

# Brian A. Bryce

4820 Chevy Chase Drive Apt. 302  
Chevy Chase, MD 20815  
Cell: (301)244-8442  
Work: (301) 975-2652  
babryce@gmail.com  
brian.bryce@nist.gov

CITIZENSHIP – United States

## OVERVIEW

I am interested in societally impactful research in electronics, spanning from basic devices to fully integrated applied electronic systems and end user products. I am particularly interested in applications with potential positive environmental purposes. I am a strong advocate of open access to scientific and engineering data and believe that scientific and engineering literacy is a critical, universally needed skill. My approach to education is a mixture of theory and practice with an emphasis on design. I believe designs should be physically realized whenever possible to provide tangible results and a sense of ownership and accomplishment to students. I feel that a partnership approach to research generally works best. Students should feel they are in control and have space to explore their interests while enough guidance and feedback is provided to avoid deadends or becoming too narrowly focused.

## EDUCATION

PhD/MS, Applied Physics, Cornell University (2012)  
Advisor – Sandip Tiwari  
Thesis: Silicon and Germanium Vapor-Liquid-Solid Wire Material Properties and Devices

BS, Physics with High Honors, University of Maryland, College Park (2005)  
BS, Electrical Engineering, University of Maryland, College Park (2005)

## EXPERIENCE

### **National Institute of Standards and Technology, Gaithersburg, MD (2014 – present)**

*National Research Council Post-Doctoral Fellow* sponsored by Albert Davydov. Designed and constructed interferometer vacuum system for study of highly integrated mass sensors based on silicon vapor-liquid-solid (VLS) nanowires. Conducted experiments in selective electrodeposition of magnetic materials on (VLS) nanowires. Produced nanowire based scanned probes. Designed custom dynamic signal analyzer, photoreceiver, stroboscopic sampler based on pulsed laser diode, and other ancillary electronics. Developing on chip plasma light sources.

### **IBM Research, Yorktown Heights, NY (2012 – 2013)**

*Post-doctoral researcher* on the piezoelectronic transistor project. Designed and directed the fabrication process of the first demonstration of this CMOS alternative concept. Successfully delivered first demonstration by DARPA deadline to receive next phase of funding. Developed measurements to rapidly characterize piezoelectric and piezoresistive material properties.

**Cornell University, Ithaca, NY (2007-2012)**

*Graduate Researcher* in Sandip Tiwari's nanoscale electroscience group. Developed silicon vapor-liquid-solid (VLS) nanowire photovoltaics. Developed controlled VLS nanowire synthesis methods. Studied nanowire growth with transmission electron microscopy. Measured minority carrier lifetime of gold and aluminum catalyzed silicon VLS nanowires using a single shot microwave impedance spectroscopy. Developed and demonstrated effectiveness of VLS nanowire based atomic force microscopy probes. Mentored undergraduate researchers. Simulated and designed instrumentation.

**teho Labs, Ithaca, NY (2011 – 2012)**

*Sole Proprietor*. Designed, marketed and sold ARM microcontroller development boards for the enthusiast and open hardware markets. Created a highly popular KiCAD tutorial for PCB design. Designed and created prototype instruments and end user products including photodetectors, arbitrary waveform generators, power supplies and audio products. Deployed and maintained webserver and related services. Created and maintained documentation, manuals and toolchain tutorials. Provided technical support for customers. Budgeted resources and estimated risk and development overheads.

**Johns Hopkins University Applied Physics Laboratory, Laurel, MD (2005)**

*Summer Intern* for National Security Analysts Department/Space Department. Conducted research analysis of the near-earth object hazard, reviewing the scholarly literature and summarized findings in a white paper.

**Laboratory for Physical Sciences, University of Maryland, College Park, MD (2002-2005)**

*Research Assistant* in B.E. Kane silicon quantum computation group. Designed electronics in support of measurements. Measured field ionized delta doped layers in silicon via CV techniques at helium temperatures. Created tuning fork based probes for a custom scanned force microscope. Measured polymer mechanical properties at liquid nitrogen temperatures for vibration isolation scheme. Fabricated single electron transistors using electron beam lithography.

