience and Nanotechnology”, plenary talk, IEEE Nano2006, Cincinnati, July 2006.

“Semiconductor Nanowires” Applied Physics Seminar, University of Michigan, Ann Arbor, March 2006.

“One-Dimensional Nanowire Heterostructures”, NERS Colloquium, University of Michigan, Ann Arbor, October 2005.

“One-Dimensional Transport in Semiconductor Nanowires”, WIMS Seminar, University of Michigan, Ann Arbor, October 2005.

“One-Dimensional Transport in Nanowire Heterostructures”, Rowland Institute, Harvard University, Cambridge, July 2005.

“One-Dimensional Transport in Semiconductor Nanowires”, AVS Spring Symposium, Michigan Chapter, East Lansing, May 2005.

“One-Dimensional Transport in Nanowire Heterostructures”, Nanotechnology Seminar Series, Purdue University, West Lafayette, April 2005.

“High-Performance Semiconductor Nanowire Devices”, Intel Corp. Hillsboro, March 2005.

“One-Dimensional Transport in Semiconductor Nanowires”, Condensed Matter Seminar, University of California - Berkeley, Berkeley, March 2005.

“Real-time electron counting studies on charge fluctuations in a semiconductor quantum dot”, SPIE, Austin, May 2005.

Conference Presentations

“Nanowire-Based High Speed Transparent and Flexible Thin-Film Transistor Devices”, E. N. Dattoli, K. Baler, W. Lu, MicroNano2008-70328, Hong Kong, June 2008.

“Amorphous Silicon Based Nonvolatile Resistive Switching Crossbar Memory”, S. Jo and W. Lu, MRS Spring Meeting, March 2008, San Francisco, CA.

“Megahertz Frequency Operation of Nanowire-Based Transparent TFT Devices”, E. N. Dattoli, W. Lu, MRS

Spring Meeting, San Francisco, March 2008.

“Microstructure of SnO₂ Nanowire and Field-effect Transistor based on SnO₂ Nanowires,” Y. Chen, X. Pan, Q. Wan, E. N. Dattoli, W. Lu, MRS Fall Meeting, November 2007, Boston, MA.

“Transparent Electronics Based on SnO₂ Nanowires,” E. N. Dattoli, Q. Wan, W. Guo, Y. Chen, X. Pan, and W. Lu, MRS Fall Meeting, November 2007, Boston, MA.

“High-performance Amorphous Si Based Non-volatile Resistive Switching Devices,” S. Jo, and W. Lu, IEEE 8th Annual Non-Volatile Memory Technology Symposium, November 2007, Albuquerque, New Mexico.

“Nonvolatile Resistive Switching Behavior in Metal/Amorphous Silicon/Crystalline Silicon Junctions,” S. Jo, and W. Lu, MRS Spring Meeting, April 2007, San Francisco, CA.

“Versatile Metal Oxide Nanowire Devices Achieved via Controlled Doping,” E. N. Dattoli, Q. Wan and W. Lu, MRS Spring Meeting, April 2007, San Francisco, CA.

“Ag/a-Si:H/c-Si Resistive Switching Nonvolatile Memory Devices,” S. Jo, and W. Lu, IEEE Nanotechnology Materials and Devices Conference 2006, October 2006, Gyeongju, Korea.