

Jeffrey J. Urban

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Education

Ph.D. in Physical Chemistry, Harvard University, November 2004
M.A. in Physical Chemistry, Harvard University, 2000
B.S. with Honors in Biochemistry and Molecular Biology, The Pennsylvania State University, 1998

Professional Background

- Facility Director, Inorganic Materials Facility, Lawrence Berkeley National Laboratory (2012-present)
- Deputy Director, Inorganic Materials Facility, Lawrence Berkeley National Laboratory (2010-2012)
- Staff Scientist, Inorganic Materials Facility, Lawrence Berkeley National Laboratory (2007-present)
- Postdoctoral Studies in Synthesis and Measurements of Nanocrystal Transistors, Thermoelectrics, and Photovoltaics with Professor Christopher B. Murray, University of Pennsylvania (2004-2007)
- Graduate Studies in Synthesis and Physical Characterization of Transition Metal Oxide Nanostructures with Professor Hongkun Park, Harvard University (1999-2004)
- Graduate Studies in Bio-organic Synthesis of Peptidomimetic Libraries with Professor Gregory L. Verdine, Harvard University (1998-1999)
- Undergraduate Research in Protein Folding Biophysics with Professor C. R. Matthews, Pennsylvania State University (1996-1998)

Teaching Experience

Guest Lecturer:

Materials Science and Engineering, University of California, Berkeley, Fall 2015
Chemical Engineering, University of California, Berkeley, Spring 2015
Chemical Engineering, University of California, Berkeley, Spring 2013
Chemical Engineering, University of California, Berkeley, Spring 2012
Physics and Nanoscale Science and Engineering, University of California, Berkeley, Spring 2012
Chemistry and Materials Science and Engineering, University of California, Berkeley, Spring 2011
Chemistry and Materials Science and Engineering, University of California, Berkeley, Spring 2010
Materials Science and Engineering, University of California, Berkeley, Spring 2010
Physics and Nanoscale Science and Engineering, University of California, Berkeley, Spring 2010
Chemistry and Materials Science and Engineering, University of California, Berkeley, Spring 2009

Teaching Fellow:

Materials Chemistry and Physics, Harvard University, Fall 2002 (Head Teaching Fellow)
Graduate Quantum Mechanics, Harvard University, Fall 2001 (Head Teaching Fellow)
Advanced Physical Organic Chemistry, Harvard University, Spring 1999
Introductory Organic Chemistry, Harvard University, Fall 1998

Presentations (past 3 years)

November 2015—ESA Retreat, MSD Opportunities in Water-energy Nexus, Berkeley, CA
November 2015—Hydrogen Storage Consortia Meeting, NREL, Golden, CO

October 2015—Technology showcase, Bay Area PV Consortium, Berkeley, CA (Invited)
September 2015—Institute of Physics, Chinese Academy of Sciences, Beijing China (Invited)
September 2015—Inorganic Colloquium, Department of Chemistry, U.C. Berkeley (Invited)
May 2015—MSD retreat, Materials Science Opportunities in the Water-Energy Nexus (Invited)
May 2015—Virginia Tech, New Horizons in Sustainable Energy Series, Blacksburg, VA (Invited)
March 2015—ACS Meeting Earth abundant materials for hydrogen storage, Denver, CO (Invited)
March 2015—LOPEC Thin-film electronics, Munich, Germany (Invited)
December 2014—MRS Symposium on Organic/Hybrid Thermoelectrics, Boston, MA (Invited)
November 2014—IEEE Nanotechnology Symposium, Santa Clara, CA (Invited)
October 2014—UC Berkeley NSE Colloquium, Berkeley, CA (Invited)
September 2014—AVS Energy Storage Meeting, Santa Clara, CA (Invited)
August 2014—Annual User Meeting, The Molecular Foundry, Berkeley, CA (Invited)
June 2014—National Academy of Engineering, Invited speaker, presenter, and co-organizer, Energy harvesting and power transmission, Tokyo, Japan (Invited)
May 2014—BAPVC Program Review, Hybrid barrier materials (Speaker and Poster), Stanford, CA
March 2014—ACS National Meeting, Li⁺ ion transport (Invited), Dallas, TX
February 2014—MURI Program Review, Thermal/Electrical Transport in Organic/Inorganic Composites, Santa Barbara, CA
December 2013—Nanotek Conference, Las Vegas, NV, Nanoscale energy storage (Invited)
November 2013—AIChE conference, San Francisco, CA, Thermal transport in nanomaterials (Invited)
October 2013—“Great in 8”, Public outreach talk in Berkeley Repertory Theater (Invited)
September 2013—NCCA VS talk on Li-ion transport (Invited), Santa Clara, CA
July 2013—ASME Heat transfer conference, Minneapolis, MN (Invited)
July 2013—MURI Review, Hybrid Organic-Inorganic Materials (Presenting Speaker), Washington DC
June 2013—User Executive Committee (UEC) Seminar, Thermal energy harvesting (Invited)
May 2013—National Academy of Engineering, Frontiers of Engineering, Beijing, China (Invited)
April 2013—DOE Physical Behavior of Materials, Washington, DC (Invited Presenter)
March 2013—TMS Conference, San Antonio, TX, Nanostructured Li-ion Batteries (Invited Speaker)
January 2013—DOE Review, Nanostructured Materials for Thermoelectrics (Presenting Speaker)
December 2012—Scientific Advisory Board Meeting, Molecular Foundry, Berkeley, CA
June 2012—Canadian Chemical Society (CSC) Conference, Calgary, Alberta, Canada (Invited Talk)
April 2012—Materials Research Society, San Francisco, CA (Invited Talk)
September 2011—IROS Workshop, San Francisco, CA (Invited Talk)
September 2011—NCCA VS Energy Storage Seminar, SEMI HQ, San Jose, CA (Invited Talk)
September 2011—MSE Seminar Series, UC Berkeley, CA (Invited Talk)
August 2011—University of Texas, Austin, Chemical Engineering Department (Invited Talk)
July 2011—Gordon Research Conference, Mount Holyoke, MA (Invited Talk)
July 2011—IEEE Nano Symposium, Santa Clara, CA (Invited Talk)
November 2010—Hydrogen Storage and Production Conference, Netherlands (Invited Talk)
August 2010—MSD Program Review, CCS EFRC (Overview Talk)
July 2010—Gordon Research Conference, Tilton, NH (Invited Lecture)
June 2010—US/Japan Clean Energy Workshop, Albuquerque, NM (Invited Participant)
June 2010—ONR Program Review, Santa Barbara, CA (Review Talk)
May 2010—Condensed Matter Physics Seminar, UC Davis (Invited Talk)
April 2010—LBL MSD Molecular Foundry Transport Workshop, Berkeley, CA (Invited Talk)
Jan 2010—DOE Review: Nanostructured Thermoelectrics, Berkeley, CA
Nov 2009—NSF/DOE Nanoscience Workshop, Saclay, France (Invited Talk)
Nov 2009—Optics Seminar in Electrical Engineering, UC Berkeley, Berkeley, CA (Invited Talk)
Sept 2009—Nanoscale Informal Science Education (NISE) Lecture, San Francisco, CA (Invited Talk)
Aug 2009—LBL MSD Program Review for Thermoelectrics, Napa Valley, CA
May 2009—ONR Hybrid Photovoltaics Review, National Harbor, MD
April 2009—Greenpower Conferences, Solar Power Generation, San Francisco, CA (Invited Talk)

