

## Delia J Milliron

McKetta Department of Chemical Engineering  
The University of Texas at Austin  
100 E. 24<sup>th</sup> Street, NHB 6.404  
Austin, Texas 78712  
milliron@che.utexas.edu

### Education:

**University of California, Berkeley:** Ph.D. in Physical Chemistry, 2004.

Thesis title: New materials for nanocrystal solar cells

Advisor: A. Paul Alivisatos

**Princeton University:** A.B., *summa cum laude*, in Chemistry, Certificate in Materials Science and Engineering, 1999.

Thesis title: Charge injection and chemistry at the indium tin oxide-organic interface

Advisors: Jeffrey Schwartz, Antoine Kahn

### Positions Held:

- 2016 –** : Frank A. Liddell, Jr. Centennial Fellowship, University of Texas at Austin  
**2014 –** : Fellow of the Henry Beckman Professorship, University of Texas at Austin  
**2013 –** : Associate Professor, Department of Chemical Engineering, University of Texas at Austin  
**2008 – 2014:** Staff Scientist, Materials Sciences Division, LBNL, Berkeley, California  
**2005 – 2008:** Research Staff Member, IBM Almaden Research Center, San Jose, California  
**2004 – 2005:** Postdoctoral Researcher, IBM Watson Research Center, Yorktown Heights, New York

### Administrative Appointments:

- 2012 – 2013:** Deputy Director, Molecular Foundry, LBNL  
**2008 – 2012:** Director, Inorganic Nanostructures Facility, Molecular Foundry, LBNL

### Journal Publications:

Contact author(s) are marked with \*.

95) BA Lindquist, RB Jadrach, DJ Milliron\*, TM Truskett\*, "On the Formation of Equilibrium Gels via a Macroscopic Bond Limitation," *J. Chem. Phys.* (2016), doi:10.1063/1.4960773.  
<http://scitation.aip.org/content/aip/journal/jcp/145/7/10.1063/1.4960773>

94) J Ephraim, D Lanigan, C Staller, DJ Milliron, E Thimsen\*, "Transparent Conductive Oxide Nanocrystals Coated with Insulators by Atomic Layer Deposition," *Chem. Mater.* **28** (2016), 5549–5553.  
<http://pubs.acs.org/doi/abs/10.1021/acs.chemmater.6b02414>

93) A Llordés\*, Y Wang, A Fernandez-Martinez, P Xiao, T Lee, A Poulain, O Zandi, CA Saez Cabezas, G Henkelman, DJ Milliron\*, "Linear Topology in Amorphous Metal Oxide Electrochromic Networks Obtained via Low-Temperature Solution Processing," *Nat. Mater.* (2016), doi:10.1038/nmat4734.  
<https://t.co/cL9Kg2Mws5>

92) NB Saleh\*, DJ Milliron, N Aich, LE Katz, HM Liljestrang, MJ Kirisits, "Importance of Doping, Dopant Distribution, and Defects on Electronic Band Structure Alteration of Metal Oxide Nanoparticles: Implications for Reactive Oxygen Species," *Sci. Tot. Environ.* **568** (2016), 926-932.  
<http://www.sciencedirect.com/science/article/pii/S0048969716313195>

91) A Bergerud, SM Selbach, DJ Milliron\*, "Oxygen Incorporation and Release in Metastable Bixbyite V<sub>2</sub>O<sub>3</sub> Nanocrystals," *ACS Nano* **10** (2016), 6147-6155.  
<http://pubs.acs.org/doi/abs/10.1021/acsnano.6b02093>

90) J Kim, A Agrawal, F Krieg, A Bergerud, DJ Milliron\*, "The Interplay of Shape and Crystalline Anisotropies in Plasmonic Semiconductor Nanocrystals," *Nano Lett.* **16** (2016), 3879-3884. *ACS Editors'*

Choice. <http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b01390>

89) S Mehra, A Bergerud, DJ Milliron, E Chan, A Salleo\*, "A Core/Shell Approach to Dopant Incorporation and Shape Control in Colloidal Zinc Oxide Nanorods," *Chem. Mater.* **28** (2016), 3454-3461. <http://pubs.acs.org/doi/abs/10.1021/acs.chemmater.6b00981>

88) EL Runnerstrom, A Bergerud, A Agrawal, RW Johns, CJ Dahlman, A Singh, SM Selbach, DJ Milliron\*, "Defect Engineering in Plasmonic Metal Oxide Nanocrystals," *Nano Lett.* **16** (2016), 3390-3398. <http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b01171>

