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EDUCATION

University of California

Berkeley, CA

PhD in Physics (Experimental Condensed Matter), 2002, Advisor: Alex Zettl

Thesis: Electrical and mechanical properties of carbon and boron nitride nanotubes

Boston University

Boston, MA

BA in Physics with Distinction, 1997

HONORS AND AWARDS

CRC Press Freshman Chemistry Award (1994)

Boston University College of Arts and Sciences Prize for Excellence in Physics (1997)

Summa Cum Laude (1997)

Phi Beta Kappa (1997)

IBM Research Fellowship (2001-2002)

Nominated by UMD for Packard Foundation Fellowship (2006)

Minta Martin Award (2006)

The MSGS and MatES Award for Outstanding Advising in Materials Science and Engineering (2007)

Sigma Xi (2008)

POSITIONS HELD

University of Maryland

College Park, MD, 2005 to present

Assistant Professor, Department of Materials Science and Engineering

Affiliate Professor, Department of Physics

Stanford University

Stanford, CA, 2003 to 2005

Postdoctoral Scholar, Department of Physics

Advisor: David Goldhaber-Gordon

Nanomix, Inc.

Emeryville, CA, 2002

Staff Scientist

Supervisor: Dr. George Grüner, CTO (while on leave from UCLA Physics)

TEACHING

University of Maryland, Department of Materials Science and Engineering

Spring 2008 – ENMA698N & ENMA489N: Special Problems in Materials Science and Engineering:
Nanomaterials.

Fall 2006 – ENMA460 & PHYS431: Introduction to the Physics of Solid Materials

Fall 2006 – ENMA181: Introduction to Nanotechnology (with I. Takeuchi and G. Rubloff)
Spring 2006 – ENMA698N & ENMA489N: Special Problems in Materials Science and Engineering:
Nanomaterials.

University of California at Berkeley, Department of Physics

Fall 1997 – Graduate Student Instructor for Physics Advanced Lab: Basic Semiconductor Circuits
Instructor: Professor Donald Orlando

INVITED PRESENTATIONS

1. November 2001, American Vacuum Society 48th International Symposium, San Francisco, California
2. June 2002, nano-7 ecos-21: 7th international conference on nanometer-scale technology & 21st European conference on surface science, Malmö, Sweden
3. October 2002, Guest speaker for DOE NETL's Sensor & Control Review Workshop, Pittsburgh, Pennsylvania
4. June 2003, ASME Mechanics and Materials Conference, Scottsdale, Arizona
5. March 2004, Columbia University, Department of Mechanical Engineering, Department Colloquium, New York, New York
6. July 2004, IBM SpinAps Retreat, Asilomar, California
7. August 2004, NASA National Nanotechnology Initiative Workshop, Palo Alto, California
8. September 2004, University of Illinois, Urbana-Champaign, Center for Microanalysis of Materials Invited Lecture Series, Urbana, Illinois
9. September 2004, Penn State University, MRSEC Seminar, State College, Pennsylvania
10. December 2004, MRS Fall Meeting, Boston, Massachusetts
11. December 2004, Boston University, Physics Department, Condensed Matter Seminar, Boston, Massachusetts
12. January 2005, University of Maryland, Materials Science and Engineering Department, College Park, Maryland
13. January 2005, University of California, Materials Science and Engineering Department, Berkeley, California
14. January 2005, University of Illinois, Physics Department, Chicago, Illinois
15. February 2005, Stanford University, Materials Science and Engineering Department, Stanford, California
16. March 2005, New York University, Physics Department, New York, New York
17. August 2005, Microscopy & Microanalysis 2005, Honolulu, Hawaii
18. October 2005, University of Maryland, Physics Department, Condensed Matter Seminar, College Park, MD
19. November 2005, National Institute of Standards and Technology, Metallurgy Division of Materials Science and Engineering Lab, Magnetic Materials Group Seminar, Gaithersburg, MD
20. January 2006, Rice University, Department of Physics and Astronomy, Condensed Matter Seminar, Houston, TX
21. January 2006, Harvard University, Division of Engineering and Applied Sciences, CMAP Colloquium, Cambridge, MA
22. February 2006, Michigan State University, Department of Physics and Astronomy, Condensed Matter Seminar, East Lansing, MI
23. March 2006, James Madison University, Department of Physics, Department Colloquium, Harrisonburg, VA
24. July 2006, Cornell University, Kavli Institute Workshop, Thirty Years of Analytical EM: Nanoscale Physics in the Electron Microscope, Ithaca, NY
25. August 2006, Microscopy & Microanalysis 2006, Chicago, IL
26. March 2007, American Physical Society March Meeting, Denver, CO
27. October 2007, Rutgers University, Department of Physics, Condensed Matter Seminar, Piscataway, NJ

