Curt A. Richter, Ph.D.
Leader, Nanoelectronics Group
Engineering Physics Division
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PERSONAL DATA: Born April, 26 1965, U.S. Citizen

EDUCATION:

Ph.D., Applied Physics, Yale University, 1993
Thesis Topic: *Transitions in the Quantum Hall Regime*
M.Phil. Applied Physics, Yale University, 1991
M.S., Applied Physics, Yale University, 1990

B.S. The College of William & Mary, 1987
High Honors – Physics; High Honors - Computer Science (double major)

EMPLOYMENT:

Group Leader, Nanoelectronics Group, (2013-present).
National Institute of Standards and Technology (NIST)

- Supervisor of a cutting-edge research team of ~32 Scientists and support staff consisting of 16 NIST Federal Employees (14 Ph.D.) and 16 NIST Associates with an FY17 Budget of $4.7 million.
- Founded NanoElectronics Group.

Project Leader, Nanoelectronic Device Metrology, (2000-2013).
National Institute of Standards and Technology (NIST)

- Lead Team of ~10 Scientists (~8 Ph.D.) to develop metrology for emerging nanoelectronic information processing technologies.
- Founded the NanoElectronic Device Metrology Project.

Physicist, Engineering Physics Division, (1993 - present).
(Formerly the Semiconductor Electronics Division), NIST

- NanoElectronic Test Structure Development, Assessment, and Characterization (2000-Present).
- Electrical Metrology for CMOS Gate Dielectric Thickness (1995-2000).
- Novel magnetic field and quantum mechanical characterization techniques for semiconductor materials and devices. (1993-present).

AWARDS:

- Department of Commerce Bronze Medal Recipient, NIST.
- EEEL Outstanding Authorship Award, NIST (2006).
- National Research Council Associate. NIST (1993-1995)
- USAF Laboratory Graduate Fellow, Yale University (1989-1992)
- Becton Fellow, Yale University (1987)
- Presidential Fellow
- National Merit Scholar

INNOVATIONS IN MEASUREMENT SCIENCE (PRINCIPLE INVESTIGATOR)

- Atom-based Devices: Single Atom Transistors to Solid State Quantum Computing (2015 –>).
- Bridging Measurement Length Scales to Advance Graphene Dev. Technologies (2012-2016).
- Spintronics: Metrology for Beyond-CMOS (2008 -2012).
- Metrology to Enable the Realization of Organic Electronics (2005-2009).
- Molecular electronics (2001-2005) (Co-lead PI).

LEADERSHIP ACTIVITIES:

- Co-Chair of Interagency Coordination Team for the National Nanotechnology Initiative (NNI), National Signature Initiative (NSI): Nanoelectronics for 2020 and Beyond.
- NIST representative for the National Nanotechnology Initiative (NNI), National Signature Initiative (NSI): Nanoelectronics for 2020 and Beyond.
- NNI Grand Challenge for Future Computing Working Group Member.
- Nanoelectronics Research Initiative (NRI) Technical Program Group (TPG) member.
- Executive Committee Member for the NRI's Center for NanoFerroic Devices (CNDF).
- Executive Committee Member for the NRI's Institute for Nanolectronics Discovery and Exploration (INDEX).
- Technical Advisory Board Member for the Semiconductor Research Corporation (SRC).

INTERNATIONAL STANDARDS COMMITTEES:

- ISO US technical expert for ISO/TC 229 JWG 2/PG

CONFERENCE & PROFESSIONAL ORGANIZATION LEADERSHIP:

- International Semiconductor Device Research Conference Symposium (2003-present; Chairman 2011; Technical Chair 2009)
- American Institute of Physics (AIP) Prize Selection Committee
- Invited Session Organizer: Electronic Materials Conference (EMC).
- AIP-FIAP March Meeting 2017 planning session committee.
- Session Chair and Session Organizer for the March Meeting of the American Physical Society.
- IEEE International Reliability Physics Symposium Nanoelectronic Reliability Vice-Chair (2009)
- Symposium Organizer for the Materials Research Society,
- Senior Member of IEEE
- Member of the American Physical Society.