87) RW Johns, HA Bechtel, EL Runnerstrom, A Agrawal, SD Lounis, DJ Milliron\*, "Direct Observation of Narrow mid-Infrared Plasmon Linewidths of Single Metal Oxide Nanocrystals," *Nature Comm.* **7** (2016), 11583. <http://www.nature.com/ncomms/2016/160513/ncomms11583/full/ncomms11583.html>

86) Y Wang, EL Runnerstrom, DJ Milliron\*, "Switchable Materials for Smart Windows," *Ann. Rev. Chem. Bio. Eng.* **7** (2016), 283-304. <http://www.annualreviews.org/doi/abs/10.1146/annurev-chembioeng-080615-034647>

85) GK Ong, TE Williams, A Singh, E Schaible, BA Helms, DJ Milliron\*, "Ordering in Polymer Micelle-Directed Assemblies of Colloidal Nanocrystals," *Nano Lett.* **15** (2015), 8240-8244. <http://pubs.acs.org/doi/10.1021/acs.nanolett.5b03765>.

84) SM Meckler, C Li, WL Queen, TE Williams, JR Long, R Buonsanti, DJ Milliron, BA Helms\*, "Sub-Micron Polymer-Zeolitic Imidazolate Framework Layered Hybrids via Controlled Chemical Transformation of Naked ZnO Nanocrystal Films," *Chem. Mater.* **27** (2015), 7673-7679. <http://pubs.acs.org/doi/abs/10.1021/acs.chemmater.5b03219>

83) A Singh, BA Lindquist, GK Ong, RB Jadrich, A Singh, H Ha, CJ Ellison, TM Truskett\*, DJ Milliron\*, "Linking Semiconductor Nanocrystals into Gel Networks through All-Inorganic Bridges," *Angew. Chem. Int. Ed.* **54** (2015), 14840-14844. <http://onlinelibrary.wiley.com/doi/10.1002/anie.201508641/abstract>

82) TM Mattox, A Agrawal, DJ Milliron\*, "Low Temperature Synthesis and Surface Plasmon Resonance of Colloidal Lanthanum Hexaboride (LaB<sub>6</sub>) Nanocrystals," *Chem. Mater.* **27** (2015), 6620-6624. <http://pubs.acs.org/doi/10.1021/acs.chemmater.5b02297>

81) EL Rosen, K Gilmore, AM Sawvel, AT Hammack, SE Doris, S Aloni, V Altoe, D Nordlund, T-C Weng, D Sokaras, BE Cohen, JJ Urban, DF Ogletree, DJ Milliron, D Prendergast, BA Helms\*, "Chemically Directing *d*-Block Heterometallics to Nanocrystal Surfaces as Molecular Beacons of Surface Structure," *Chem. Sci.* **6** (2015), 6295-6304. <http://pubs.rsc.org/en/Content/ArticleLanding/2015/SC/C5SC01474C>

80) J Kim, GK Ong, Y Wang, G LeBlanc, TE Williams, TM Mattox, BA Helms, DJ Milliron\*, "Nanocomposite Architecture for Rapid, Spectrally-Selective Electrochromic Modulation of Solar Transmittance," *Nano Lett.* **15** (2015), 5574-5579. <http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.5b02197>

79) CJ Dahlman, Y Tan, MA Marcus, DJ Milliron\*, "Spectroelectrochemical Signatures of Capacitive Charging and Ion Insertion in Doped Anatase Titania Nanocrystals," *J. Am. Chem. Soc.* **137** (2015), 9160-9166. <http://pubs.acs.org/doi/abs/10.1021/jacs.5b04933>

78) HM Jeong, KM Choi, T Cheng, DK Lee, R Zhou, IW Ock, DJ Milliron, WA Goddard, JK Kang\*, "Rescaling of Metal Oxide Nanocrystals for Energy Storage Having High Capacitance and Energy Density with Robust Cycle Life," *Proc. Nat. Acad. Sci.* **112** (2015), 7914-7919. <http://www.pnas.org/cgi/doi/10.1073/pnas.1503546112>

77) A Singh, A Singh, J Ciston, K Bustillo, D Nordlund, DJ Milliron\*, "Synergistic Role of Dopants on the Morphology of Alloyed Copper Chalcogenide Nanocrystals," *J. Am. Chem. Soc.* **137** (2015), 6464-6467. <http://pubs.acs.org/doi/abs/10.1021/jacs.5b02880>

