Jeffrey Bokor, Ph.D.

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Expertise

- Electronics
- Nanofabrication
- Nanotechnology
- Electronic Device Physics
- Nanomagnetics and Spintronics
- Optics and Optoelectronics
- Photonics
- Semiconductor Physics
- Semiconductor Process
- Integrated Circuit Technology

Professional Summary

Education

Year	College/University	Degree
1980	Stanford University	Ph.D., Electrical Engineering
1976	Stanford University	MS, Electrical Engineering
1975	Massachusetts Institute of Technology	BS, Electrical Engineering

Employment History

From: 1993 University of California, Department of Electrical Engineering and Computer Science
To: Present Berkeley, CA
Position: Professor

- Associate Dean for Research, College of Engineering: 2012-present
- Joint Appointment: 2008-present, Senior Scientist, Lawrence Berkeley National Laboratory
- Joint Appointment: 2004-2012, Deputy Director for Science, The Molecular Foundry, Lawrence Berkeley National Laboratory
- Joint Appointment: 1993-2004, Group Leader for Advanced Lithography, Center for X-ray Optics, Lawrence Berkeley National Laboratory

Current research interests:

- Ultrafast spin dynamics
- Spintronics
- Carbon electronics

Classroom teaching:

- Undergraduate and graduate courses in semiconductor physics

and technology
- Undergraduate and graduate courses in optical physics and engineering
- Freshman seminar introduction to electrical engineering

From: 1980 AT&T, Bell Laboratories
To: 1993 Holmdel and Murray Hill, NJ

Position:

1990-93 Ultra-Large Scale Integrated Circuits (ULSI) Technology Research Department. Department Head. Murray Hill, NJ Leader of group of 15 Ph.D. scientists, 35 total technical personnel. Responsible for directing research to create technologies relevant to silicon IC manufacturing in the year 2000. Also responsible for continuing improvement and operation of 20,000 sq. ft. Class 100 research cleanroom facility. Experience included:
- ULSI Process integration
- Deep sub-micron silicon MOSFET device physics
- Device and circuit design
- Advanced process and device modeling software
- Advanced lithography

1987-90 Laser Science Research Department. Department Head, Holmdel, NJ. Leader of group of 10 Ph.D. scientists, 20 total technical personnel. Managed diverse program of basic research in optical physics. Conducted high visibility research program, including:
- X-ray lithography
- Nonlinear optics
- Picosecond optoelectronics
- Femtosecond phenomena in electronic materials
- Fiber optics
- Atomic physics

1980-87 Quantum Electronics Research Department. Member of Technical Staff, Holmdel, NJ. Independently directed basic research, including:
- Nonlinear optics
- Picosecond optoelectronics
- Semiconductor device physics
- Ultraviolet laser technology

Major Research Accomplishments (1980-Present)

- Experimental demonstration of the ultimate lowest switching energy set by fundamental physics (Landauer's principle) in single-bit operations on nanomagnetic memory bits (2016)
- Demonstration of spin transfer torque switching in sub-10 nm size magnetic tunnel junctions (2016)
- Demonstration of fluid-suspended magnetic particle manipulation using multiferroic magnetic actuation (2015)