Patents:

1. "Nonvolatile Memory Device and Processing Method." N. Gergel-Hackett, B. Hamadani, C. A. Richter, and D. J. Gundlach, US 9,048,414 B2:, Issued 2 June 2015.
2. "Voltage controlled spin transport channel." Curt A. Richter and Hyuk-Jae Jang, patent number: US 9,548,092 B2 Issued Jan 17, 2017.

TECHNICAL MANUSCRIPTS: (as of September 2017)

Web-of Science:	**Google Scholar**
H-index: 29	H-index: 36
Total papers: 188	Total titles: 335

SELECTED PUBLICATIONS: (FULL LIST APPENDED BELOW)

INVITED "*Organic spin-valves and beyond: spin injection and transport in organic semiconductors and the effect of interfacial engineering,*" Hyuk-Jae Jang, and C. A. Richter, , Advanced Materials, DOI: 10.1002/adma.201602739, 29, 1602739 (15 November 2016).	Cited 4
"Edge-state transport in graphene p-n junctions in the quantum Hall regime," N.N Klimov, S.T. Le, J. Yan, P. Agnihotri, E. Comfort, J.U. Lee, D.B. Newell, and C.A. Richter, Phys. Rev. B 92, 241301(R) (7 Dec 2015)	Cited 9
"Towards clean and crackless transfer of graphene," Xuelei Liang, Brent A. Sperling, Irene Calizo, Guangjun Cheng, Christina A. Hacker, Qin Zhang, Yaw S. Obeng, Kai Yan, Hailin Peng, Qiliang Li, Xiaoxiao Zhu, Hui Yuan, Angela R. Hight Walker, Zhongfan Liu, Lianmao Peng, and Curt A. Richter, ACS Nano VOL. 5 NO. 11 9144–9153 (2011). [NOV 2011]	Cited 416
"*A Flexible Solution-Processed Memristor*," Nadine Gergel-Hackett, Behrang Hamadani, Barbara Dunlap, John Suehle, Curt Richter, Christina Hacker, David Gundlach, *IEEE Electron Device Lett* vol. 30, pp. 706-708, Jul 2009.	Cited 209
"Electrical and spectroscopic characterization of metal/monolayer/Si devices." Richter, C.A., C.A. Hacker, and L.J. Richter, Journal Of Physical Chemistry B, 2005. 109(46): p. 21836-21841.	Cited 66
"Electrical characterization of Al/AlOx/molecule/Ti/Al devices." Richter, C.A., D.R. Stewart, D.A.A. Ohlberg, and R.S. Williams, Applied Physics A-Materials Science & Processing, 2005. 80(6): p. 1355-1362.	Cited 60
"A comparison of quantum-mechanical capacitance-voltage simulators." Richter, C.A., A.R. Hefner, and E.M. Vogel, IEEE Electron Device Letters, 2001. 22(1): p. 35-37.	Cited 89
"New resistivity for high-mobility quantum Hall conductors." McEuen, P.L., A. Szafer, C.A. Richter, B.W. Alphenaar, J.K. Jain, A.D. Stone, R.G. Wheeler, and R.N. Sacks, Physical Review Letters, 1990. 64(17): p. 2062-2065.	Cited 257

PUBLISHED MANUSCRIPTS: FULL LIST: (as of September 2017)