76) RJ Mendelsberg, PM McBride, JT Duong, MJ Bailey, A Llodes, DJ Milliron\*, BA Helms\*, "Dispersible Plasmonic Doped Metal Oxide Nanocrystal Sensors that Optically Track Redox Reactions in Aqueous Media with Single-Electron Sensitivity," *Adv. Opt. Mater.* **3** (2015), 1293-1300. <http://onlinelibrary.wiley.com/doi/10.1002/adom.201500208/abstract>

- 75) R Sharma, AM Sawvel, B Barton, A Dong, R Buonsanti, A Llodes, E Schaible, S Axnanda, Z Liu, JJ Urban, D Nordlund, C Kisielowski, DJ Milliron\*, "Nanocrystal Superlattice Embedded within an Inorganic Semiconducting Matrix by In Situ Ligand Exchange: Fabrication and Morphology," *Chem. Mater.* **27** (2015), 2755-2758. <http://pubs.acs.org/doi/abs/10.1021/cm504716s>
- 74) N DeForest\*, A Shehabi, J O'Donnell, G Garcia, J Greenblatt, ES Lee, S Selkowitz, DJ Milliron, "United States Energy and CO<sub>2</sub> Savings Potential from Deployment of Near-Infrared Electrochromic Window Glazings," *Build. Environ.* **89** (2015), 107-117. <http://www.sciencedirect.com/science/article/pii/S0360132315000785>
- 73) A Agrawal, I Kriegel, DJ Milliron\*, "Shape-Dependent Field Enhancement and Plasmon Resonance of Oxide Nanocrystals," *J. Phys. Chem. C* **119** (2015), 6227-6238. <http://pubs.acs.org/doi/abs/10.1021/acs.jpcc.5b01648>
- 72) A Singh, C Coughlan, DJ Milliron, KR Ryan\*, "Solution Synthesis and Assembly of Wurtzite derived Cu-In-Zn-S Nanorods with Tunable Composition and Band Gap," *Chem. Mater.* **27** (2015), 1517-1523. <http://pubs.acs.org/doi/abs/10.1021/cm5035613>
- 71) MV Kovalenko\*, L Manna, A Cabot, Z Hens, DV Talapin, CR Kagan, VI Klimov, AL Rogach, P Reiss, DJ Milliron, P Guyot-Sionnest, G Konstantatos, WJ Parak, T Hyeon, B Korgel, CB Murray, W Heiss\*, "Prospects of Nanoscience with Nanocrystals," *ACS Nano* **9** (2015), 1012-1057. <http://pubs.acs.org/doi/abs/10.1021/nn506223h>
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- 69) JB Rivest, G Li, ID Sharp, JB Neaton, DJ Milliron\*, "Phosphonic Acid Adsorbates Tune the Surface Potential of TiO<sub>2</sub> in Gas and Liquid Environment," *J. Phys. Chem. Lett.* **5** (2014), 2450-2454. <http://pubs.acs.org/doi/abs/10.1021/jz501050f>
- 68) EL Runnerstrom, A Llodes, SD Lounis, DJ Milliron\*, "Nanostructured Electrochromic Smart Windows: Traditional Materials and NIR-Selective Plasmonic Nanocrystals," *Chem. Commun.* **50** (2014), 10555-10572. (invited Feature) <http://pubs.rsc.org/en/content/articlehtml/2014/cc/c4cc03109a>
- 67) SD Lounis, EL Runnerstrom, A Bergerud, D Nordlund, DJ Milliron\*, "Influence of dopant distribution on the plasmonic properties of indium tin oxide nanocrystals," *J. Am. Chem. Soc.* **136** (2014), 7110-7116. <http://pubs.acs.org/doi/abs/10.1021/ja502541z>
- 66) SD Lounis, EL Runnerstrom, A Llodes, DJ Milliron\*, "Defect chemistry and plasmon physics of colloidal metal oxide nanocrystals," *J. Phys. Chem. Lett.* **5** (2014), 1564-1574. (invited Perspective) <http://pubs.acs.org/doi/abs/10.1021/jz500440e>
- 65) EL Rosen, AM Sawvel, DJ Milliron, BA Helms\*, "Influence of surface composition on electronic transport through naked nanocrystal networks," *Chem. Mater.* **26** (2014), 2214. <http://pubs.acs.org/doi/abs/10.1021/cm404149u>
- 64) IB Pehlivan\*, R Marsal, E Pehlivan, EL Runnerstrom, DJ Milliron, CG Granqvist, GA Niklasson, "Electrochromic devices with polymer electrolytes functionalized by SiO<sub>2</sub> and In<sub>2</sub>O<sub>3</sub>:Sn nanoparticles: Rapid coloring/bleaching dynamics and strong near-infrared absorption," *Sol. Energy Mater. Sol. Cells* **126** (2014), 241. <http://www.sciencedirect.com/science/article/pii/S092702481300295X>
- 63) DJ Gargas, EM Chan, AD Ostrowski, S Aloni, V Altoe, ES Barnard, B Sanii, JJ Urban, DJ Milliron, BE Cohen\*, PJ Schuck\*, "Engineering bright sub-10-nm upconverting nanocrystals for single-molecule imaging," *Nature Nano.* **9** (2014), 300. <http://www.nature.com/nnano/journal/v9/n4/full/nnano.2014.29.html>
- 62) TE Williams, CM Chang, EL Rosen, G Garcia, EL Runnerstrom, BL Williams, B Koo, R Buonsanti, DJ Milliron\*, BA Helms\*, "NIR-selective electrochromic heteromaterial frameworks: A platform to understand mesoscale transport phenomena in solid-state electrochemical devices," *J. Mater. Chem. C* **2** (2014), 3328. <http://pubs.rsc.org/en/content/articlepdf/2014/tc/c3tc32247e>
- 61) TM Mattox, A Bergerud, A Agrawal, DJ Milliron\*, "Influence of shape on the surface plasmon