- Direct optical detection of current induced spin accumulation in non-magnetic metals (2015)
- Demonstration of sub-nsec signal propagation in nanomagnetic logic (2015)
- Electric field control of magnetic domain walls for manipulation of magnetic particles in microfluidics (2014)
- High performance nanoscale solution processed carbon nanotube transistors (2013)
- Bottom-up chemically synthesized graphene nanoribbon transistors (2013)
- Nanoscale hyperspectral imaging with tapered plasmonic “Campanile” tip (2012)
- Demonstration of nanomagnetic logic signal propagation (2012)
- Demonstration of fundamental thermodynamic limit of energy dissipation in magnetic memory and logic (2011)
- Demonstration of bandgap and sub-band formation in graphene nanomesh superlattice transistors (2010)
- Self-assembly of gold nanoparticle chain structures for nanophotonics using DNA origami (2010)
- Measurement of Schottky contact junction capacitance, doping profiles and carrier mobility in single semiconductor nanowire and carbon nanotube transistors using ultrasensitive C-V measurements (2009)
- Label-free DNA biosensors using functionalized carbon nanotube transistors (2009)
- Directed assembly of nanophotonic device structure using DNA nanotechnology (2009)
- Theory of spin-dependent scattering in silicon MOSFET transistors (2009)
- Proposed new concepts for nanomagnetic logic technology (2008)
- Study of spin-dependent scattering from impurity donors in silicon MOSFETs for use in quantum computing (2007)
- Measurement of spin coherence of antimony donors in silicon near silicon dioxide interfaces (2006)
- First observation of Stark tuning of donor electron spins in silicon, a key step towards implementation of quantum logic in silicon technology (2006)
- First monolithic integrated circuit with both carbon nanotube and silicon MOS transistors (2004)
- Development of a monolithic inkjet printhead array capable of sub-3 μm droplet generation (2004)
- Study of surface and bulk acoustic phonon excitations in superlattices using picosecond ultrasonics (2003)
- Invention and demonstration of “spacer lithography”, a sub-10 nm patterning technology for nano-catalysts and DNA label-free hybridization detection (2003)
- Development of 10 nm gate-length MOSFET devices (2002)
- Demonstration of extreme ultraviolet lensless Fourier transform holography (2001)
- Demonstration of 30 nm lithography using extreme ultraviolet radiation (2001)
- Demonstration of aberration testing and alignment optimization of a commercial prototype four-mirror ring field extreme ultraviolet optical system using at-wavelength interferometry (2000)
- Development of complementary silicide source/drain technology for sub-20 nm MOSFET devices (2000)

- Development of picosecond ultrasonic characterization of Mo/Si extreme ultraviolet multilayer reflectors (1999)
- Development of 17 nm gate-length FinFET devices (1999)
- First demonstration of the “FinFET”, a manufacturable double-gate MOSFET with 25 nm gate-length (1998)
- Development of at-wavelength defect detection metrology for extreme ultraviolet lithography (1998)
- Co-invention and demonstration of the phase-shifting, point diffraction interferometer, and application to high-accuracy wavefront metrology of extreme ultraviolet lithography optics (1996)
- First demonstration of working MOS devices fabricated with extreme ultraviolet lithography (1996)
- Direct, quantitative measurement of saturation velocity and overshoot velocity in MOS inversion layers (1994)
- Demonstration of interferometry at extreme ultraviolet wavelengths for characterization of lithography optics (1994)
- First direct observation of non-thermal energy distributions and thermalization dynamics in laser-excited metal films (1992)
- Development of 89 GHz f T Si MOSFET transistors with 0.15 mm channel length (1992)
- First feasibility demonstration of diffraction-limited extreme ultraviolet projection lithography (1990)
- First direct observation of surface state kinetics during semiconductor surface recombination (1989)
- Invention and demonstration of the coplanar vacuum photodiode, an ultrafast, high sensitivity photodetector for the visible and ultraviolet (1987)
- First demonstration of time-resolved photoemission for measurement of picosecond electronic signals in integrated circuits (1986)
- First direct detection of band-gap states at GaAs Schottky barrier interfaces (1986)
- Application of time-resolved photoemission to the first measurement of picosecond electron dynamics on InP, GaAs, and Si surfaces (1985)
- Invention and demonstration of picosecond time-resolved ultraviolet photoemission spectroscopy for the study of electron dynamics at semiconductor surfaces (1985)
- Development of a source of 35.5 nm coherent radiation by seventh harmonic generation in a pulsed jet. At the time, this was the shortest wavelength source of coherent radiation yet demonstrated (1983)
- Invention of the pulsed jet harmonic generator for the production of extreme ultraviolet coherent radiation (1983)
- First picosecond pulse krypton-fluoride excimer laser (1982)
- First demonstration of an autoionization pumped laser (1982)
- High resolution two-photon spectroscopy in molecular Hydrogen (1981)
- First third harmonic generation using an excimer laser (1980)
- Development of the first tunable, single-mode excimer laser system (1980)
- 16 μm wavelength NH_3 gas laser by two-photon pumping using 10 μm wavelength CO_2 laser (1979)