1. *"Molecular beam epitaxy growth and structure of self-assembled Bi2Se3/Bi2MnSe4 multilayer heterostructures,"* J. A. Hagmann, X. Li, S. Chowdhury, S. – N. Dong, S. Rouvimov, S. J. Pookpanratana, K. M. Yu, T. A. Orlova, T. B. Bolin, C. U. Segre, D. G. Seiler, C. A. Richter, X. Liu, M. Dobrowolska, and J. K. Furdyna, New Journal of Physics 19, 085002 (14 August 2017) DOI:10.1088/1367-2630/aa759c/ (WERB ID: 917902).
2. *"Calibration of Bulk Trap-Assisted Tunneling and Shockley-Read-Hall Currents and Impact on InGaAs Tunnel-FETs,"* Quentin Smets, Anne Verhulst, Eddy Simoen, David Gundlach, Curt A. Richter, Nadine Collaert, Marc M. Heyns, IEEE Transactions on Electron Devices PP. 1-5. 10.1109/TED.2017.2724144. (July 2017).
3. *Interacting nanoscale magnetic superatom cluster arrays in molybdenum oxide bronzes."* Joseph A. Hagmann, Son Le, Lynn F. Schneemeyer, Joseph A. Stroscio, Tiglet Besara,Theo Siegrist, Curt A. Richter, David G. Seiler, " Nanoscale 9, 7922 (26 May 2017). WERB #: G2016-1622
4. *"Electrical stabilization of surface resistivity in epitaxial graphene systems by amorphous boron nitride encapsulation."* Albert Rigosi, Chieh-I Liu, Nicholas Glavin, Yanfei Yang, Heather Hill, Jiuning Hu, Angela Hight Walker, Curt Richter, Randolph Elmquist, David Newell, ACS Omega 2 (5), 2326-2332 (May 25, 2017), DOI:10.1021/acsomega.7b00341 PubID 922485.
5. *"Preservation of surface conductivity and dielectric loss tangent in large-scale, encapsulated epitaxial graphene measured by non-contact microwave cavity perturbations."* Albert Rigosi, Nicholas Glavin, Chieh-I Liu, Yanfei Yang, Jan Obrzut, Heather Hill, Jiuning Hu, Hsin Yen Lee, Angela Hight Walker, Curt Richter, Randolph Elmquist, David Newell, Small 13 (26), 1700452 (19 May 2017). 10.1002/smll.201700452 PubID 922696.
6. *"Pulsed I-V on TFETs: Modeling and Measurements."* Quentin Smets, Ji-hong Kim, Jason Campbell, David Nminibapiel, Dmitry Veksler, Pragya Shrestha, Rahul Pandey, Anne Verhulst, Eddy Simoen, David Gundlach, Curt Richter, Charles Cheung, Suman Datta, Anda Mocuta, Nadine Collaert, Aaron V-Y. Thean, Marc M. Heyns, IEEE Transactions on Electron Devices. PP. 1-9. 10.1109/TED.2017.2670660. (March 2017).
7. *"The Influence of Isomer Purity on Trap States and Performance of Organic Thin-Film Transistors,"* P. J. Diemer, J. Hayes, E. Welchman, R. Hallani, S. Pookpanratana, C. A. Hacker, C. A. Richter, J. E. Anthony, T. Thonhauser, and O. D. Jurchescu, Adv. Electron. Mater. 3, 1600294 (Jan 2017) DOI: 10.1002/aelm.201600294 (WERB ID: 921133)
8. *"Reply to Comment on Polymorphism in the organic charge-transfer complex dibenzotetrathiafulvalene-7,7,8,8-tetracyanoquinodimethane (DBTTF-TCNQ) and its effect on optical and electrical properties,"* K. P. Goetz, J. Tsutsumi, S. Pookpanratana, J. Chen, C. A. Richter, C. A. Hacker, T. Hasegawa, and O. D. Jurchescu, Adv. Electron. Mater. 3, 1600521 (2017) (no WERB ID as no new data was introduced in this reply)
9. **INVITED** *"Organic spin-valves and beyond: spin injection and transport in organic semiconductors and the effect of interfacial engineering",* Hyuk-Jae Jang, and C. A. Richter, Advanced Materials, DOI: 10.1002/adma.201602739, 29, 1602739 (15 November 2016). WERB EPR Control #: G2016-1037.
10. *"Calibration of the Effective Tunneling Bandgap in GaAsSb/InGaAs for Improved TFET Performance Prediction."* Quentin Smets, Anne S. Verhulst, Salim El Kazzi, David Gundlach, Curt A. Richter, Anda Mocuta, Nadine Collaert, Aaron Voon-Yew Thean, and Marc M. Heyns, IEEE Transactions on Electron Devices. PP. 1-7. 10.1109/TED.2016.2604860. (ERB Control #: G2016-1299). (Oct 2016).
11. *"Photo-induced magnetic field effects in single crystalline tetracene field-effect transistors"*Hyuk-Jae Jang, E. G. Bittle, Q. Zhang, D. J. Gundlach, and C. A. Richter, , Proceedings of IEEE, International Semiconductor Device Research Symposium 2016, (2017).