Peer-Reviewed Publications

(star indicates contact author(s), gray text clarifies role in contributing-author-only work)

67. “Modular design of solution-processed n- and p-type nanoscale hybrid organic-inorganic thermoelectrics”, Ayaskanta Sahu, Boris Russ, Norman C. Su, Jason D. Forster, Preston Zhou, Eun Seon Cho, Peter Ercius, Nelson E. Coates, and **Jeffrey J. Urban***, *submitted* (2016).

66. “Tailoring polymer configuration for nanocrystal growth: the role of chain length and solvent”, Eun Seon Cho, Fen Qiu, and ***Jeffrey J. Urban**, *submitted* (2016).

65. “Long range order in nanocrystal assemblies determines thin-film charge transport”, Michela Sainato, Ayaskanta Sahu, Brian Shevitski, Jason D. Forster, Shaul Aloni, Giuseppe Barillaro*, and **Jeffrey J. Urban***, *submitted* (2016).

64. “Transparent and robust metal-organic framework/polymer films as water vapor barriers”, Youn Jue Bae, Eun Seon Cho, Fen Qiu, Daniel T. Sun, Teresa E. Williams, Berend Smit, **Jeffrey J. Urban***, and Wendy L. Queen*, *submitted* (2016).

63. “Graphene oxide/metal nanocrystal laminates: the atomic limit for safe, selective hydrogen storage”, Eun Seon Cho, Anne M. Ruminski, Shaul Aloni, and ***Jeffrey J. Urban**, *accepted, Nature Communications* (2016). +ALS

62. “Organic thermoelectrics for conformal energy harvesting and personal comfort”, Boris Russ[^], Anne Glauddell[^], **Jeffrey J. Urban***, Michael L. Chabinye*, and Rachel A. Segalman*, *Nature Reviews Materials*, *under revision* (2016).

61. “Geometric analysis of enhanced thermal conductivity in epoxy composites: a comparison of graphite and carbon nanofibers fillers”, Anne M. Ruminski, Fan Yang, Eun Seon Cho, Joseph Silber, Edgar Olivera, Thomas Johnson, Eric C. Anderssen, Carl H. Haber, and ***Jeffrey J. Urban**, *submitted* (2016).

60. “Tethered tertiary amines as solid-state n-type dopants for solution-processable organic semiconductors”, Boris Russ, Maxwell J. Robb, Bhooshan C. Popere, Erin E. Perry, Cheng-Kang Mai, Stephanie Fronk, Shrayesh N. Patel, Thomas E. Mates, Guillermo C. Bazan, **Jeffrey J. Urban**, ***Michael L. Chabinye**, ***Craig J. Hawker**, and ***Rachel A. Segalman**, *accepted, Chemical Science* (2015).

Role in work: Contributed to experimental design, measurements, and data interpretation.

59. “Anisotropic in-plane thermal conductivity of black phosphorus nanoribbons at temperatures higher than 100K”, Sangwook Lee, Fan Yang, Joonki Suh, Sijie Yang, Yeonbae Lee, Guo Li, Hwan Sung Choe, Aslihan Suslu, Yabin Chen, Changhyun Ko, Joonsuk Park, Kai Liu, Jingbo Li, Kedar

Hippalgaonkar, Jeffrey J. Urban, Sefaattin Tongay, and *Junqiao Wu, *Nature Communications*, **6**, 1-7, (2015).

Role in work: Contributed to thermal conductivity modeling.

58. “Prospects for thermoelectricity in quantum dot hybrid arrays”, *Jeffrey J. Urban, *Invited commentary, Nature Nanotechnology*, **10(12)**, 997-1001, (2015).

57. “Carrier scattering at alloy nanointerfaces enhances power factor in PEDOT:PSS hybrid thermoelectrics”, Edmond W. Zaia, Ayaskanta Sahu, Preston Zhou, Madeleine P. Gordon, Jason D. Forster, Yi-Sheng Liu, Jinghua Guo, and *Jeffrey J. Urban, *submitted* (2015). +ALS

56. “Far-field optical nanothermometry with sub-diffraction limit spatial resolution using individual sub-50nm NaYF₄:ErYb nanoparticles”, Jacob Kilbane, Emory R. Chan, Jeffrey J. Urban, and Chris Dames, *submitted* (2016).

55. “**Omni-thermoelectrics**: Atomically convertible p/n nanowire inks for flexible generators”, Ayaskanta Sahu, Boris Russ, Miao Liu, Jason Forster, Fan Yang, Raffaella Buonsanti, Chris Dames, Kristin Persson, Nelson E. Coates, Rachel A. Segalman, and *Jeffrey J. Urban, *under review* (2016).

54. “Carrier Lifetime Enhancement in a Tellurium Nanowire/PEDOT:PSS Nanocomposite by Sulfur Passivation”, Heyman, J.N*., Sahu, A., Coates, N.E., Ehmann, B. and Urban, J.J., *MRS Proc.*, **1742**, (2015).

Role in work: Contributed to materials, experimental design, measurements, and data interpretation

53. “Enhancing separation and mechanical performance of hybrid membranes through nanoparticle surface modification”, Norman C. Su, Hilda G. Buss, Bryan D. McCloskey, and Jeffrey J. Urban*, *ACS Macro Lett.*, **4**, 1239-1243 (2015).