- resonance of tungsten bronze nanocrystals," *Chem. Mater.* **26** (2014), 1779-1784.  
<http://pubs.acs.org/doi/pdf/10.1021/cm4030638>
- 60) DJ Milliron\*, R Buonsanti, A Llodes, BA Helms, "Constructing functional mesostructured materials from colloidal nanocrystal building blocks," *Acc. Chem. Res.* **47** (2014), 236.  
<http://pubs.acs.org/doi/pdf/10.1021/ar400133k>
- 59) A Dong\*, Y Jiao, DJ Milliron, "Electronically coupled nanocrystal superlattice films by in situ ligand exchange at the liquid-air interface," *ACS Nano* **7** (2013), 10978-10984.  
<http://pubs.acs.org/doi/pdf/10.1021/nn404566b>
- 58) L De Trizio, R Buonsanti, AM Schimpf, A Llodes, DR Gamelin, R Simonutti, DJ Milliron\*, "Nb-doped colloidal TiO<sub>2</sub> nanocrystals with tunable infrared absorption," *Chem. Mater.* **25** (2013), 3383-3390.  
<http://pubs.acs.org/doi/pdf/10.1021/cm402396c>
- 57) A Llodes, G Garcia, J Gazquez, DJ Milliron\*, "Tunable near-infrared and visible light transmittance in nanocrystal-in-glass composites," *Nature* **500** (2013), 323-326.  
<http://www.nature.com/nature/journal/v500/n7462/full/nature12398.html>
- 56) A Bergerud, R Buonsanti, JL Jordan-Sweet, DJ Milliron\*, "Synthesis and phase stability of metastable bixbyite V<sub>2</sub>O<sub>3</sub> colloidal nanocrystals," *Chem. Mater.* **25** (2013), 3172.  
<http://pubs.acs.org/doi/pdf/10.1021/cm401530t>
- 55) A Shehabi\*, N DeForest, A McNeil, E Masanet, J Greenblatt, ES Lee, G Masson, BA Helms, DJ Milliron, "U.S. energy savings potential from dynamic daylighting control glazings," *Energy Build.* **66** (2013), 415. <http://www.sciencedirect.com/science/article/pii/S0378778813004015>
- 54) C Kim, R Buonsanti, R Yaylian, DJ Milliron, J Cabana\*, "Carbon-free TiO<sub>2</sub> battery electrodes enabled by morphological control at the nanoscale," *Adv. Ener. Mater.* **3** (2013), 1286.  
<http://onlinelibrary.wiley.com/doi/10.1002/aenm.201300264/abstract>
- 53) JB Rivest, R Buonsanti, TE Pick, L Zhu, E Lim, C Clavero, E Schaible, BA Helms\*, DJ Milliron\*, "Evolution of ordered metal chalcogenide architectures through chemical transformations," *J. Am. Chem. Soc.* **135** (2013), 7446-7449. <http://pubs.acs.org/doi/pdf/10.1021/ja403071w>
- 52) L Xu, C Kim, AK Shukla, A Dong, TM Mattox, DJ Milliron, J Cabana\*, "Monodisperse Sn nanocrystals as platform for the study of mechanical damage during electrochemical reactions with Li," *Nano Lett.* **13** (2013), 1800. <http://pubs.acs.org/doi/pdf/10.1021/nl400418c>
- 51) R Buonsanti\*, DJ Milliron\*, "Chemistry of doped colloidal nanocrystals," *Chem. Mater.* **25**, (2013), 1305. *Invited review* <http://pubs.acs.org/doi/pdf/10.1021/cm304104m>
- 50) N DeForest\*, A Shehabi, G Garcia, J Greenblatt, E Masanet, ES Lee, S Selkowitz, DJ Milliron, "Regional performance targets for transparent near-infrared switching electrochromic window glazings," *Build. Environ.* **61** (2013), 160. <http://www.sciencedirect.com/science/article/pii/S0360132312003265>
- 49) G Garcia, R Buonsanti, A Llodes, EL Runnerstrom, A Bergerud, DJ Milliron\*, "Near infrared spectrally selective plasmonic electrochromic thin films," *Adv. Opt. Mater.* **1** (2013), 215.  
<http://onlinelibrary.wiley.com/doi/10.1002/adom.201200051/full>
- 48) IE Rauda, LC Saldarriaga-Lopez, BA Helms, LT Schelhas, D Membreno, DJ Milliron, SH Tolbert\*, "Nanoporous semiconductors synthesized through polymer templating of ligand-stripped CdSe nanocrystals," *Adv. Mater.* **25** (2013), 1315.  