12. *"Edge-state transport in graphene p-n junctions in the quantum Hall regime"* N.N Klimov, S.T. Le, J. Yan, P. Agnihotri, E. Comfort, J.U. Lee, D.B. Newell, and C.A. Richter, Phys. Rev. B 92, 241301(R) (7 Dec 2015)
13. "*Redox-Active Molecular Nanowire Flash Memory for High-Endurance and High-Density Nonvolatile Memory Applications"* Hao Zhu, S.J. Pookpanratana, J.E. Bonevich, S.N. Natoli‖, C.A. Hacker, Tong Ren, J.S. Suehle, C.A. Richter, and Qiliang Li, ACS APPLIED MATERIALS & INTERFACES Volume: 7 Issue:49 Pages: 27306-27313 (16 DEC 2015)
14. *"Fe-catalyzed etching of exfoliated graphite through carbon hydrogenation"*Guangjun Cheng, Irene Calizo, C.A. Hacker, C.A. Richter, A.R. Hight Walker, CARBON Volume:96 Pages: 311-315 (JAN 2016).
15. *"Advanced Experimental Methods for Low-Temperature Magnetotransport Measurement of Novel Materials"* J. A. Hagmann, S. T. Le, C.A. Richter, D. G. Seiler, Journal of Visualized Experiments, (21-Jan-2016) (PubID: 918445)
16. *"Non-volatile Memory Devices with Redox-active Diruthenium Molecular Compound"*S. J. Pookpanratana, H. Zhu, E. G. Bittle, S. Natoli, T. Ren, C. A. Richter, Q. Li, C. A. Hacker, Journal of Physics Condensed Matter, Vol. 28, No. 9, a special issue on "Molecular functionalization of surfaces for device applications" (12-Feb-2016)
17. *"Field effects of current crowding in metal-MoS2 contacts"*Hui Yuan, Guangjun Cheng, Sheng Yu, A.R. Hight Walker, C.A. Richter, Minghu Pan, and Qiliang Li, Appl. Phys. Lett. 108, 103505 (10 MAR 2016); http://dx.doi.org/10.1063/1.4942409
18. *"Polymorphism in the 1:1 Charge-Transfer Complex DBTTF–TCNQ and Its Effects on Optical and Electronic Properties"*Katelyn P. Goetz, Jun'ya Tsutsumi, Sujitra Pookpanratana, Jihua Chen, Nathan S. Corbin, Rakesh K. Behera, Veaceslav Coropceanu, Curt A. Richter, Christina A. Hacker, Tatsuo Hasegawa, and Oana D. Jurchescu, Advanced Electronic Materials online: 14 SEP 2016 | DOI: 10.1002/aelm.201600203
19. *"Calibration of the Effective Tunneling Bandgap in GaAsSb/InGaAs for Improved TFET Performance Prediction"*Quentin Smets, Anne S. Verhulst, Salim El Kazzi, David Gundlach, Curt A. Richter, Anda Mocuta, Nadine Collaert, Aaron Voon-Yew Thean, and Marc M. Heyns, IEEE Transactions on Electron Devices (accepted for publication 29 AUG 2016) online September 2016.
20. *"Modifying spin injection characteristics of Co/Alq3 system by using a molecular self-assembled monolayer"*Hyuk-Jae Jang, J.-S Lee, S. J. Pookpanratana, I. C. Tran, C. A. Hacker, and C. A. Richter, , J. Phys. Chem. C 119, 12949 (May 19, 2015). http://pubs.acs.org/doi/abs/10.1021/acs.jpcc.5b01222
21. *"Self-Assembled Monolayers Impact Cobalt Interfacial Structure in NanoElectronic Junctions"*S. Pookpanratana, L. K. Lydecker, C. A. Richter, and C. A. Hacker, J. Phys. Chem. C, 119(12), 6687-6695 (March 26, 2105). http://pubs.acs.org/doi/abs/10.1021/acs.jpcc.5b00816
22. *"Influence of Metal−MoS_2 Interface on MoS_2 Transistor Performance: Comparison of Ag and Ti Contacts,"* H. Yuan, G. Cheng, L. You, H. Li, H. Zhu, W. Li, J. J. Kopanski, Y. S. Obeng, A. R. Hight Walker, D. J. Gundlach, C. A. Richter, D. E. Ioannou, and Q. Li, ACS Applied Materials and Interfaces, Jan 21, 2015, DOI: 10.1021/am506921y.
23. *"Making Contact to Molecular Layers: Linking Large Ensembles of Molecules to the Outside World,"* C. A. Hacker, S. Pookpanratana, M. Coll, and C. A. Richter, Book title: Molecular Electronics: An Experimental and Theoretical Approach editor: Ioan Baldea Pan Stanford Publishing, 2015",Hardcover ISBN 978-981-4613-90-3. Invited Book Chapter, (2015).
24. *"Polarization of Bi2Te3 thin film in a floating-gate capacitor structure,"*Hui Yuan, Kai Zhang, Haitao Li, Hao Zhu, John E. Bonevich, Helmut Baumgart, Curt A. Richter, and Qiliang Li, Appl. Phys. Lett. 105, 233505 (Dec 8, 2014). http://dx.doi.org/10.1063/1.4904003