52. “**Influence** of nanoparticle size on Raman and FTIR spectra of Lanthanum Hexaboride”, Tracy M. Mattox, Shruthi Chockkalingam, and Jeffrey J. Urban*, *submitted* (2015).

51. “Enhanced permeation arising from dual transport pathways in hybrid polymer-MOF membranes”, Norman C. Su, Daniel T. Sun, Christine Beavers, David K. Britt, Wendy L. Queen, and Jeffrey J. Urban*, *accepted, Energy and Environmental Science* (2015).

This article was featured on the cover of *Energy and Environmental Science*, Issue ? (2016). +ALS

50. “**Thermal** transport in Silicon Nanowires at high temperature up to 700K”, Jaeho Lee[^], Woochul Lee[^], Jongwoo Lim[^], Yi Yu, Qiao Kong, Jeffrey J. Urban*, and Peidong Yang*, *submitted* (2015).

49. “Chemically directing d-block heterometallics to nanocrystal surfaces as molecular beacons of surface structure”, Evelyn L. Rosen, Keith Gilmore, April M. Sawvel, Aaron T. Hammack, Sean E. Doris, Shaul Aloni, Virginia Altoe, Dennis Nordlund, Bruce E. Cohen, Jeffrey J. Urban, D. Frank Ogletree, Delia J. Milliron, David Prendergast, and *Brett A. Helms, *Chemical Science*, **6**, 6295-6304 (2015). +ALS

Role in work: Contributed to experimental design and concept.

48. “Nanocrystal superlattice embedded within an inorganic semiconducting matrix by in situ ligand exchange: fabrication and morphology”, Sharma, R., Sawvel, A., Barton, B., Dong, A., Llordes, A.,

Buonsanti, R., Axnanda, S., Liu, Z., Urban, J.J., Nordlund, D., Kieslowski, C. and *Milliron, D.M. *Chemistry of Materials*, **27(8)**, 2755-2758 (2015).

Role in work: Contributed to experimental design, measurements, and data interpretation.

47. “Engineering synergy: energy and mass transport in hybrid nanomaterials”, Eun Seon Cho, Nelson E. Coates, Jason D. Forster, Anne M. Ruminski, Boris Russ, Ayaskanta Sahu, Norman Su, Fan Yang, and *Jeffrey J. Urban, *Advanced Materials*, **27(38)**, 5744-5752, (2015).
46. “Chemical controls of plasmons in metal chalcogenide and metal oxide nanostructures”, Tracy M. Mattox, Xingchen Ye, Karthish Manthiram, P. James Schuck, A. Paul Alivisatos, and *Jeffrey J. Urban, *Advanced Materials*, **27(38)**, 5830-5837, (2015).
45. “Varying the ionic functionalities of conjugated polyelectrolytes leads to both p- and n-type carbon nanotube composites for flexible thermoelectrics”, Cheng-Kang Mai, Boris Russ, Stephanie L. Fronk, Nan Hu, Mary B. Chan-Park, Jeffrey J. Urban, Rachel A. Segalman, Michael L. Chabinyc, and *Guillermo C. Bazan, **8**, 2341-2346, *Energy and Environmental Science* (2015).
This article was featured on the cover of *Energy and Environmental Science*, Issue 8 (2015).
Role in work: Contributed to experimental design, measurements, and data interpretation.
44. “**Modified** Schottky emission to explain thickness dependence and slow depolarization in BaTiO₃ nanowires”, Y. Qi, J.M.P. Martirez, Wissam A. Saidi, Jeffrey J. Urban, J.E. Spanier, and *A.M. Rappe, *in press Phys. Rev. B* (2015). Published online at arXiv as: **arXiv:1502.04105**
Role in work: Contributed to materials growth and fabrication.
43. “Size-dependent permeability deviations from Maxwell’s model in hybrid cross-linked poly(ethylene glycol)/silica nanoparticle membranes”, Norman C. Su, Zachary P. Smith, Benny D. Freeman, and *Jeffrey J. Urban, *Chemistry of Materials*, **27(7)**, 2421-2429 (2015).
42. “Enhanced water vapor blocking in transparent hybrid polymer-nanocrystal films”, Eun Seon Cho, Christopher M. Evans, Emily C. Davidson, Megan L. Hoarfrost, Miguel A. Modestino, Rachel A. Segalman, and *Jeffrey J. Urban, *ACS Macro Lett.*, **4**, 70-74 (2015).
41. “Gold nanocrystal arrays as a macroscopic platform for molecular junction thermoelectrics”, William B. Chang, Boris Russ, Victor Ho, Jeffrey J. Urban, and *Rachel Segalman, *Phys. Chem. Chem. Phys.*, **17(9)**, 6207-6211(2015).
Role in work: Contributed to materials, experimental design, measurements, and data interpretation.
40. “Mechanistic insight into the formation of cationic naked nanocrystals generated under equilibrium control”, Sean E. Doris, Jared J. Lynch, Changyi Li, Andrew W. Wills, Jeffrey J. Urban, and *Brett A. Helms, *J. Am. Chem. Soc.*, **136(44)**, 15702-15710 (2014).
39. “Ligand symmetry correlates to thermopower enhancement in small molecule/nanocrystal hybrid materials”, Jared J. Lynch, Michele Kotiuga, Vicky V.T. Doan-Nguyen, Wendy L. Queen, Jason D. Forster, Ruth A. Schlitz, Christopher B. Murray, Jeffrey B. Neaton, Michael L. Chabinyc, and *Jeffrey J. Urban, *ACS Nano* **8(10)**, 10528-10536 (2014).
38. “Li⁺ concentration mapping and transport via *in-situ* confocal Raman microscopy”, Jason D. Forster, Stephen J. Harris, and *Jeffrey J. Urban, *J. Phys. Chem. Lett.* **5(11)**, 2007-2011 (2014).