<http://onlinelibrary.wiley.com/doi/10.1002/adma.201203309/abstract>
- 47) AM Schimpf, S Ochsenbein, R Buonsanti, DJ Milliron\*, DR Gamelin\*, "Comparison of extra electrons in colloidal *n*-type Al<sup>3+</sup>-doped and photochemically reduced ZnO nanocrystals," *Chem. Commun.* **48** (2012), 9352.
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- 44) EM Chan\*, G Han, JD Goldberg, DJ Gargas, AD Ostrowski, PJ Schuck, BE Cohen, DJ Milliron\*, "Combinatorial discovery of lanthanide-doped nanocrystals with spectrally pure upconverted emission," *Nano Lett.* **12** (2012), 3839. <http://pubs.acs.org/doi/pdf/10.1021/nl3017994>
- 43) MA Caldwell, RGD Jeyasingh, H-SP Wong, DJ Milliron\*, "Nanoscale phase change memory materials," *Nanoscale* **4** (2012), 4382. *Invited*
- 42) JT Duong, MJ Bailey, PM McBride, R Buonsanti, TE Pick, EL Rosen, DJ Milliron, BA Helms\*, "Efficient polymer passivation of ligand-stripped nanocrystal surfaces," *J. Poly. Sci. A: Poly. Chem.* **50** (2012), 3719-3727. <http://onlinelibrary.wiley.com/doi/10.1002/pola.26178/abstract>
- 41) EM Chan\*, DJ Gargas, PJ Schuck, DJ Milliron, "Concentrating and recycling energy in lanthanide codopants for efficient and spectrally pure emission: The case of NaYF<sub>4</sub>:Er<sup>3+</sup>/Tm<sup>3+</sup> upconverting nanocrystals," *J. Phys. Chem. B* **116** (2012), 10561.
- 40) IB Pehlivan\*, EL Runnerstrom, S-Y Li, GA Niklasson, DJ Milliron, CG Granqvist, "A polymer electrolyte with high luminous transmittance and low solar throughput: Polyethyleneimine-lithium bis(trifluoromethylsulfonyl) imide with In<sub>2</sub>O<sub>3</sub>:Sn nanocrystals," *Appl. Phys. Lett.* **100** (2012), 241902.
- 39) RJ Mendelsberg, G Garcia, H Li, L Manna, DJ Milliron\*, "Understanding the plasmon resonance in ensembles of degenerately doped semiconductor nanocrystals," *J. Phys. Chem. C* **116** (2012), 12226-12231. <http://pubs.acs.org/doi/abs/10.1021/jp302732s>.
- 38) RJ Mendelsberg, G Garcia, DJ Milliron\*, "Extracting reliable electronic properties from transmission spectra of metal oxide thin films and nanocrystal films by careful application of Drude theory," *J. Appl. Phys.* **111** (2012), 063515.
- 37) AD Ostrowski, EM Chan, DJ Gargas, EM Katz, G Han, PJ Schuck, DJ Milliron, BE Cohen\*, "Controlled synthesis of bright and biocompatible lanthanide-doped upconverting nanoparticles," *ACS Nano* **6** (2012), 2686.
- 36) EL Rosen, R Buonsanti, A Llordes, AM Sawvel, DJ Milliron, BA Helms\*, "Exceptionally mild reactive stripping of native ligands from nanocrystal surfaces using Meerwein's salt," *Angew. Chem. Int. Ed.* **51** (2012), 684-689.
- 35) RY Wang, R Tangirala, S Raoux, JL Jordan-Sweet, DJ Milliron\*, "Ionic and electronic transport in Ag<sub>2</sub>S nanocrystal – GeS<sub>2</sub> matrix composites with size-controlled Ag<sub>2</sub>S nanocrystals," *Adv. Mater.* **24** (2012), 99-103. <http://onlinelibrary.wiley.com/doi/10.1002/adma.201102623/abstract>
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- 23) RY Wang, J Feser, X Gu, KM Yu, RA Segalman, A Majumdar, DJ Milliron\*, JJ Urban\*, "A Universal and Solution-Processable Precursor to Bismuth Chalcogenide Thermoelectrics," *Chem. Mater.* **22** (2010), 1943.
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heterostructures with linear and branched topology," *Nature* **430** (2004), 190.

