

Phillip T. Barton

Ph.D. Materials Engineering

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Summary

- Researched and developed materials from start to finish including synthesis, processing, and performance
- Worked in diverse areas ranging from lithium-ion batteries to transistors to fiber-reinforced composites
- Characterized chemical composition, crystal structure, morphology, microstructure, and properties
- Modeled and analyzed data through MatLab, IGOR, and other software to quantify figures of merit
- Published 17 times in academic journals, plus grants/proposals, and presented at 10 technical conferences
- Directed team projects by identifying opportunities, establishing goals, and developing plans of action
- Managed laboratory equipment, including procurement, setup, design, trouble-shooting, and repair
- Collaborated with National Labs and international research institutions, traveling the globe

Fields: Materials Science and Engineering, Solid-State and Inorganic Chemistry, Condensed-Matter Physics

Education

Ph.D. Materials Engineering, University of California, Santa Barbara (2009–2013)
Dissertation: *Preparation, characterization, and modeling of magnetic transition-metal oxides*
Adviser: Ram Seshadri

Technology Management Program, University of California, Santa Barbara (2013–)

B.S. Materials Science and Engineering, Northwestern University, Evanston, Illinois (2005–2009)
Thesis: *Formation and characterization of metal-semiconductor axial nanowire heterostructures*
Adviser: Lincoln J. Lauhon; Honors, Magna Cum Laude

Awards

National Science Foundation Graduate Research Fellowship (2011-2014)
Materials Research Society Graduate Student Silver Award (2013)
American Physical Society Ovshinsky Student Travel Award for Materials Physics (2013)
UCSB Materials Research Laboratory Educational Outreach Award for Outstanding Mentoring (2011)

Skills

<i>Inorganic synthesis:</i>	• ceramic • air-sensitive • microwave • solvothermal • USP • sol-gel
<i>Processing:</i>	• metallurgy • SPS • ball milling • RTA • etching • lithography • spin casting
<i>Characterization:</i>	• XRD • TGA • ICP • DSC • UV-Vis-NIR • PL • XPS • porosity • SQUID • heat capacity • dielectric constant • electrical transport • thermopower • stress-strain • hardness
<i>Microscopy:</i>	• optical • SEM (EDS and EBSD) • TEM • metallography
<i>Lab equipment:</i>	• cryostats • vacuum pumps • gas lines and glassware • furnaces • electronics
<i>Data analysis:</i>	• X-ray pattern modeling • Peak-shape fitting • Applying theory
<i>Programming:</i>	• MatLab • Mathematica • Python • DFT • Monte Carlo
<i>Communication:</i>	• presentations • grants and proposals • LaTeX • HTML • Skype
<i>Operating systems:</i>	• Microsoft Windows • Mac OS • Linux

International research experiences

- International MRS Conference of Young Researchers on Advanced Materials, Singapore (July 2012)
- Prof. Cheetham, Functional Inorganics and Hybrid Materials, Dept. of Materials, Univ. of Cambridge, UK
- Prof. Rosseinsky, Inorganic Materials Chemistry, Dept. of Chem., University of Liverpool, UK (Sept 2010)
- Prof. Jansen, Air-sensitive Synthesis, Max Planck Ins. for Solid State Chem, Stuttgart, Germany (July 2011)

Collaborations with national laboratories

- National Institute of Standards and Technology: neutron diffraction (two proposals)
- Los Alamos National Laboratory: neutron diffraction and total scattering (three proposals)
- Argonne National Laboratory: X-ray diffraction, total scattering, and absorption (five proposals)

Undergraduate research internships

- ONR NREIP at Naval Research Lab: Reduction of dislocations in GaN by confined epitaxy (Summer 2009)
- NSF REU at Northwestern Univ.: Electrical contact to semiconductor nanowires (2008-09, Summer 2008)
- NSF REU at Harvard University: Evolution of electromigration in copper wires (Summer 2007)
- Solar Car Team at Northwestern Univ.: Mechanical properties of fiber-reinforced composites (2005-06)

Select scientific publications

Full list of 5 first-author and 12 co-author available at <http://research.mrl.ucsb.edu/~barton>

- P. T. Barton, Y. D. Premchand, P. A. Chater, R. Seshadri, and M. J. Rosseinsky, Chemical inhomogeneity, short-range order, and magnetism in $\text{LiNiO}_2\text{-NiO}$, *Chem. Eur. J.*, **19**, (2013) 14521. [doi]
- M. W. Gaultois, P. T. Barton, C. S. Birkel, L. M. Misch, R. Seshadri, and G. Stucky, Structural disorder, magnetism, and electrical and thermoelectric properties of pyrochlore $\text{Nd}_2\text{Ru}_2\text{O}_7$, *J. Phys.: Condens. Matter*, **25**, (2013) 186004(1-10). [doi]
- W. Li, Z. Zhang, E. G. Bithell, A. S. Batsanov, P. T. Barton, P. J. Saines, P. Jain, M. A. Carpenter, and A. K. Cheetham, Ferroelasticity in a metal-organic framework perovskite; towards a new class of multiferroics, *Acta Materialia*, **61**, (2013) 4928-4938. [doi]
- P. J. Saines, M. Steinmann, J.-C. Tan, H. H.-M. Yeung, P. T. Barton, and A. K. Cheetham, Isomer-directed structural diversity and its effect on the nanosheet exfoliation and magnetic properties of 2,3-dimethylsuccinate hybrid frameworks, *Inorg. Chem.*, **51**, (2012) 11198-11209. [doi]

Oral and poster presentations

- North American Solid State Chemistry Conference, Oregon State University, Corvallis, OR (June 2013)
- Meeting of the American Physical Society, Boston, MA (Mar 2012) and Baltimore, MD (Mar 2013)
- Solid State Chemistry Materials Research Group Seminar, Johns Hopkins Univ., Baltimore, MD (July 2011)
- Summer Symposium on Chemistry and Physics of Functional Materials, UC Santa Barbara, CA (July 2011)
- The International Chemical Congress of Pacific Basin Societies, Honolulu, HI (Dec 2010)
- Gordon Research Conference on Solid State Chemistry, Colby-Sawyer College (July 2013)
- International Center for Materials Research, University of California, Santa Barbara, CA (Annually 2010-13)
- Materials Research Outreach Program, University of California, Santa Barbara, CA (Annually 2010-13)
- Undergraduate Research Symposium, Argonne National Laboratory, Chicago, IL (Nov 2008)

Mentoring

- Mentored seven research interns teaching them laboratory, analytical, and communication skills
- Developed and managed intern projects, culminating in three scientific publications

Teaching

- Teaching assistant for **Materials 200B**: Electronic and Atomic Structure of Materials (Winter 2011, UCSB)
- Grader for **Materials 218 / Chemistry 277**: Introduction to Inorganic Materials (Winter 2012, UCSB)
- Co-instructor/developer of a **SST** high school course: "Sustainable Energy: Fact and Fiction" (Winter 12)

K-12 education outreach

- **Materials Research Laboratory** volunteer for K-12 educational workshops including *Build a Buckyball*, *Racing Solar Cars*, *It's a Material World*, STaRS Academy mentorship, and *Science Day* at the Zoo
- **CSEP** volunteer for the Assistant Researchers program, SST, and *NanoDays* at the Natural History Museum