37. “Terahertz and infrared transmission of an organic/inorganic hybrid thermoelectric material”, Heyman, J.N., *Alebechew, B., Kaminski, Z., *Nguyen, M., Coates, N.E., and Urban, J.J., *Appl. Phys. Lett.*, **104**, 141912 (2014).
Role in work: Contributed to materials, experimental design, measurements, and data interpretation.
36. “Power factor enhancement in solution-processed organic n-type thermoelectric modules through side chain design”, Russ, B.R., Brunetti, F., Robb, M., Miller, L., Patel, S., Ho, V., Hawker, C., Urban, J.J., *Chabynyc, M., and *Segalman, R.A., *Adv. Mater.*, **26(21)**, 3473-3477 (2014).
Role in work: Contributed to experimental design, measurements, and data interpretation.
35. “Engineering bright sub-10-nm upconverting nanocrystals for single-molecule imaging”, Gargas, D.J., Chan, E.M., Ostrowski, A.D., Aloni, S., Altoe, M.V.P., Barnard, E.S., Sanii, B., Urban, J.J., Milliron, D.M., *Cohen, B.E., and *Schuck, P.J., *Nature Nanotechnology*, **9**, 300-305 (2014).
Role in work: Contributed to theory, phonon dynamics, and analysis
34. “Using polymer-nanocrystal interactions to drive simultaneous enhancement of hydrogen storage and air-stability in Mg/Polymer nanocomposites”, Anne M. Ruminski, Rizia Bardhan, Alyssa Brand, and *Jeffrey J. Urban, *Energy & Environmental Science*, **6(11)**, 3267-3271 (2013).
33. “Uncovering the intrinsic size-dependence of hydriding phase transitions in nanocrystals”, Rizia Bardhan, Lester O. Hedges, Cary L. Pint, Ali Javey, *Stephen Whitelam and *Jeffrey J. Urban, *Nature Materials*, **12**, 905-912 (2013).
32. “Ultralow thermal conductivity in inorganic CdSe nanocomposites with controlled grain size”, *Joseph P. Feser, Emory Chan, Arun Majumdar, Rachel A. Segalman and *Jeffrey J. Urban, *Nano Lett.*, **13(5)**, 2122-2127 (2013).
31. “Thermoelectric power factor optimization in PEDOT:PSS Tellurium nanowire hybrid composite”, Shannon K. Yee, Nelson E. Coates, , Arun Majumdar, *Jeffrey J. Urban, and *Rachel A. Segalman, *Phys. Chem. Chem. Phys.* **15**, 4024-4032 (2013).
30. “Effect of interfacial properties on polymer-nanocrystal thermoelectric transport”, Nelson E. Coates, Shannon K. Yee, Brian McCullough, Kevin C. See, Arun Majumdar, *Rachel A. Segalman, and, *Jeffrey J. Urban, *Adv. Mater.* **23(11)**, 1629-1633 (2013).
29. “Rationally designed, three-dimensional carbon nanotube back-contacts for efficient solar devices”, Cary L. Pint, Kuniharu Takei, Rehan Kapadia, Maxwell Zheng, Alexandra C. Ford, Junjun Zhang, Arash Jamshidi, Rizia Bardhan, Jeffrey J. Urban, Ming Wu, Joel W. Ager, Brett A. Cruden, and *Ali Javey, *Advanced Energy Materials*, **1**, 1040-1045 (2011).
Role in work: Contributed the Raman microscopy measurements in this work.
28. “Tip-enhanced Raman spectroscopy with bowtie-antenna-based scan probes”, Alexander Weber-Bargioni, Adam Schwartzberg, Ariel Ismach, Jeffrey J. Urban, Paul Ashby, D. Frank Ogletree, *Stefano Cabrini, and *P. James Schuck, *Nano Lett.*, **11**, 1201-1207 (2011).
Role in work: Contributed to development of tip-based optical probes featured here.
27. “Air-stable metal hydride nanocomposites: a platform for engineering lightweight, high-energy density, cyclable storage materials”, Anne M. Ruminski, Rizia Bardhan, Alyssa Brand, and *Jeffrey J. Urban, *invited article, Energy & Environmental Science*, **4**, 4882-4895 (2011).

26. “Controlling nanorod self-assembly in polymer thin films”, Miguel A. Modestino, Elaine R. Chan, Alexander Hexemer, Jeffrey J. Urban, and *Rachel A. Segalman, *Macromolecules*, **44(18)**, 7364-7371 (2011).
Role in work: Contributed to experimental design and materials synthesis.
25. “Optically- and thermally-responsive programmable materials based on carbon nanotube-hydrogel polymer composites”, Xiaobo Zhang, Cary L. Pint, Min Hyung Lee, Bryan Edward Schubert, Arash Jamshidi, Kuniharu Takei, Hyunhyub Ko, Andrew Gillies, Rizia Bardhan, Jeffrey J. Urban, Ming Wu, Ronald Fearing, and *Ali Javey, *Nano Lett.*, **11(8)**, 3229-3244 (2011).
Role in work: Contributed to optical microscopy and light scattering experiments.

Work highlighted in Nature, July 28, 2011

24. “Pd nanoparticle decorated p-InP nanopillars for efficient water reduction”, Jaehyun Moon, Cary L. Pint, Kuniharu Takei, Min Hyung Lee, Rizia Bardhan, Jeffrey J. Urban, Arash Jamshidi, Ming Wu, and *Ali Javey, *submitted* (2011).
Role in work: Contributed the Pd nanocrystals used in this work.
23. “Size- and surface-dependent CO₂ capture in chemically synthesized magnesium oxide nanocrystals”, Anne M. Ruminski, Ki-Joon Jeon, and, *Jeffrey J. Urban, invited article in *J. Mater. Chem.*, special themed issue on “Chemical transformations of nanoparticles”, **21**, 11486-11491 (2011).
22. “Optical cavity characterization in nanowires via self-generated broad-band emission”, Adam M. Schwartzberg, Shaul Aloni, Tevye Kuykendall, P. James Schuck, and *Jeffrey J. Urban, *Optics Express*, **19(9)**, 8903-8911 (2011).
21. “Hyperspectral nanoscale imaging on dielectric substrates with coaxial optical antenna scan probes”, Alexander Weber-Bargioni, Adam M. Schwartzburg, Matteo Cornaglia, Ariel Ismach, Jeffrey J. Urban, YuanJie Pang, Reuven Gordon, Jeffrey Bokor, Miquel Salmeron, D. Frank Ogletree, *Stefano Cabrini, and *P. James Schuck, *Nano Lett.*, **11(3)**, 1201-1207 (2011).
Role in work: Contributed to development of tip-based optical probes featured here.
20. “Interface segregating fluoroalkyl-modified polymers enable high fidelity block copolymer nanoimprint lithography with PS-b-PDMS”, Vincent Voet, Teresa E. Pick, Sang-Min Park, Manuel Moritz, Aaron T. Hammack, Jeffrey J. Urban, D. Frank Ogletree, *Deirdre L. Olynick, and *Brett A. Helms, *J. Amer. Chem. Soc.*, **133(9)**, 2812-2815 (2011).
Role in work: Contributed to surface chemical analysis via XPS spectroscopy.
19. “Air-stable magnesium nanocomposites provide rapid and high-capacity hydrogen storage without using heavy-metal catalysts”, Ki-Joon Jeon, Hoi Ri Moon, Anne M. Ruminski, Bin Jiang, Christian Kisielowski, Rizia Bardhan, and *Jeffrey J. Urban, *Nature Materials*, **10(4)**, 286-290 (2011).