25. *"Electron and Hole Photoemission Detection for Band Offset Determination of Tunnel Field-Effect Transistor Heterojunctions,"*W. Li, Q. Zhang, R. Bijesh, O. A. Kirillov, Y. Liang, I. Levin, L-M. Peng, C. A. Richter, X. Liang, S. Datta, D. J. Gundlach, and N. V. Nguyen, Applied Physics Letters, vol. 105, 213501, November 24, 2014.

26. *"Broad Band Optical Properties of Large Area Monolayer CVD Molybdenum Disulfide,"*W. Li, A. G. Birdwell, M. Amani, R. A. Burke, X. Ling, Y-H. Lee, X. Liang, L. Peng, C. A. Richter, J. Kong, D. J. Gundlach, N. V. Nguyen, Physics Review B, vol. 90, 195434, November 21, 2014.

27. *"Gate assisted Kelvin test structure to measure the electron and hole flows at the same nanowire contacts,"*H. Yuan, A. Z. Badwan, C. A. Richter, H. Zhu, O. Kirillov, D. E. Ioannou and Q. Li, Appl. Phys. Lett. 105, 133513 (Oct 2014). http://dx.doi.org/10.1063/1.4897008

28. *"Carbon scrolls from chemical vapor deposition grown graphene."*Cheng, G., Calizo, I., Liang, X., Sperling, B.A., Maslar, J. Richter, C.A., Hight Walker, A. R., Carbon, 76,Pages 257–265, DOI: 10.1016/j.carbon.2014.04.076 [September 2014]

29. *"Attachment of a Diruthenium Compound to Au and SiO2/Si Surfaces by "Click"*S. Pookpanratana, J. W. F. Robertson, C. A. Richter, C. A. Hacker, L. J. Richter, J. Savchenko, S. N. Natoli, S. P. Cummings, and T. Ren, Chemistry," Langmuir 30, 10280-10289 (2014). [(Web): August 10, 2014]. http://pubs.acs.org/doi/abs/10.1021/la501670c

30. *"Optimum band gap and supply voltage in tunnel FETs,"* Qin Zhang, Yeqing Lu, Curt A. Richter, Debdeep Jena, and Alan Seabaugh, IEEE TRANSACTIONS ON ELECTRON DEVICES, VOL. 61, NO. 8, [AUGUST 2014.] 10.1109/TED.2014.2330805

31. H. Li, H. Zhu, H. Yuan, L. You, C. A. Richter, J. J. Kopanski, E. Zhao and Q. Li, "SnTe Field Effect Transistors and the Anomalous Electrical Response of Structural Phase Transition," Appl. Phys. Lett. 105, 013503 (published online 7 July 2014) http://dx.doi.org/10.1063/1.4887055