Patents

1. Thomas Schenkel, Cheuk Chi LO, Christoph Weis, Stephen Lyon, Alexei Tyryshkin, Jeffrey Bokor, "Scalable quantum computer architecture with coupled donor-quantum dot qubits," US 8, 816,325 B2, August 2014
2. Brian Lambson, Zheng Gu, David Carlton, Jeffrey Bokor, "Concave nanomagnets with widely tunable anisotropy," US 8,766,754 B2, July 2014
3. Ji Zhu, Jeff Grunes, Yang-Kyu Choi, Jeffrey Bokor, Gabor Somorjai, "Methods for Fabrication of Positional and Compositionally Controlled Nanostructures on Substrate," US 8,486,287 B2, July 2013
4. Jeffrey Bokor, Nathan C. Emley, David Carlton, "Nanomagnetic signal propagation and logic gates," US 8,134,441 B1, March, 2012
5. David Carlton, Nathan C. Emley, Jeffrey Bokor, "Nanomagnetic Register," US 8,138,874 B1, March, 2012
6. Jeffrey Bokor, Patrick Naulleau, "System For Interferometric Distortion Measurements That Define An Optical Path," US 6,559,952 B1, May, 2003
7. Jeffrey Bokor, Yun Lin, "Method And Apparatus For Inspecting Reflection Masks For Defects," US 6,555,828 B1, April, 2003
8. Jeffrey Bokor, Seongtae Jeong, "Multi-Level Scanning Method for Defect Inspection," US 6,484,306 B1, November 2002
9. Chenming Hu, Tsu-Jae King, Vivek Subramanian, Leland Chang, Xuejue Huang, Yang-Kyu Choi, Jakub Tadeusz Kedzierski, Nick Lindert, Jeffrey Bokor, Wen-Chin Lee, "FINFET Transistor Structures having a Double Gate Channel Extending Vertically From a Substrate and Methods of Manufacture," US 6,413,802 B1, July 2002
10. Jeffrey Bokor, Anthony M. Johnson, "High Speed Photodetector Having Dual Transmission Line Geometry," US 4,933,542 A, June 1990
11. Jeffrey Bokor, Anthony M. Johnson, Ralph H. Storz, "High Speed Circuit Measurements Using Photoemission Sampling," US 4,721,910 A, January, 1988

Professional Associations, Service, and Awards

- Fellow, Optical Society of America
- Fellow, American Physical Society
- Fellow, Institute of Electronics and Electrical Engineers
- Senior Scientist, Lawrence Berkeley National Laboratory
- American Association for the Advancement of Science
- Paul R. Gray Distinguished Professorship in Electrical Engineering and Computer Sciences, 2015-present
- National Semiconductor Distinguished Professorship in Engineering, University of California, 2007-2015
- Deputy Director, Center for Energy Efficient Electronic Science, an NSF Science and Technology Center headquartered at Berkeley, 2010-present.
- Co-Chair, 3rd Berkeley Symposium on Energy Efficient Electronic Systems, 2013
- Co-Chair, 2nd Berkeley Symposium on Energy Efficient Electronic Systems, 2011
- Co-Chair, 1st Berkeley Symposium on Energy Efficient Electronic Systems, 2009