Work highlighted in Nature Materials, News & Views (pg. 265-266).

Work highlighted in Nature Nanotechnology, April, 2011

Work highlighted in CNN interview (“The Big Innovation”), March 22, 2011

18. “Size-dependent polar ordering in colloidal GeTe nanocrystals”, Mark J. Polking, Jeffrey J. Urban, Delia J. Milliron, Haimei Zheng, Emory Chan, Marissa A. Caldwell, Simone Raoux, Christian F. Kisielowski, Joel W. Ager III, *Ramamoorthy Ramesh, and *A.P. Alivisatos, *Nano Lett.*, **11(3)**, 1147-1152 (2011).

Role in work: Contributed to analysis of size-dependent phase transition and synthesis.

17. “Water-processable polymer-nanocrystal hybrids for thermoelectrics”, Kevin C. See, Joseph P. Feser, Cynthia E. Chen, Arun Majumdar, ***Jeffrey J. Urban**, and *Rachel A. Segalman, *Nano Lett.*, **10(11)**, 4664-4667 (2010).

Work highlighted in MRS Bulletin, December 2010.

16. “Spectroscopic evidence for exceptional thermal contribution to electron-beam induced fragmentation”, Marissa A. Caldwell, Ben Haynor, Shaul Aloni, D. Frank Ogletree, H.-S. Philip Wong, ***Jeffrey J. Urban**, and *Delia J. Milliron, *J. Phys. Chem. C*, **114**, 22064-22068 (2010).
15. “Universal and solution-processable precursor to bismuth chalcogenide thermoelectrics”, Robert Y. Wang, Joseph P. Feser, Xun Gu, Kin Man Yu, Rachel A. Segalman, Arun Majumdar, *Delia J. Milliron, and ***Jeffrey J. Urban**, *Chem. Mater.*, **22(6)**, 1943-1945 (2010).
14. “Carrier distribution and dynamics of nanocrystal solids doped with artificial atoms”, Dong-Kyun Ko, **Jeffrey J. Urban**, and *Christopher B. Murray, *Nano. Lett.*, **10(5)**, 1842-1847 (2010).
Role in work: Contributed to thermoelectric measurements and data analysis.

13. “Block copolymers for organic electronics”, *Rachel A. Segalman, Bryan McCulloch, Saar Kirmayer, and **Jeffrey J. Urban**, *Macromolecules*, **42(23)**, 9205-9216 (2009).
Role in work: Contributed both to optical and electronic characterization sections.

Article selected for cover art, December 8, 2009.

12. “Size-controlled synthesis and optical properties of monodisperse colloidal magnesium oxide nanocrystals”, Hoi Ri Moon, **Jeffrey J. Urban**, and *Delia J. Milliron, *Angewandte Chemie*, **48(34)**, 6278-6281 (2009).
Role in work: Contributed both to nanocrystal synthesis and optical properties characterization.

Work selected as “hot paper” by editor.

Work highlighted in Photonics Spectra (Nov. 2009)

Work highlighted in Reuters press coverage (Nov. 2009)

11. “Label-free in situ imaging of lignification in the cell wall of low lignin transgenic *Populus trichocarpa*,” Martin Schmidt, Adam M. Schwartzberg, Pradeep N. Perera, Alex Weber-Bargioni, Andrew Carroll, Purbasha Sarkar, Elena Bosneaga, **Jeffrey J. Urban**, Jingyuan Song, Mikhail Y. Balakshin, Ewellyn A. Capanema, Manfred Auer, Paul D. Adams, Vincent L. Chiang, and *P. James Schuck, *Planta*, **230**, 589-597 (2009).
Role in work: Contributed to development of confocal Raman microscopy tools used here.

Moved to LBNL (December 2007)

10. “Synergism in binary nanocrystal superlattices leads to enhanced *p*-type conductivity in self-assembled PbTe/Ag₂Te thin films,” ***Jeffrey J. Urban**, Dmitri V. Talapin, Elena V. Shevchenko, Cherie R. Kagan, and *C.B. Murray, *Nature Materials* **6(2)** 115-121 (2007).

Work highlighted in Nature 445 492-493 (2007).

9. "Magnetic switching of phase-slip dissipation in NbSe₂ nanobelts" Abram Falk, Mandar M. Deshmukh, Amy L. Prieto, Jeffrey J. Urban, Andrea Jonas, and *Hongkun Park, *Phys. Rev. B.* **75** 020501(R) (2007)
8. "Observation of optical nonlinearities in strongly quantum confined PbS nanocrystals for all-optical tunable nanophotonics," Charlton J. Chen, J.I. Dadap Jr., Jeffrey J. Urban, C.B. Murray, and *C.W. Wong, *Proc. of Optics East* (2006).
7. "Self-assembly of PbTe quantum dots into nanocrystal superlattices and glassy films," *Jeffrey J. Urban, Dmitri V. Talapin, Elena V. Shevchenko, and *C.B. Murray, *J. Am. Chem. Soc.* **128(10)**, 3248-3255 (2006).