28. October 2007, Johns Hopkins University, Department of Physics, Condensed Matter Seminar, Baltimore, MD
29. October 2007, University of Texas, Department of Physics, Condensed Matter Seminar, Austin, TX
30. March 2008, American Physical Society March Meeting, New Orleans, LA
31. May 2008, Materials Science and Engineering Department Seminar, Massachusetts Institute of Technology, Cambridge, MA

REVIEW PUBLICATIONS

1. A. Zettl and **John Cumings**. Elastic properties of fullerenes, in *Handbook of Elastic Properties of Solids, Liquids, and Gases*, Levy, Bass, and Stern, Eds. (Academic Press, 2000) Chap. 11, p. 163
2. **John Cumings** and A. Zettl, Electrical and Mechanical Properties of Nanotubes Determined using In-Situ TEM Probes, in *Applied Physics of Nanotubes: Fundamentals of Theory, Optics and Transport Devices*, Slava V. Rotkin, Shekhar Subramoney, Eds.; Series: Nanoscience and Nanotechnology, Ph. Avouris, Ser.Ed. (Springer Verlag GmbH & Co. KG, 2005) Chap. 11
3. **John Cumings**, Eva Olsson, Amanda K. Petford-Long, and Yimei Zhu, Electric and Magnetic Phenomena Studied by In-Situ Transmission Electron Microscopy, *MRS Bulletin*, in press (2008)

RESEARCH PUBLICATIONS

- 1) **John Cumings**, P.G. Collins, and A. Zettl. Peeling and sharpening multiwall nanotubes. *Nature*, 406(6796), p. 586 (2000)
- 2) **John Cumings**, A. Zettl. Low-friction nanoscale linear bearing realized from multiwall carbon nanotubes. *Science*, 289(5479), p. 602 (2000)
- 3) **John Cumings** and A. Zettl. Mass-production of boron nitride double-wall nanotubes and nanococoons. *Chemical Physics Letters*, 316(3-4), p. 211 (2000)
- 4) M. Ishigami, **John Cumings**, A. Zettl, S. Chen, and U. Dahmen. A simple method for the continuous production of carbon nanotubes. *Chemical Physics Letters*, 319(5-6), p. 457 (2000)
- 5) E. A. Stach, T. Freeman, A. M. Minor, D. K. Owen, **John Cumings**, M. A. Wall, T. Chraska, R. Hull, J. W. Morris, A. Zettl, and U. Dahmen. Development of a nanoindenter for in situ transmission electron microscopy. *Microscopy and Microanalysis*, 7(6), p. 507 (2001)
- 6) W. Q. Han, **John Cumings**, X. S. Huang, K. Bradley, and A. Zettl. Synthesis of aligned $B_xC_yN_z$ nanotubes by a substitution-reaction route. *Chemical Physics Letters*, 346(5-6), p. 368 (2001)
- 7) W. Q. Han, **John Cumings**, and A. Zettl. Pyrolytically grown arrays of highly aligned $B_xC_yN_z$ nanotubes. *Applied Physics Letters*, 78(18), p. 2769 (2001)
- 8) B. G. Demczyk, **John Cumings**, A. Zettl, and R. O. Ritchie. Structure of boron nitride nanotubules. *Applied Physics Letters*, 78(18), p. 2772 (2001)
- 9) A. Zettl and **John Cumings**. Sharpened nanotubes, nanobearings, and nanosprings, in *Electronic Properties of Novel Materials-- Molecular Nanostructures*, H. Kuzmany, J. Fink, M. Mehring, and S. Roth, eds. (American Institute of Physics, New York, 2000) p. 526
- 10) A. Zettl and **John Cumings**, Electromechanical properties of multiwall carbon nanotubes. In *Nanonetwork Materials: Fullerenes, Nanotubes, and Related Systems*, (AIP Conference Proceedings 590, American Institute of Physics, Melville, New York 2001) p. 107 (2001)
- 11) **John Cumings**, M. R. McCartney, J. C. H. Spence, and A. Zettl. Electron holography of field-emitting carbon nanotubes, in *Electronic Properties of Molecular Nanostructures*, H. Kuzmany, J. Fink, M. Mehring, and S. Roth, eds. (American Institute of Physics, New York, 2001) p. 572
- 12) **John Cumings** and A. Zettl. Field emission properties of boron nitride nanotubes, in *Electronic Properties of Molecular Nanostructures*, H. Kuzmany, J. Fink, M. Mehring, and S. Roth, eds. (American Institute of Physics, New York, 2001) p. 577