- Scientific Advisory Committee, Advanced Light Source, Lawrence Berkeley National Laboratory, 2006-2010
- Scientific Advisory Board, Catalan Institute for Nanoscience (ICN), Autonomous University of Barcelona, 2007-present
- IEEE Paul Rappaport Award for best paper of the year published in Electron Device Society journals, 2002
- DARPA Most Significant Technical Accomplishment Award, 2000
- Program Committee, CMOS devices, International Electron Devices Meeting, 1999-2000
- Scientific Advisory Committee, Advanced Light Source, Lawrence Berkeley National Laboratory, 1998-2002
- Technical Advisory Committee, Laser Science and Technology Program, Lawrence Livermore National Laboratory, 1996-1997
- General Co-chair, Quantum Electronics and Laser Science Conference, Baltimore, MD, 1997
- Program Committee, Topical Meeting on Extreme Ultraviolet Lithography, Boston, MA, 1996
- Users Executive Committee, Advanced Light Source, Lawrence Berkeley National Laboratory, 1994-1998
- Program Co-chair, Quantum Electronics and Laser Science Conference, Baltimore, MD, 1995
- Technical Council, Optical Society of America, 1991-1994
- Chairman, Technical Group on X-ray and XUV Physics, Optical Society of America, 1991-1994
- Program Committee, Topical Meeting on Soft X-ray Projection Lithography, Monterey, CA, April, 1992
- Cochairman, Topical Meeting on Soft X-ray Projection Lithography, Monterey, CA, April, 1991
- Cochairman, Topical Meeting on Short Wavelength Coherent Radiation, Generation and Applications, Monterey, CA, March, 1986
- Program Committee, Conference on Lasers and Electro-Optics (CLEO) ‘84, Anaheim, CA, June, 1984
- Program Committee, Topical Meeting on Laser Techniques in the Extreme Ultraviolet, Boulder, CO, March, 1984
- Program Committee, Topical Meeting on Excimer Lasers, Lake Tahoe, NV, January, 1983
- Program Committee, Topical Meeting on Laser Techniques for Extreme Ultraviolet Spectroscopy, Boulder, CO, March 1982