Work highlighted in Photonics Spectra, April 2006

6. "Ferroelectric phase transitions in individual single-crystalline BaTiO₃ nanowires," Jonathan E. Spanier, Alexie M. Kolpak, Jeffrey J. Urban, Ilya Grinberg, Wan Soo Yun, Lian Ouyang, Andrew M. Rappe, and *Hongkun Park, *Nano Lett.* **6**, 735-739 (2006).
5. "Synthesis of single-crystalline La_{1-x}Ba_xMnO₃ nanocubes with adjustable doping," Jeffrey J. Urban, Lian Ouyang, Moon-Ho Jo, Dina S. Wang and *Hongkun Park, *Nano Lett.* **4**, 1547-1550 (2004).
4. "Single-Crystalline Barium Titanate Nanowires," Jeffrey J. Urban, Jonathan, E. Spanier, Lian Ouyang, Wan Soo Yun, and *Hongkun Park, *Adv. Mater.* **15**, 423-426 (2003).
3. "Ferroelectric properties of individual barium titanate nanowires investigated by scanned probe microscopy," Wan Soo Yun, Jeffrey J. Urban, Qian Gu and *Hongkun Park, *Nano Lett.* **2**, 447-450 (2002).

Work highlighted in Chemical and Engineering News, March 4, 2002.

2. "Synthesis of single-crystalline perovskite nanowires composed of barium titanate and strontium titanate," Jeffrey J. Urban, Wan Soo Yun, Qian Gu and *Hongkun Park, *J. Am. Chem. Soc.* **124**, 1186 (2002).

Work highlighted in Chemical and Engineering News, March 4, 2002.

1. "A Modular Synthetic Approach Toward Exhaustively Stereodiversified Ligand Libraries," Tiffany M. Gierasch, Milan Chytil, Mary T. Didiuk, Julie Y. Park, Jeffrey J. Urban, Steven P. Nolan, *Gregory L. Verdine, *Org. Lett.* **2**, 3999-4002 (2000).

Book Chapters and Invited Editorial and Review Articles

1. "New design rules for polymer-based thermoelectric materials", Nelson E. Coates, and *Jeffrey J. Urban, invited book chapter to appear in *Innovative Thermoelectric Materials* (Imperial Press, in press).
2. "Future prospects for hydrogen storage in designer nanocomposites", Anne M. Ruminski, Rizia Bardhan, Alyssa Brand, and *Jeffrey J. Urban, invited editorial, *Biofuels*, **2(6)**, 591-594 (2011).
3. "The Physics and Chemistry of Quantum-Dot Based Photovoltaics", Delia J. Milliron and Jeffrey J. Urban, invited book chapter appearing in *Colloidal Quantum Dot Devices: Sensors, Sources, and Solar Cells* (Cambridge University Press, 2014).

4. "Integrated Miniaturized Materials—From Self-Assembly to Device Integration," **Jeffrey J. Urban** et al., invited book chapter appearing in *Materials Research Society Symposium Proceedings, Spring 2010, Volume 1272* (Materials Research Society Press, 2011).
5. "Ferroelectric Nanowires," Jonathan E. Spanier, Jeffrey J. Urban, Lian Ouyang, Wan Soo Yun, and Hongkun Park, invited book chapter appearing in *Nanowires and Nanobelts: Materials, Properties, and Devices: Volume 2* (Kluwer, Netherlands, 2003).

Awards and Honors

Invited participant, Global Grand Challenges of Engineering Summit (jointly hosted by NAE, RAE, and CAE), Beijing, China (2015)
Selected by the National Academy of Engineering (NAE) as one of the top 60 scientists under age 45 for 2013 CAFOE program (2013)
Selected for "Early Career Scientist" training at U.C. Berkeley Haas Business School (2012)
Lawrence Berkeley National Lab, Outstanding Performance Award, Materials Sciences Division (2011)

Journal Editorships

Co-editor, special issue for *Materials Science and Engineering B* (Elsevier): "Nanomaterials and Upscaling Processes in Hydrogen Technology and Carbon Capture Storage" (with Prof. Sofoklis Makridis) (2015)
Co-editor, special issue for *MRS Communications* on "Hard Functional Materials" (2015)

Filed Patents and Disclosures

1. "Transition metal oxide nanowires and devices incorporating them," Hongkun Park, Jeffrey J. Urban, Wan Soo Yun, Qian Gu, *US Patent 7,918,935 B2* (2007).
2. "Inorganic Nanostructure-Organic Polymer Heterostructures Useful for Thermoelectric Devices," Kevin C. See, Nelson E. Coates, Shannon K. Yee, Rachel A. Segalman, and ***Jeffrey J. Urban**, International Patent *Application PCT/US2011/037816*, *U.S. Patent Application 13/685,505*, *LBNL Disclosure IB-2859* (2012).
3. "Gallium nitride nanowires as a low-power directional nanoscale light source", Adam M. Schwartzberg and ***Jeffrey J. Urban**, *LBNL Disclosure IB-2860* (2011).
4. "Thermoelectrochromic coatings", Nelson E. Coates, Shannon K. Yee, Jeffrey J. Urban, and Rachel A. Segalman, *LBNL Disclosure IB-3134* (2011).
5. "Composites of air-stable magnesium nanoparticles and gas-selective polymer for hydrogen storage", Ki-Joon Jeon, Hoi Ri Moon, Anne M. Ruminski, and ***Jeffrey J. Urban**, *US Patent Application Number 61/437,456*, *LBNL Disclosure IB-2918* (2011).
6. "Room temperature hydrogen storage using composites of magnesium nanoparticles containing metal catalysts encapsulated in gas-selective polymer", Anne M. Ruminski, Alyssa Brand, Rizia Bardhan, and ***Jeffrey J. Urban**, *ROI filing 2013-065* (2013).