**TEACHING EXPERIENCE****Teaching assistant experience**

*Introduction to Quantum Mechanics*, David A. Muller Professor, Cornell (2007)

*Intermediate Electromagnetism*, Chris Xu Professor, Cornell (2006)

*Basic Circuit Theory*, R.D. Gomez Professor, U. Maryland (2004)

Responsibilities included: creating problems; planning and executing weekly or biweekly discussion sections; designing, administering and grading quizzes. Assisting students one-on-one in office hours. Grading weekly homework assignments and exams. Proctoring exams.

**Undergraduate student mentoring**

Participated in research for undergraduates program at Cornell providing guidance and instruction in fabrication and nanoscience related projects.

**Tutoring**

Provided one-on-one tutoring for struggling students grades 3-12 across subject areas. Provided students with problems and practice at an attainable but challenging level to provide a pattern and pathway to confidence and success.

## PAPERS

**B.A. Bryce**, M. Copel, M. S. Gordon; Optical spectroscopy of samarium selenide thin films, *in preparation* (2014).

P.M. Solomon, **B.A. Bryce**, M.A. Kuroda, R. Keech, S. Shetty, T.M. Shaw, M. Copel, L-W. Hung, A.G. Schrott, C. Armstrong, M.S. Gordon, K.B. Reuter, T.N. Theis, W. Haensch, S.M. Rossnagel, H. Miyazoe, B.G. Elmegreen, X-H. Liu, S. Trolier-McKinstry, G.J. Martyna, and D.M. Newns; Pathway to the Piezoelectronic Transduction Logic Device, *submitted* (2014).

**B.A. Bryce**, B. R. Ilic, M. C. Reuter, S. Tiwari; Wafer scale tilt-compensated silicon nanowire atomic force microscopy probes for high aspect ratio geometries, *Journal of Micromechanics and Microengineering*, **24**, 095016 (2014).

**B.A. Bryce**, B. R. Ilic, M. C. Reuter, S. Tiwari; Silicon Nanowire Atomic Force Microscopy Probes for High Aspect Ratio Geometries, *Applied Physics Letters*, **100**, 213106 (2012).

**B.A. Bryce**, M. C. Reuter, B. A. Wacaser, S. Tiwari; Contactless Measurement of Surface Dominated Recombination in Gold-and Aluminum-Catalyzed Silicon Vapor-Liquid-Solid Wires, *Nano Letters*, **10**, 4282-7 (2011).

**B.A. Bryce**, M.P. Levendorf, J. Park, S. Tiwari; Structure and Interfacial Properties of Germanium Nanowires Grown on Titanium, *Electrochemical and Solid-State Letters*, **13**, K77-K79 (2010).

## PATENTS

**B. A. Bryce**, J. B. Chang, M. A. Kuroda, M. Copel; Passivation and alignment of piezoelectronic transistor piezoresistor, *US Patent Application* (2014).

J. B. Chang, **B. A. Bryce**, H. Miyazoe; Self-limited etch to prevent device shorting, *US Patent Application* (2014).

J. B. Chang, **B. A. Bryce**, M. A. Kuroda; Piezoelectronic transistor with co-planar common and gate electrodes, *US Patent Application* (2014).

**B. A. Bryce**, J. B. Chang, M. A. Kuroda; Integrating a piezoresistive element in a piezoelectronic transistor, *US Patent Application* (2014).

**B.A. Bryce**, B. R. Ilic, M. C. Reuter, S. Tiwari; Scanned Probe Microscopy (SPM) Probe Having Angled Tip, *US Patent 8,539,611* (2013).

## CONFERENCES

B. A. Wacaser, M. M. Khayyat, **B. A. Bryce**, M. C. Reuter, D. K. Sadana<sup>1</sup>, S. Tiwari, C. Wen, R. A. Haight, F. M. Ross; Si Nanowires Seeded with Al Growth, Characteristics, and Templating, *Materials Research Conference Fall Meeting*, Boston, MA, Dec. 2013.