Publications

1. Y. Kang, J. Bokor, and V. Stojanovic, "Design Requirements for a Spintronic MTJ Logic Device for Pipelined Logic Applications," IEEE Transactions on Electron Devices, vol. 63, pp. 1754-1761, 2016.
2. J. Hong, B. Lambson, S. Dhuey, and J. Bokor, "Experimental test of Landauer's principle in single-bit operations on nanomagnetic memory bits," Science Advances, vol. 2, e1501492, 2016.
3. J. Hong, A. Hadjikhani, M. Stone, P. Liang, F. Allen, V. Safonov, J. Bokor, and S. Khizroev, "The Physics of Spin-transfer Torque Switching in Magnetic Tunneling Junctions in Sub-10-nm Size Range," IEEE Transactions on Magnetics, vol. PP, pp. 1-1, 2016.
4. L. You, O. Lee, D. Bhowmik, D. Labanowski, J. Hong, J. Bokor, and S. Salahuddin, "Switching of perpendicularly polarized nanomagnets with spin orbit torque without an external magnetic field by engineering a tilted anisotropy," *Proceedings of the National Academy of Sciences*, vol. 112, pp. 10310-10315, August 18, 2015 2015.
5. H. Sohn, M. E. Nowakowski, C.-y. Liang, J. L. Hockel, K. Wetzlar, S. Keller, B. M. McLellan, M. A. Marcus, A. Doran, A. Young, M. Kläui, G. P. Carman, J. Bokor, and R. N. Candler, "Electrically Driven Magnetic Domain Wall Rotation in Multiferroic Heterostructures to Manipulate Suspended On-Chip Magnetic Particles," *ACS Nano*, vol. 9, pp. 4814-4826, 2015/05/26 2015.
6. A. Pattabi, Z. Gu, J. Gorchon, Y. Yang, J. Finley, O. J. Lee, H. A. Raziq, S. Salahuddin, and J. Bokor, "Direct optical detection of current induced spin accumulation in metals by magnetization-induced second harmonic generation," *Applied Physics Letters*, vol. 107, p. 152404, 2015.
7. Y. Lee, Z. Q. Liu, J. T. Heron, J. D. Clarkson, J. Hong, C. Ko, M. D. Biegalski, U. Aschauer, S. L. Hsu, M. E. Nowakowski, J. Wu, H. M. Christen, S. Salahuddin, J. B. Bokor, N. A. Spaldin, D. G. Schlom, and R. Ramesh, "Large resistivity modulation in mixed-phase metallic systems," *Nat Commun*, vol. 6, 01/07/online 2015.
8. Z. Gu, R. Storz, M. Marcus, A. Doran, A. Young, A. Scholl, W. Chao, D. Carlton, B. Lambson, M. Nowakowski, and J. Bokor, "Time-Resolved Photo-Emission Electron Microscopy of Nanomagnetic Logic Chains," in *Ultrafast Magnetism I*. vol. 159, J. Y. Bigot, W. Hubner, T. Rasing, and R. Chantrell, Eds., Cham: Springer Int Publishing Ag, 2015, pp. 281-283.
9. Z. Gu, M. E. Nowakowski, D. B. Carlton, R. Storz, M.-Y. Im, J. Hong, W. Chao, B. Lambson, P. Bennett, M. T. Alam, M. A. Marcus, A. Doran, A. Young, A. Scholl, P. Fischer, and J. Bokor, "Sub-nanosecond signal propagation in anisotropy-engineered nanomagnetic logic chains," Nat Commun, vol. 6, 03/16/online 2015.
10. S.-J. Choi, P. Bennett, D. Lee, and J. Bokor, "Highly uniform carbon nanotube nanomesh network transistors," *Nano Research*, vol. 8, pp. 1320-1326, 2015/04/01 2015.
11. H. Sohn, M. E. Nowakowski, C.-Y. Liang, J. L. Hockel, K. Wetzlar, S. Keller, B. M. McLellan, M. A. Marcus, A. Doran, A. Young, M. Kläui, G. P. Carman, J. Bokor, and R. N. Candler, "Electrically Driven Magnetic Domain Wall Rotation in

Multiferroic Heterostructures to Manipulate Suspended On-Chip Magnetic Particles," *ACS Nano*, vol. 9, pp. 4814-4826, 2015.