7. “Engineering bright, sub-10nm upconverting nanocrystals for single-molecule imaging”, Bruce E. Cohen, James P. Schuck, Daniel J. Gargas, Emory M. Chan, Alexis D. Ostrowski, Jeffrey J. Urban, and Delia J. Milliron, *LBNL Disclosure IB-2013-146-01* (2014).
8. “Self-doping materials for n-type organic thermoelectric applications”, Boris Russ, Fulvio Brunetti, Craig Hawker, Michael Chabiny, Jeffrey J. Urban, and Rachel A. Segalman, *UCB Disclosure BK-2014-134-1* (2014).
9. “Graphene oxide/metal nanocrystal laminates: the atomic limit for safe, selective gas storage”, Eun Seon Cho, Anne M. Ruminski, Shaul Aloni, and *Jeffrey J. Urban, ROI filing *2015-017*, *Provisional Patent 62/203,198* (2015).
10. “Self-doping materials and methods”, Boris Russ, Fulvio Brunetti, Craig J. Hawker, Michael L. Chabiny, Jeffrey J. Urban, Rachel A. Segalman, *US Prov. Patent App. # 61/942,511 UC2014-633/BK2014-134* (2014).
11. “Graded Thermoelectric Materials and Application Thereof”, Boris Russ, David Brown, Jared Lynch, Travis Day, Nelson E. Coates, Ayaskanta Sahu, Jason D. Forster, G. Jeffrey Snyder, Rachel A. Segalman, Jeffrey J. Urban, *BK-2015-144* (2015).
12. “Self-doping materials for n-type organic thermoelectric applications”, Boris Russ, Maxwell Robb, Craig J. Hawker, Michael L. Chabiny, Jeffrey J. Urban, Rachel A. Segalman, *U.S. Patent Filed 2014-633/BK 2014-134 / SLW Ref: 4171.003US1* (2015).
13. “Tunable, Solution-Processed Thermoelectric Nanomaterials and Application Thereof”, Jared Lynch, Nelson E. Coates, Jason D. Forster, Ayaskanta Sahu, Boris Russ, Jeffrey J. Urban, ROI filing *BK-2015-145, 2015-085, Provisional Patent 62/256,786* (2015).
14. “Nanostructured graphene and magnesium composites for hydrogen storage”, Felix Fischer, Jeffrey J. Urban, Eun Seon Cho, Anne M. Ruminski, Ryan Cloke, Tomas Marangoni, and Cameron Rogers UCB Invention Disclosure, *BK-2015-135; Our Ref.: 00012-035P01* (2015).
15. “Interface engineering and doping in nanostructures using surface-binding moieties for controlled and switchable carrier conduction”, Ayaskanta Sahu, Boris Russ, Miao Liu, Jason Forster, Fan Yang, Raffaella Buonsanti, Chris Dames, Kristin Persson, Nelson E. Coates, Rachel A. Segalman, and Jeffrey J. Urban, ROI filing *2015-086* (2015).
16. “Low-energy, low-cost forward osmosis water desalination via ionic liquids/water phase separation”, Robert Kostecki and Jeffrey J. Urban ROI filing *2015-099* (2015)
17. “Flexible, Thin Film, Solution-Processable Peltier Device and Application Thereof”, Boris Russ, David Brown, G. Jeffrey Snyder, Jeffrey J. Urban, ROI filing (2015).

new. update the TE and H2 provisional patents, add supercooling from boris (11/8)

Professional Service (Past Year and Future Commitments)

Leadership Roles:

Acting Program lead, LBL Thermoelectrics (2013-Present)
MURI Thrust Lead, Organic and Hybrid Thermoelectrics (2011-Present)
Co-lead, LBL Water Initiative (2014-Present)
Berkeley Lead, HyMarc Hydrogen Storage Hub (2015 – Present)

Professional Evaluation:

Invited external letter writer for tenure promotion case at the University of Wisconsin, Department of Electrical Engineering

Editor Roles:

Guest editor, MRS Communications special issue on “Hard Functional Materials” (co-editors are Prof. McIntyre, Stanford and Dr. Alec Talin, Sandia National Labs)

Review and Organizer Roles:

Reviewer for 2016 NSF Panel on Thermoelectric materials
Reviewer for 2016 Army Research Office (ARO) proposal on gas-selective membranes
Reviewer for 2016 DOE EERE proposals on Hydrogen storage
Reviewer for 2016 Cyclotron Road entrepreneurial scientist cohort
Organizer for 2016 APS session on thermoelectrics
Co-organizer for 2016 MRS fall meeting on organic and hybrid thermoelectrics (with Howard Katz)
Reviewer for 2015 LBNL Visiting Faculty Program proposals
Reviewer for 2015 NSF Chemistry proposals (request Marjorie Langell)
Reviewer for 2015 DOE BES Program on Thermoelectric Materials (request Refik Kortan)
Co-organizer and session chair, 2015 ACCGE crystal growth conference (Montana)
On-site Reviewer 2015 ARPA-E program on thermodevices (GENSETS)
Reviewer for 2015 MSD LDRDs (request Xiang Zhang)
Reviewer for 2014 ARPA-E program on Thermodevices (GENSETS)
Reviewer for 2014 DOE BES Program on Thermoelectric Materials and Devices (request Refik Kortan)
Reviewer for 2014 NSF proposal from DMRE on Materials Genome
Reviewer for 2014 DOE BES Early Career Research Proposals
Reviewer for 2014 NSF proposal in SSMC
Reviewer for Petroleum Research Fund, Thermoelectric interfaces, 2014
Co-organizer, National Academy of Engineering US-Japan FOE Symposium, June 2014
Reviewer for NWO, Netherlands Scientific Programs, March 2013
Reviewer for DOE-BES Program Renewal in OPV for FY14, February 2013
Co-organizer, October 2012, DOE NSRC meeting on nanocrystals, Argonne, IL
Co-organizer, LBL, October 2012, Molecular Foundry Symposium on Energy Storage
Co-organizer, EMS, April 2012, Electronic Materials Symposium
Co-organizer, APS, 2012, Thermoelectric Materials Physics
Co-Organizer, EMS, April 2011, Electronic Materials Symposium
Session Chair, ASHRAE, February 2011, Low-GWP Refrigerants
Session Chair, Gordon Research Conference, July 2010, Nanofabrication: Self-Assembly
Co-Organizer, EMS, April 2010, Electronic Materials Symposium
Co-Organizer, MRS, April 2010, Directed Assembly and Self-Assembly
Session Chair, MRS, April 2010, Directed Assembly and Self-Assembly: Device Applications
Session Chair, MRS, April 2010, Thermoelectric Materials

Co-Organizer, LBL, April 2010, Nanoscale Transport Phenomena
Session Chair, APS, March 2009, Photoexcited Charge Transport at Interfaces
Session Chair, APS, March 2009, Organic Electronics and Photovoltaics
Co-Organizer, EMS, April 2009, Electronic Materials Symposium
Co-Organizer, LBL, October 2009, Nanostructured Materials for Photovoltaics
Co-Organizer, MRS, March 2010, Directed Self-Assembly and Self-Assembly
Co-Organizer, LBL, April 2010, Transport Phenomena
Co-Organizer, EMS, April 2010, Electronic Materials Symposium

Consulting and Scientific Advising:

Reviewer for *Nature*, *Nature Materials*, *Nature Nanotechnology*, *Nature Communications*, *JACS*, *Nano Letters*, etc.