32. *"Interface engineering to control magnetic field effects of organic-based devices by using a molecular self-assembled monolayer,"* Hyuk-Jae Jang, S. J. Pookpanratana, A. N. Brigeman, R. J. Kline, J. I. Basham, D. J. Gundlach, C. A. Hacker, O. A. Kirillov, O. D. Jurchescu, and C. A. Richter, ACS Nano, 8, 7192-7201 (2014). [(Web): June 26, 2014] http://pubs.acs.org/doi/abs/10.1021/nn502199z.

33. *"Discrete charge states in nanowire flash memory with multiple Ta2O5 charge-trapping stacks,"* Hao Zhu, John E. Bonevich, Haitao Li, Curt A. Richter, Hui Yuan, Oleg Kirillov, Qiliang Li, *Appl. Phys. Lett.*, 104, 233504 (2014) [published online 11 June 2014)] . http://dx.doi.org/10.1063/1.4883717.

34. *"Highly reproducible and reliable metal/graphene contact by UV-Ozone treatment."* Li, W., Hacker, C.A., Cheng, G., Liang, Y., Tian, B., Hight Walker, A. R., Richter, C.A., Gundlach, D.J., Liang, X., Peng, L. *J. Appl. Phys.* 115: 114304 (March 2014).

35. *"Self-assembled nanowire array capacitors: capacitance and interface state profile*," Q. Li, H. D. Xiong, X. Liang, X. Zhu, D. Gu, D. E. Ioannou, H. Baumgart, C. A. Richter, Nanotechnology 25, 135201 (Feb 28, 2014).

36. *"Demonstration of In0.9Ga0.1As/GaAs0.18Sb0.82 Near Broken-gap Tunnel FET with ION=740μA/μm, GM=700μS/μm and Gigahertz Switching Performance at VDS=0.5V,"* R. Bijesh, H. Liu, H. Madan, D. Mohata, W. Li, N. V. Nguyen, D. Gundlach, C. A. Richter, J. Maier, K. Wang, T. Clarke, J. M. Fastenau, D. Loubychev, W. K. Liu, V. Narayanan and S. Datta, 2013 International Electron Devices Meeting Digest, pp. 28.2.1 - 28.2.4, [December 2013].

37. *"Design and Fabrication of Ta2O5 Stacks for Discrete Multibit Memory Application,"* Hao Zhu, Hui Yuan, Haitao Li, CA Richter, OA Kirillov, DE Ioannou, Qiliang Li, IEEE TRANSACTIONS ON NANOTECHNOLOGY 12, 6, pp. 1151-1157, DOI: 10.1109/TNANO.2013.2281817 (NOV 2013).

38. *"Non-volatile memory with self-assembled ferrocene charge trapping layer,"* H. Zhu, C. A. Hacker, S. J. Pookpanratana, C. A. Richter, H. Yuan, H. Li, O. Kirillov, D. E. Ioannou, and Q. Li, *Appl. Phys. Lett*. 103, 053102 (July 2013).

39. *"UV/Ozone Treatment to Reduce Metal-Graphene Contact Resistance,"* W. Li, Y. Liang, D. Yu, L. Peng, K. P. Pernstich, T. Shen, A. R. Hight Walker, G. Cheng, C. A. Hacker, C. A. Richter, Q.Li, D. J. Gundlach, and X. Liang, Applied Physics Letters, vol. 102, 183110, May 2013

40. *"Graphene as transparent electrode for direct observation of hole photoemission from silicon to oxide,"* R. Yan, Q. Zhang, O. A. Kirillov, W. Li,J. Basham, A. Boosalis, X. Liang, D. Jena, C. A. Richter, A. C. Seabaugh, D. J. Gundlach, H. G. Xing, and N. V. Nguyen, Applied Physics Letters, vol. 102, 123106, May 2013.