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4) JP Chen, G Klaerner, JI Lee, D Markiewicz, VY Lee, RD Miller, JC Scott\*, "Efficient, blue light-emitting diodes using crosslinked layers of polymeric arylamine and fluorene," *Synth. Met.* **107** (1999), 129.

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#### **Editorial & Commentary:**

3) BA Helms\*, TE Williams, R Buonsanti, DJ Milliron, "Colloidal Nanocrystal Frameworks," *Adv. Mater.* (2015), <http://dx.doi.org/10.1002/adma.201500127>

2) DJ Milliron, "Quantum dot solar cells: The surface plays a core role," *Nat. Mater.* **13** (2014), 772. <http://www.nature.com/nmat/journal/v13/n8/full/nmat4032.html>

1) B Dubertret, J Hollingsworth, H Liu, D Milliron, J Owen, E Weiss, WE Buhro, F Caruso, SM Kauzlarich, M Ward, "Preface to the *Chemistry of Materials* Special Issue: Synthetic and Mechanistic Advances in Nanocrystal Growth," *Chem. Mater.* **25** (2013), 1153-1154.

#### **Book Chapters:**

3) A Llordes, EL Runnerstrom, SD Lounis, DJ Milliron, "Plasmonic electrochromism of metal oxide nanocrystals," in *Electrochromic Materials and Devices*, RJ Mortimer, DR Rosseinsky and PMS Monk, Eds. Wiley, 2015.

2) JJ Urban, DJ Milliron, "Heterojunction solar cells based on colloidal quantum dots," in *Colloidal Quantum Dot Optoelectronics and Photovoltaics*, G Konstantatos and EH Sargent, Eds. Cambridge Univ. Press, 2013.

1) DJ Milliron, Q Huang, Y Zhu, "Novel Deposition Methods," in *Phase Change Materials: Science and Applications*, S Raoux and M Wuttig, Eds. Springer, 2009.

#### **Issued Patents:**

- 13) DJ Milliron, G Garcia, A Lordes, R Tangirala, R Buonsanti, "Nanostructured transparent conducting oxide electrochromic device," US9341913, 2016.
- 12) R Tangirala, DJ Milliron, A Lordes, "Nanocomposite and method of making thereof," US9287119, 2016.
- 11) DJ Milliron, EL Runnerstrom, BA Helms, A Lordes, R Buonsanti, G Garcia "Nanocrystal polymer composite electrochromic device," US9207513, 2015.
- 10) DJ Milliron, R Buonsanti, "Colloidal infrared reflective and transparent conductive aluminum-doped zinc oxide nanocrystals," US8961828, 2015.
- 9) AP Alivisatos, JJ Dittmer, WU Huynh, D Milliron, "Semiconductor-nanocrystal/conjugated polymer thin films," US8753916, 2014.
- 8) AP Alivisatos, I Gur, D Milliron, "Nanocrystal solar cells processed from solution," US8440906, 2013.
- 7) I Gur, D Milliron, AP Alivisatos, H Liu, "Methods of making functionalized nanorods," US8093494, 2012.
- 6) J Hedrick, DJ Milliron, A Nelson, R Pratt, "Method for forming and aligning chemically mediated dispersion of magnetic nanoparticles in a polymer," US7854878, 2010.
- 5) AP Alivisatos, JJ Dittmer, WU Huynh, DJ Milliron, "Semiconductor-nanocrystal/conjugated polymer thin films," US7777303, 2010.
- 4) MA Caldwell, DJ Milliron, "Inorganic metal chalcogen cluster precursors and methods for forming colloidal metal chalcogenide nanoparticles using the same," US7670584, 2010.
- 3) MA Caldwell, DJ Milliron, "Inorganic metal chalcogen cluster precursors and methods for forming colloidal metal chalcogenide nanoparticles using the same," US7563430, 2009.
- 2) DJ Milliron, DB Mitzi, "Solution deposition of chalcogenide films containing transition metals," US7341917, 2008.
- 1) AP Alivisatos, D Milliron, L Manna, SM Hughes, "Nanocrystals with linear and branched topology," US7303628, 2007.