- 13) **John Cumings**, M. McCartney, J. C. H. Spence, and A. Zettl, "Electron holography of field emitting carbon nanotubes," *Physical Review Letters*, 88(5), 056804 (2002)
- 14) W. Mickelson, **John Cumings**, W. Q. Han, and A. Zettl, Effects of carbon doping on superconductivity in magnesium diboride. *Physical Review B*, 65(8), 052505 (2002)
- 15) W. Q. Han, W. Mickelson, **John Cumings**, and A. Zettl, Transformation of $B_xC_yN_z$ nanotubes to pure BN nanotubes. *Applied Physics Letters*, 81(6), p. 1110, 2002 Aug 5.
- 16) B. G. Demczyk, Y. M. Wang, **John Cumings**, M. Hetman, W. Q. Han, A. Zettl, and R. O. Ritchie, Direct mechanical measurement of the tensile strength and elastic modulus of multiwalled carbon nanotubes. *Materials Science & Engineering A-Structural Materials Properties Microstructure & Processing*, 334(1-2), p.173 (2002)
- 17) **John Cumings** and A. Zettl, Resistance of telescoping nanotubes, in *Structural and Electronic Properties of Molecular Nanostructures*, H. Kuzmany, J. Fink, M. Mehring, and S. Roth, eds. (American Institute of Physics, New York, 2002) p. 227
- 18) A. Zettl, **John Cumings**, W. Q. Han, and W. Mickelson, Boron nitride nanotube peapods, in *Structural and Electronic Properties of Molecular Nanostructures*, H. Kuzmany, J. Fink, M. Mehring, and S. Roth, eds. (American Institute of Physics, New York, 2002) p. 140
- 19) W. Mickelson, S. Aloni, Wei-Qiang Han, **John Cumings**, and A. Zettl, Packing C_{60} in Boron Nitride Nanotubes. *Science*, 300(5618), p. 467 (2003)
- 20) **John Cumings**, W. Mickelson, and A. Zettl, Simplified synthesis of double-wall carbon nanotubes. *Solid State Communications*, 126(6), p. 359 (2003)
- 21) Keith Bradley, **John Cumings**, Alexander Star, Jean-Christophe P. Gabriel, and George Grüner, Influence of mobile ions on nanotube based FET devices. *Nano Letters*, 3(5), p. 639 (2003)
- 22) A. M. Fennimore, T. D. Yuzvinsky, Wei-Qiang Han, M. S. Fuhrer, **J. Cumings**, A. Zettl Rotational actuators based on carbon nanotubes. *Nature*, 424(6947), p. 408 (2003)
- 23) **John Cumings** and A. Zettl, Field emission and current-voltage properties of boron nitride nanotubes. *Solid State Communications*, 129(10), p. 661 (2004)
- 24) **John Cumings** and A. Zettl, Localization and nonlinear resistance in telescopically extended nanotubes, *Physical Review Letters*, 93(8), 086801 (2004)
- 25) **John Cumings**, A. Zettl, and M. R. McCartney, Carbon Nanotube Electrostatic Biprism: Principle of Operation and Proof of Concept. *Microscopy and Microanalysis*, 10(4), p. 420 (2004)
- 26) **John Cumings**, L. S. Moore, H. T. Chou, K. C. Ku, G. Xiang, S. A. Crooker, N. Samarth, and D. Goldhaber-Gordon, A Tunable Anomalous Hall Effect in a Non-Ferromagnetic System. *Physical Review Letters*, 96(19), 196404 (2006)
- 27) C. H. L. Quay, **John Cumings**, S. J. Gamble, A. Yazdani, H. Kataura, and D. Goldhaber-Gordon, Transport properties of carbon nanotube C_{60} peapods. *Physical Review B*, 76(7), 073404 (2007)
- 28) C. H. L. Quay, **John Cumings**, S. J. Gamble, R. de Picciotto, H. Kataura, and D. Goldhaber-Gordon, Magnetic field dependence of the spin-1/2 and spin-1 Kondo effects in a quantum dot, *Physical Review B*, 76(24), 245311 (2007)
- 29) I-Kai Hsu, Rajay Kumar, Adam Bushmaker, Stephen B. Cronin, Michael T. Pettes, Li Shi, Todd Brintlinger, Michael S. Fuhrer, and **John Cumings**, Optical measurement of thermal transport in suspended carbon nanotubes, *Applied Physics Letters*, 92(6), 063119 (2008)
- 30) Todd Brintlinger, Yi Qi, Kamal H. Baloch, D. Goldhaber-Gordon, and **John Cumings**, Electron Thermal Microscopy, *Nano Letters*, 8(2), 582 (2008)
- 31) Yi Qi, T. Brintlinger, and **John Cumings**, Direct observation of the ice rule in artificial kagome spin ice, *arXiv:0802.0034* and *Physical Review B*, in press (2008)

PATENTS

- 1) **John P. Cumings** and Alex K. Zettl. Method for shaping a nanotube and a nanotube shaped thereby. US Patent no. 6,709,566, filed July 24, 2001
- 2) **John P. Cumings**, Alex K. Zettl, Marvin L. Cohen, and Steven G. Louie. Telescoped Multiwall Nanotube and Manufacture Thereof. US Patent no. 6,874,668, filed July 24, 2001