41. *"Topological insulator Bi2Se3 nanowire high performance field-effect transistors,"* Zhu H, Richter C.A., Zhao E., Bonevich J.E., Kimes W.A., Jang H.J., Yuan H., Li H., Arab A., Kirillov O., Maslar J.E., Ioannou D.E., Li Q., Nature Scientific Reports 3, 1757, April 30, 2013.

42. *"Physical and Electrical Characterization of Bilayer Carboxylic Acid Functionalized Molecular Layers,"* S. Pookpanratana, J. W. F. Robertson, C. Jaye, D. A. Fischer, C. A. Richter, and C. A. Hacker, *Langmuir* 29, 2083, 29, 2083−2091 (dx.doi.org/10.1021/la304225m). (Jan. 30, 2013).

43. *"Direct measurement of Dirac Point Energy at the Graphene/Oxide Interface,"* K. Xu, C. Zeng, Q. Zhang, P. Ye, K. Wang, A. C. Seabaugh, R. Yan, G. Xing, J. S. Suehle, C. A. Richter, D. Gundlach, and N. V. Nguyen, Nano Letters, vol. 13, n. 1, pp. 131-136, January 2013

44. *"A Unique Approach to Measure Narrow Heterojunction Band Offsets of InAs/AlGaSb Tunnel Field Effect Transistors,"* Q. Zhang, R. Li, R. Yan, T. Kosel, H. G. Xing, A. C. Seabaugh, K. Xu, O. A. Kirillov, D. J. Gundlach, C. A. Richter, and N. V. Nguyen, Applied Physics Letters, vol. 102, 012101, January 2013.

45. *"Single-Nanowire CMOS Inverter Based on Ambipolar Si Nanowire FETs,"* Hui Yuan, Qiliang Li, Hao Zhu, Haitao Li, Dimitris Ioannou and Curt A. Richter, ECS Trans. 2013 volume 50 ,issue 6, 151-156 (2012).

46. *"Metrology for Organic Monolayers on Cobalt Surfaces,"* S. Pookpanratana, L. K. Lydecker, H.-J. Jang, **C. A. Richter,** and C. A. Hacker, 2013 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics Proceeding (2013).

47. *"Observation of spin-polarized electron transport in Alq3 by using a low work function metal",* Hyuk-Jae Jang, K. P. Pernstich, D. J. Gundlach, O. D. Jurchescu, and C. A. Richter, Appl. Phys. Lett. 101, 102412 (2012).

48. *"Switching Mechanisms in Flexible Solution-Processed TiO2 Memristors,"* J.L. Tedesco, L. Stephey, M. Hernández-Mora, C.A. Richter, and N. Gergel-Hackett, Nanotechnology 23, 305206 (2012). [note: selected as a "Recommended Readers Article"] [AUG 3 2012]

49. *"Determination of graphene work function and graphene-insulator-semiconductor band alignment by internal photoemission spectroscopy,"*Rusen Yan, Qin Zhang, Wei Li, Irene Calizo, Tian Shen, Curt A. Richter, Angela R. Hight-Walker, Xuelei Liang, Alan Seabaugh, Debdeep Jena, Huili Grace Xing, David J. Gundlach, and N. V. Nguyen, *Appl. Phys. Lett.*, **101**, 022105, (2012). DOI: 10.1063/1.4734955 [JUL 9 2012].

50. *"Tunnel FET Heterojunction Band Alignment by Internal Photoemission Spectroscopy,"* Q. Zhang, G. Zhou, H. G. Xing, A. C. Seabaugh, K. Xu, S. Hong, O. A. Kirillov, C. A. Richter, and N. V. Nguyen, Appl. Phys. Lett., vol 100, Is: 10 102104 (2012) DOI: 10.1063/1.3692589. [MAR 5 2012]

51. *"Spin transport in memristive devices,"* Hyuk-Jae Jang, Oleg A. Kirillov, Oana D. Jurchescu, and Curt A. Richter, Appl. Phys. Lett. 100, 043510 (2012); doi: 10.1063/1.3679114. [JAN 23 2012]

[note: also selected for the February 6, 2012 issue of Virtual Journal of Nanoscale Science & Technology. http://www.vjnano.org/]