**B. A. Bryce**, B. R. Ilic, M. C. Reuter, S. Tiwari, P. M. Solomon, M. A. Kuroda, R. Keech, S. Shetty, L-W. Hung, M. Copel, T. M. Shaw, A. G. Schrott, H. Miyazoe, S. M. Rossnagel, S. Trolier-

McKinstry, X-H. Liu, B. G. Elmegreen, W. Haensch, G.J. Martyna, D.M. Newns; Nanomechanical Applications with Non-Standard Materials: Tilt-Compensated Vapor-Liquid-Solid Nanowire Scanned Probes and Piezoelectronic Transistors, *Cornell NanoScale Science and Technology Facility Meeting*, Ithaca, NY, Sept. 2013.

**B. A. Bryce**, B. R. Ilic , M. C. Reuter, S. Tiwari; Silicon Nanowire Atomic Force Microscopy Probes for High Aspect Ratio Geometries, *Cornell Center for Materials Research Next-Generation Materials Characterization Symposium*, Ithaca, NY, Sept. 2012.

**B. A. Bryce**, B. R. Ilic , M. C. Reuter, S. Tiwari; Silicon Nanowire Atomic Force Microscopy Probes for High Aspect Ratio Geometries, *54th Annual Electronic Materials Conference*, State College, PA, June. 2012.

**B. A. Bryce**, M. C. Reuter, B. A. Wacaser, S. Tiwari; Measurement of carrier lifetimes in silicon vapor-liquid-solid wires, *American Physical Society Meeting*, Dallas, TX, March. 2011.

**B. A. Bryce**, M. P. Levendorf, J. Park, S. Tiwari; Simple Lithographic Preparation of Transmission Electron Microscopy Grids for Observation of Germanium Nanowires, *Cornell NanoScale Science and Technology Facility Meeting*, Ithaca, NY, Sept. 2009.

#### SELECTED SKILLS

Semiconductor device: design, process development, fabrication, and characterization  
Programming: scientific, low level embedded systems, mobile platforms, web, general purpose  
Instrument design: microwave, optical and vacuum systems, PCB and board level electronic design, electromechanical systems, system integration, automated test and measurement systems  
IC design: mixed signal VLSI, RF VLSI, FPGA

#### AWARDS AND ACCOMPLISHMENTS

National Research Council Fellowship (2013)  
Cornell Center for Materials Research overall microscopy contest winner (2010)  
Best Physics Honors Thesis and Defense, University of Maryland (2005/2006)  
Created a product that has been distributed to over 500,000 people

#### REFERENCES

##### **Dr. Sandip Tiwari**

Professor, School of Electrical and Computer Engineering, Cornell University  
410 Phillips Hall, Cornell University, Ithaca, NY 14853  
(607)254-6254  
[st222@cornell.edu](mailto:st222@cornell.edu)

##### **Dr. B. Robert Ilic**

Project Leader, Nanofabrication Research Group, National Institute of Standards and Technology  
100 Bureau Drive, Mail Stop 6203, Gaithersburg, MD 20899-8555  
(301)975-2639  
[robert.ilic@nist.gov](mailto:robert.ilic@nist.gov)

**Dr. Mathew Copel**

Research Staff Member, IBM Research

IBM T.J. Watson Research Center, 1101 Kitchawan Road, Yorktown Heights, NY 10598

(914) 945-2907

[mcopel@us.ibm.com](mailto:mcopel@us.ibm.com)

**Dr. Albert Davydov**

Group Leader, Functional Nanostructured Materials, National Institute of Standards and Technology

100 Bureau Drive, Mail Stop 8555, Gaithersburg, MD 20899-8555

(301)975-4916

[albert.davydov@nist.gov](mailto:albert.davydov@nist.gov)

**Dr. David A. Muller**

Professor, School of Applied and Engineering Physics, Cornell University

274 Clark Hall, Cornell University, Ithaca, NY 14853

(607)255-4065

[dm24@cornell.edu](mailto:dm24@cornell.edu)