#### **Pending Patent Applications:**

- 9) DJ Milliron, Y Wang, "Electrochromic Electrodes and Methods of Making and Use Thereof," 2016.
- 8) DJ Milliron, J Kim, "Electrochromic Electrodes and Methods of Making and Use Thereof," 2016.
- 7) DJ Milliron, BH Kim, "Nanostructured Conducting Films with a Heterogeneous Dopant Distribution and Methods of Making and Use Thereof," 2015.
- 6) DJ Milliron, G LeBlanc, A Bergerud, "Electrochemically and Thermally Switchable Optical Coatings," 2015.
- 5) BE Cohen, JP Schuck, DJ Gargas, EM Chan, AD Ostrowski, JJ Urban, DJ Milliron, "Engineering Bright Sub-10-nm Upconverting Nanocrystals for Single-Molecule Imaging," 2014.
- 4) DJ Milliron, A Lordes, Y Wang, G LeBlanc, "Method for Producing Electrochromic Films by Low Temperature Chemical Condensation of Polyoxometalates," 2014.
- 3) DJ Milliron, B Koo, G Garcia, CJ Dahlman, TM Mattox, L De Trizio, "Conductive Transition Metal Oxide Nanostructured Electrochromatic Material and Optical Switching Devices Constructed Thereof," 2014.
- 2) BA Helms, DJ Milliron, EL Rosen, R Buonsanti, A Lordes, "Surface Chemical Modification of Nanocrystals," 2013.
- 1) DJ Milliron, A Lordes, R Buonsanti, G Garcia, "Electrochromic Nanocomposite Films," 2011, 2014.

#### **Honors and Awards:**

- Energy Sciences Leadership Group member (2016, deferred)
- Sloan Research Fellowship (2016)



- Defense Science Study Group member (2016-2017)
- Caltech Resnick Institute Resonate Award (2015)
- DOE Early Career Research Program Awardee (2010-2015)
- R&D 100 Award for Universal Smart Windows (2013)
- BASF/VW Science Award in Electrochemistry (finalist, 2012, 2013)
- Saint-Gobain NOVA External Venturing Innovation Competition (w/ Heliotrope, 1<sup>st</sup> place, 2012)
- NREL Innovation Growth Forum (w/ Heliotrope, finalist, 2012)
- Berkeley Lab Spot Award (2011)
- MDV (Mohr Davidow Ventures) Innovators Award (2010)
- LBNL Outstanding Performance Award (2010)
- DOE Outstanding Mentor Award (2010)
- Berkeley Lab Spot Award (2010)
- R&D 100 Award for Nanocrystal Solar Cells (2009)
- EPCOS Conference, Best Presentation Award (2009)
- MRS Spring Meeting, Best Poster Award (2007)
- Tech Transfer Award, LBNL (2004)
- National Defense Science and Engineering Graduate Fellowship (1999-2002)
- Barry M. Goldwater Scholarship (1997-1999)
- Robert C. Byrd Scholarship (1995-1999)
- National Science Scholars' Program award recipient (1995)
- Calvin Dodd MacCracken Senior Thesis Award (1999) – one of two awarded from 300 eligible
- Robert Thornton McCay Prize in Physical Chemistry (1999) – one of three (class of 40)
- Outstanding Achievement in Materials Science (1999) – only award in Materials Science
- William Foster Memorial Prize in Chemistry (1998) – only award (class of 40)

#### **Synergistic Activities:**

- Gordon Research Conference on Colloidal Semiconductor Nanocrystals (founding vice chair, 2014; chair, 2016)
- Founder and Chief Scientific Officer, Heliotrope Technologies (2012 - )
- Scientific Advisory Board, PLANT PV (2011 - )
- Technical Advisory Board, Pacific Light Tech (2011 - )
- Technical Advisory Board, Spectrawatt (2010-2011)
- Scientific Advisory Board, Nanosys (2009-2010)
- MRS/APS committee on Energy Critical Elements (2009-2011)