Consulting for Artiman Ventures
Consulting scientific advisor for Twente Dutch Solar Car Racing Team
Consulting for TPG Capital on Electrochemical Energy Storage Technologies
Joined scientific committee for MRE (Materials Research for Energy)
Consulting for Research Gate on Scientific Publishing and Reputational Indices
Consulting for RusNano (Russia) on Energy Conversion Technologies
Consulting for Total (France) on Energy Conversion Technologies
Consulting for Lux Research, Gas Storage Technologies
Reviewer, FY12 UC Discovery Grants (Engineering, Electronics, and New Materials Panel)
Reviewer, 2012 LDRD Pool, MSD Submissions for LDRD Funding
Joined Scientific Advisory Board for Clean Tech Institute, Santa Clara, CA, April 2011
Consulting for TPG Capital on Thermoelectrics Startup Company, March 2011
Reviewer (2009-2010) France-Berkeley Fund
Reviewer, 2010 ARPA-E proposals on building thermodevices
Committee Member, 2010, Photovoltaics Installation at ALS Assessment Team
Committee Member, 2010-2012, Heat Island Group
Committee Member, 2009-2010, White Roofs Strategic Planning Initiative

Recent Collaborators (Past Year): P. Yang (UCB/LBL), J. Wu (UCB/LBL), B. McCloskey (UCB/LBL), B. Freeman (U.T. Austin), R. Segalman (UCSB), A. Majumdar (Stanford), R. Ramesh (LBL), Lane Martin (UCB/LBL), Chris Dames (LBL/UCB), Jeffrey B. Neaton (LBL/UCB), M. Chabinyk (UCSB), G. Bazan (UCSB), J.G. Snyder (Northwestern), D.G. Cahill (UIUC), P.J. Schuck (LBL), S. Aloni (LBL)

Graduate and Postdoctoral Advisees

Postdoctoral Advisees:

Dr. Youngsang Kim (2015 – present)
Dr. Boris Russ (2015 – present)
Dr. Heng Wang (2015 – present)
Dr. Karol Miszta (2015 – present)
Dr. Fen Qiu (2015 – present)
Dr. Fan Yang (2015 - present)

Dr. Woochul Lee (2014 – present)
 Dr. Ayaskanta Sahu (2013-present)
 Dr. Eun Seon Cho (2013-present)
 Dr. Jason Forster (2012-present)
 Dr. Jared Lynch (2012-2013), currently a staff scientist at Nanosys, Inc.
 Dr. Richa Sharma (2010-2013), co-advised with Dr. Delia Milliron, currently at SDR (Schlumberger-Doll Research)
 Dr. Nelson Coates (2010-2014), Assistant Professor at California Maritime Academy
 Dr. Emory Chan (2010-2014)
 Dr. Rizia Bardhan (2010-2012), Assistant Professor at Vanderbilt University
 Dr. Aaron Hammack (2010-2012), co-advised with Dr. Frank Ogletree, currently a staff scientist at Hitachi HGST
 Dr. Rueben Mendelsberg (2010-2011), co-advised with Dr. Andre Anders, Dr. Delia Milliron, currently a staff scientist at First Solar
 Dr. Anne Ruminski (2009-2015), currently a scientist at Silicium Energy
 Dr. Ki-Joon Jeon (2008-2011), currently an Assistant Professor at Inha University, S. Korea
 Dr. Saar Kirmayer (2008-2010), currently a postdoctoral researcher at the Weizmann Institute
 Dr. Adam Schwartzberg (2007-2010), currently a staff scientist at The Molecular Foundry, LBNL, Berkeley, CA
 Dr. Kevin See (2008-2010), currently with Lux Research
 Dr. Hoi Ri Moon, (2008-2010), currently an Assistant Professor at UNIST, S. Korea
 Dr. Robert Wang (2008-2011), currently an Assistant Professor at Arizona State University, co-advised with Dr. Delia Milliron

Masters and Graduate Student Advisees:

- Erin Creel (2015 - present), graduate student from Chemistry Department, U.C. Berkeley
- Lukas Hackl (2015-2016), masters student from ETH, Zurich
- Aizhao Pan (2015-), student from Chinese Scholarship Council, Xi'an Jiaotong University
- Paul Baade (2015), masters student from ETH, Zurich
- Maxime Szybowski (2015), masters student from ETH, Zurich
- Eddy Zaia (2014-present), graduate student from CBE Department, U.C. Berkeley
- Edgar Olivera (2013-2015), undergraduate student from MSE Department, U.C. Berkeley
- Robin Mutschler (2014-2015), masters student from ETH, Zurich
- Norman Su (2011-present) (NDSEG award winner), graduate student from CBE Department, U.C. Berkeley
- William Chang (2011-2014), graduate student from CBE department, U.C. Berkeley, co-advised with Prof. Rachel Segalman
- Cynthia E. Chen (2011-2014), graduate student from CBE department, U.C. Berkeley, co-advised with Prof. Rachel Segalman, currently a scientist at LAM Research
- Shannon K. Yee (2010-2013), Hertz Fellowship award winner, graduate student from Mechanical Engineering department, U.C. Berkeley, co-advised with Prof. Rachel Segalman, currently an Assistant Professor at Georgia Tech (Department of Mechanical Engineering, 2013-present)
- Boris Russ (2010-2015), (NDSEG award winner), graduate student from CBE department, U.C. Berkeley, co-advised with Prof. Rachel Segalman
- Alyssa Brand (2010-present)
- Ann Katrin-Michel (2011), co-advised with Dr. Delia Milliron
- Anna Bezryadina (2010-2011)

- Bryan McCulloch (2008-2010), graduate student from CBE department, U.C. Berkeley, co-advised with Prof. Rachel Segalman, currently at DOW Chemical
- Joseph P. Feser (2008-2011), graduate student from Mechanical Engineering department, U.C. Berkeley, currently an Assistant Professor in mechanical engineering at the University of Delaware (2013-present), co-advised with Prof. Rachel Segalman
- Wendy X. Gu (2008-2010), (Fulbright and NDSEG award winner), undergraduate student, CBE department, U.C. Berkeley, currently a postdoc at U.C. Berkeley

Professional References

1. Professor Hongkun Park

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5. Prof. Arun Majumdar

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