12. Y. Lee, Z. Q. Liu, J. T. Heron, J. D. Clarkson, J. Hong, C. Ko, M. D. Biegalski, U. Aschauer, S. L. Hsu, M. E. Nowakowski, J. Wu, H. M. Christen, S. Salahuddin, J. B. Bokor, N. A. Spaldin, D. G. Schlom, and R. Ramesh, "Large resistivity modulation in mixed-phase metallic systems," *Nat Commun*, vol. 6, 01/07/online 2015.
13. Z. Gu, R. Storz, M. Marcus, A. Doran, A. Young, A. Scholl, W. Chao, D. Carlton, B. Lambson, and M. Nowakowski, "Time-Resolved Photo-Emission Electron Microscopy of Nanomagnetic Logic Chains," *in Ultrafast Magnetism I*: Springer, 2015, pp. 281-283.
14. Z. Gu, M. E. Nowakowski, D. B. Carlton, R. Storz, M.-Y. Im, J. Hong, W. Chao, B. Lambson, P. Bennett, M. T. Alam, M. A. Marcus, A. Doran, A. Young, A. Scholl, P. Fischer, and J. Bokor, "Sub-nanosecond signal propagation in anisotropy-engineered nanomagnetic logic chains," *Nat Commun*, vol. 6, 03/16/online 2015.
15. A. R. Schmidt, E. Henry, C. C. Lo, Y. T. Wang, H. Li, L. Greenman, O. Namaan, T. Schenkel, K. B. Whaley, J. Bokor, E. Yablonovitch, and I. Siddiqi, "A prototype silicon double quantum dot with dispersive microwave readout," *Journal of Applied Physics*, vol. 116, p. 044503, Jul 2014.
16. C. C. Lo, S. Simmons, R. Lo Nardo, C. D. Weis, A. M. Tyryshkin, J. Meijer, D. Rogalla, S. A. Lyon, J. Bokor, T. Schenkel, and J. J. L. Morton, "Stark shift and field ionization of arsenic donors in Si-28-silicon-on-insulator structures," *Applied Physics Letters*, vol. 104, p. 193502, May 2014.
17. D. Lee, M. L. Seol, D. I. Moon, P. Bennett, N. Yoder, J. Humes, J. Bokor, Y. K. Choi, and S. J. Choi, "High-performance thin-film transistors produced from highly separated solution-processed carbon nanotubes," *Applied Physics Letters*, vol. 104, p.143508, Apr 2014.
18. T. Schenkel, C. C. Lo, C. D. Weis, J. Bokor, A. M. Tyryshkin, and S. A. Lyon, "A Spin Quantum Bit Architecture with Coupled Donors and Quantum Dots in Silicon," *in Single-Atom Nanoelectronics*, E. Prati and T. Shinada, Eds., 2013, pp. 255-279.
19. C. C. Lo, C. D. Weis, J. van Tol, J. Bokor, and T. Schenkel, "All-Electrical Nuclear Spin Polarization of Donors in Silicon," *Physical Review Letters*, vol. 110, p. 57601, Jan 2013.
20. B. Lambson, Z. Gu, M. Monroe, S. Dhuey, A. Scholl, and J. Bokor, "Concave nanomagnets: investigation of anisotropy properties and applications to nanomagnetic logic," *Applied Physics A-Materials Science & Processing*, vol. 111, pp. 413-421, May 2013.
21. S. J. Choi, P. Bennett, K. Takei, C. Wang, C. C. Lo, A. Javey, and J. Bokor, "Short-Channel Transistors Constructed with Solution-Processed Carbon Nanotubes," *ACS Nano*, vol. 7, pp. 798-803, Jan 2013.
22. P. B. Bennett, Z. Pedramrazi, A. Madani, Y.-C. Chen, D. G. de Oteyza, C. Chen, F. R. Fischer, M. F. Crommie, and J. Bokor, "Bottom-up graphene nanoribbon field effect transistors," *Applied Physics Letters*, vol. 103, 253114, 2013.
23. W. Bao, M. Staffaroni, J. Bokor, M. B. Salmeron, E. Yablonovitch, S. Cabrini, A. Weber-Bargioni, and P. J. Schuck, "Plasmonic near-field probes: a comparison of

the campanile geometry with other sharp tips," *Optics Express*, vol. 21, pp. 8166-8176, Apr 2013.