52. *"Structural and electrical properties of Flip Chip Laminated metal-molecule-silicon structures varying molecular backbone and atomic tether,"* Mariona Coll, Nadine Gergel-Hackett, Curt A. Richter, Christina A. Hacker, *J. Phys. Chem. C*, 115 (49), pp 24353–24365 (2011). [DEC 15 2011]

53. *"Quantum Hall effect on centimeter scale chemical vapor deposited graphene films,"* Tian Shen, Wei Wu, Qingkai Yu, Curt A. Richter, Randolph Elmquist,David Newell, and Yong P. Chen, Appl. Phys. Lett. 99, 232110 (2011). [DEC 5 2011]

54. *"Towards clean and crackless transfer of graphene,"* Xuelei Liang, Brent A. Sperling, Irene Calizo, Guangjun Cheng, Christina A. Hacker, Qin Zhang, Yaw S. Obeng, Kai Yan, Hailin Peng, Qiliang Li, Xiaoxiao Zhu, Hui Yuan, Angela R. Hight Walker, Zhongfan Liu, Lianmao Peng, and Curt A. Richter, ACS Nano VOL. 5 NO. 11 9144–9153 (2011). [NOV 2011]

55. **Invited** *"Memristors With Flexible Electronic Applications,"* Gergel-Hackett, N.; Tedesco, J. L.; and Richter, C. A.; Proceedings of the IEEE , **100**, 1971 (2012).

56. *"Self-aligned multi-channel silicon nanowire field-effect transistors*," Hao Zhu, Qiliang Li, Hui Yuan, Helmut Baumgart, D.E. Ioannou,

57. **Featured Cover Article. (invited)** *"Fabrication, characterization and simulation of high performance Si nanowire-based non-volatile memory cells,"* Xiaoxiao Zhu; Qiliang Li; DE Ioannou,; Diefeng Gu; JE Bonevich, H Baumgart, JS Suehle, CA Richter, *Nanotechnology*, vol. 22, 254020 (8 pp.) June 2011.

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2. **INVITED** Curt A. Richter, "Future Computing Research at NIST: An Overview," Future Computing Grand Challenge Interagency Meeting, Ballston, VA (August 2017).
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5. Joseph A. Hagmann, Xiqiao Wang, Pradeep Namboodiri, Jonathan Wyrick, Roy Murray, M. D. Stewart Jr., Richard M. Silver, Curt A. Richter, "Towards single atom devices for quantum information and metrology: weak localization in embedded phosphorus delta layers in silicon", 59th Electronic Materials Conference 2017, Jun 28-30, 2017, Notre Dame, IN WERB #: G2017-0964.
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22. **INVITED** Emily G. Bittle, "Complications in Organic Transistor Characterization" International Semiconductor Device Research Symposium, Bethesda, MD, December 2016 ERB # G2017-1683
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38. S. Pookpanratana, K. Goetz, C. A. Richter, O. Jurcheschu, C. A. Hacker, "Interplay of Interfaces on Electronic Structure in Charge Transfer Salts," MRS Fall 2015 Meeting, (1 December 2015).
39. **INVITED** Christina Hacker, Sujitra Pookpanratana, Hyuk-Jae Jang, Curt Richter, "Interfacial Engineering to Enhance Spin Injection into an Organic Semiconductor from a Ferromagnetic Metal" 9th Scientific TMS Workshop Towards Molecular Spintronics, Dresden Germany, (Nov. 2015).
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42. C. A. Richter, H. –J. Jang, S. Pookpanratana, J. –S. Lee, C. A. Hacker, and D. J. Gundlach, "Interfacial engineering to enhance spin injection into an organic semiconductor from a ferromagnetic metal" 13th European Conference on Molecular Electronics (ECME), September 2015, Strasbourg France.
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48. Christina A. Hacker, Sujitra Pookpanratana, Leigh K. Lydecker, Curt A Richter, "Impact Of Self-assembled Monolayers On (Oxidized) Cobalt For Si-based Molecular Electronic Junctions," ACS 249th National meeting, Denver, Colorado, March 25, 2015.
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