24. A. T. Zayak, H. Choo, Y. S. Hu, D. J. Gargas, S. Cabrini, J. Bokor, P. J. Schuck, and J. B. Neaton, "Harnessing Chemical Raman Enhancement for Understanding Organic Adsorbate Binding on Metal Surfaces," *Journal of Physical Chemistry Letters*, vol. 3, pp. 1357-1362, May 2012.
25. W. Bao, M. Melli, N. Caselli, F. Riboli, D. S. Wiersma, M. Staffaroni, H. Choo, D. F. Ogletree, S. Aloni, J. Bokor, S. Cabrini, F. Intonti, M. B. Salmeron, E. Yablonovitch, P. J. Schuck, and A. Weber-Bargioni, "Mapping Local Charge Recombination Heterogeneity by Multidimensional Nanospectroscopic Imaging," *Science*, vol. 338, pp. 1317-1321, Dec 2012.
26. D. Carlton, B. Lambson, A. Scholl, A. Young, P. Ashby, S. Dhuey, and J. Bokor, "Investigation of Defects and Errors in Nanomagnetic Logic Circuits," *IEEE Transactions on Nanotechnology*, vol. 11, pp. 760-762, Jul 2012.
27. S. J. Choi, C. Wang, C. C. Lo, P. Bennett, A. Javey, and J. Bokor, "Comparative study of solution-processed carbon nanotube network transistors," *Applied Physics Letters*, vol. 101, Sep 2012.
28. H. Choo, M. K. Kim, M. Staffaroni, T. J. Seok, J. Bokor, S. Cabrini, P. J. Schuck, M. C. Wu, and E. Yablonovitch, "Nanofocusing in a metal-insulator-metal gap plasmon waveguide with a three-dimensional linear taper," *Nature Photonics*, vol. 6, pp. 837-843, Dec 2012.
29. M. Ilg, C. D. Weis, J. Schwartz, A. Persaud, Q. Ji, C. C. Lo, J. Bokor, A. Hegyi, E. Guliyev, I. W. Rangelow, and T. Schenkel, "Improved single ion implantation with scanning probe alignment," *Journal of Vacuum Science & Technology B*, vol. 30, Nov 2012.
30. B. Lambson, Z. Gu, D. Carlton, S. Dhuey, A. Scholl, A. Doran, A. Young, and J. Bokor, "Cascade-like signal propagation in chains of concave nanomagnets," *Applied Physics Letters*, vol. 100, p. 152406, Apr 2012.
31. C. C. Lo, F. R. Bradbury, A. M. Tyryshkin, C. D. Weis, J. Bokor, T. Schenkel, and S. A. Lyon, "Suppression of microwave rectification effects in electrically detected magnetic resonance measurements," *Applied Physics Letters*, vol. 100, p. 63510, Feb 2012.
32. M. T. Martinez, Y. C. Tseng, M. Gonzalez, and J. Bokor, "Streptavidin as CNTs and DNA Linker for the Specific Electronic and Optical Detection of DNA Hybridization," *Journal of Physical Chemistry C*, vol. 116, pp. 22579-22586, Oct 2012.
33. C. D. Weis, C. C. Lo, V. Lang, A. M. Tyryshkin, R. E. George, K. M. Yu, J. Bokor, S. A. Lyon, J. J. L. Morton, and T. Schenkel, "Electrical activation and electron spin resonance measurements of implanted bismuth in isotopically enriched silicon-28," *Applied Physics Letters*, vol. 100, p. 172104, Apr 2012.
34. A. T. Zayak, Y. S. Hu, H. Choo, J. Bokor, S. Cabrini, P. J. Schuck, and J. B. Neaton, "Chemical Raman Enhancement of Organic Adsorbates on Metal Surfaces," Physical Review Letters, vol. 106, p. 083003, Feb 2011.
35. J. W. J. Wu, D. Carlton, J. S. Park, Y. Meng, E. Arenholz, A. Doran, A. T. Young, A. Scholl, C. Hwang, H. W. Zhao, J. Bokor, and Z. Q. Qiu, "Direct observation of

imprinted antiferromagnetic vortex states in CoO/Fe/Ag(001) discs," *Nature Physics*, vol. 7, pp. 303-306, Apr 2011.

36. A. Weber-Bargioni, A. Schwartzberg, M. Cornaglia, A. Ismach, J. J. Urban, Y. J. Pang, R. Gordon, J. Bokor, M. B. Salmeron, D. F. Ogletree, P. Ashby, S. Cabrini, and P. J. Schuck, "Hyperspectral Nanoscale Imaging on Dielectric Substrates with Coaxial Optical Antenna Scan Probes," *Nano Letters*, vol. 11, pp. 1201-1207, Mar 2011.
37. Z. Liu, R. Brandt, Y. Yahagi, B. Hansen, B. Harteneck, J. Bokor, A. R. Hawkins, and H. Schmidt, "Detecting single nanomagnet dynamics beyond the diffraction limit in varying magnetostatic environments," *Applied Physics Letters*, vol. 98, Jan 2011.
38. V. L. V. Lang, C. C. Lo, R. E. George, S. A. Lyon, J. Bokor, T. Schenkel, A. Ardavan, and J. J. L. Morton, "Electrically detected magnetic resonance in a W-band microwave cavity," *Review of Scientific Instruments*, vol. 82, p. 034704, Mar 2011.
39. B. Lambson, D. Carlton, and J. Bokor, "Exploring the Thermodynamic Limits of Computation in Integrated Systems: Magnetic Memory, Nanomagnetic Logic, and the Landauer Limit," *Physical Review Letters*, vol. 107, p. 010604, Jul 2011.
40. J. Wu, D. Carlton, E. Oelker, J. S. Park, E. Jin, E. Arenholz, A. Scholl, H. Chanyong, J. Bokor, and Z. Q. Qiu, "Switching a magnetic vortex by interlayer coupling in epitaxially grown Co/Cu/Py/Cu(001) trilayer disks," *J. Phys., Condens. Matter.*, vol. 22, pp. 342001 (4 pp.)-342001 (4 pp.), 1 September 2010.
41. Y. C. Tseng and J. Bokor, "Characterization of the junction capacitance of metal-semiconductor carbon nanotube Schottky contacts," *Applied Physics Letters*, vol. 96, p. 013103, Jan 2010.
42. M. T. Martinez, Y. C. Tseng, J. P. Salvador, M. P. Marco, N. Ormategui, I. Loinaz, and J. Bokor, "Electronic Anabolic Steroid Recognition with Carbon Nanotube Field-Effect Transistors," *ACS Nano*, vol. 4, pp. 1473-1480, Mar 2010.
43. X. Liang, Y.-S. Jung, S. Wu, A. Ismach, D. L. Olynick, S. Cabrini, and J. Bokor, "Formation of Bandgap and Subbands in Graphene Nanomeshes with Sub-10 nm Ribbon Width Fabricated via Nanoimprint Lithography," *Nano Letters*, vol. 10, pp. 2454-2460, 2010.
44. Ismach, C. Druzgalski, S. Penwell, A. Schwartzberg, M. Zheng, A. Javey, J. Bokor, and Y. G. Zhang, "Direct Chemical Vapor Deposition of Graphene on Dielectric Surfaces," *Nano Letters*, vol. 10, pp. 1542-1548, May 2010.
45. Q. Ding, Z. T. Deng, H. Yan, S. Cabrini, R. N. Zuckermann, and J. Bokor, "Gold Nanoparticle Self-Similar Chain Structure Organized by DNA Origami," *Journal of the American Chemical Society*, vol. 132, pp. 3248-+, Mar 2010.
46. D. Weis, A. Schuh, A. Batra, A. Persaud, I. W. Rangelow, J. Bokor, C. C. Lo, S. Cabrini, D. Olynick, S. Duhey, and T. Schenkel, "Mapping of ion beam induced current changes in FinFETs," *Nuclear Instruments & Methods in Physics Research, Section B-Beam Interactions with Materials and Atoms*, vol. 267, pp. 1222-1225, 2009.
47. T. Schenkel, C. C. Lo, C. D. Weis, A. Schuh, A. Persaud, and J. Bokor, "Critical issues in the formation of quantum computer test structures by ion implantation,"

Nuclear Instruments & Methods in Physics Research Section B-Beam Interactions with Materials and Atoms, vol. 267, pp. 2563-2566, Aug 2009.

48. M. T. Martinez, Y. C. Tseng, N. Ormategui, I. Loinaz, R. Eritja, and J. Bokor, "Label-Free DNA Biosensors Based on Functionalized Carbon Nanotube Field Effect Transistors," *Nano Letters,* vol. 9, pp. 530-536, Feb 2009.
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