#### **Teaching Experience:**

Materials Physics	UT Austin CHE 384T (2016)
Chemical Engineering Materials	UT Austin CHE 350 (2014-2015)
General Chemistry	Graduate Student Instructor, UCB Chemistry
Statistical Mechanics and Thermodynamics	Graduate Student Instructor, UCB Chemistry (2 terms)
Introduction to Nanotechnology	Annual (4 times to date) guest lecture at Haas School of Business, UCB
Introduction to Nano-Science and Engineering	Guest lecture in graduate class, UCB MSE Department
Preparative Strategies in Solid State and Materials Chemistry	Guest lectures in ICMR summer school, UCSB
Materials Chemistry	Guest lectures, UCB Chem and MSE Depts
Introduction to Nanotechnology	Guest lecture, Stanford EE Dept

#### **Graduate and Postdoctoral Advisors and Advisees:**

<b>First name</b>	<b>Last name</b>	<b>Relationship</b>	<b>Co-advisor</b>	<b>Current Affiliation</b>
Ankit	Agrawal	student		UT-Austin
Shin Hum	Cho	student		UT-Austin
Clayton	Dahlman	student		UT-Austin

Lauren	Gilbert	student		UT-Austin
Sung Yeon	Heo	student		UT-Austin
Robert	Johns	student		UC Berkeley
Gary	Ong	student		UC Berkeley
Camila	Saez	student		UT-Austin
Corey	Staller	student		UT-Austin
Byung Hyo	Kim	postdoc		UT-Austin
Beth	Lindquist	postdoc	TM Truskett, UT-Austin	UT-Austin
Omid	Zandi	postdoc		UT-Austin
Amy	Bergerud	student		
Marissa	Caldwell	student	H-SP Wong, Stanford	Medtronic
Guillermo	Garcia	student		Heliotrope Technologies
Sebastien	Lounis	student		LBNL
Evan	Runnerstrom	student		NC State (postdoc)
Raffaella	Buonsanti	postdoc		EPFL
Emory	Chan	postdoc		LBNL
Gang	Han	postdoc	BE Cohen, LBNL	Univ. of Massachusetts
Jongwook	Kim	postdoc		Ecole Polytechnique
Natacha	Krins	postdoc	TJ Richardson, J Cabana, LBNL	Univ. Pierre et Marie Curie
Gabriel	LeBlanc	postdoc		Univ. of Tulsa
Anna	Llordes	postdoc		CIC EnergiGUNE, Spain
Rueben	Mendelsberg	postdoc	A Anders, LBNL	Velo3D
Hoi Ri	Moon	postdoc	JJ Urban, LBNL	UNIST
Oun Ho	Park	postdoc		Applied Materials
Jessy	Rivest	postdoc		Palo Alto Research Center
Evelyn	Rosen	postdoc	BA Helms, LBNL	Heliotrope Technologies
April	Sawvel	postdoc	BA Helms, LBNL	LLNL (postdoc)
Richa	Sharma	postdoc		Schlumberger Research
Amita	Singh	postdoc		LANL (postdoc)
Ajay	Singh	postdoc		LANL (postdoc)
Yizheng	Tan	postdoc		
Ravisubhash	Tangirala	postdoc		Nanosys
Robert	Wang	postdoc		Arizona State Univ.
Yang	Wang	postdoc		Air Liquide
Renjia	Zhou	postdoc		Linear Technologies
A. Paul	Alivisatos	PhD advisor		UC Berkeley/LBNL
David	Mitzi	PD advisor		Duke Univ.

### Professional Memberships:

- American Chemical Society
- Materials Research Society
- American Physical Society
- American Institute of Chemical Engineers
- Sigma Xi
- Phi Beta Kappa

### Research Proposal Review Activities:

- NSF Division of Materials Research
- DOE Basic Energy Sciences

- Proposal Study Panels for Center for Functional Nanomaterials, Brookhaven National Laboratory and Center for Integrated Nanotechnologies, Los Alamos and Sandia National Laboratories
- Cyclotron Road, Lawrence Berkeley National Laboratory

#### **Journal Editorial Activities:**

- *Nano Letters*, Associate Editor (2015 - )
- *ACS Photonics*, Editorial Advisory Board (2016 - )
- *Chemistry of Materials*, Editorial Advisory Board (2015 - )
  - *Chemistry of Materials* Reviewer Award (2015)
- *ACS Combinatorial Science*, Editorial Advisory Board (2011 - 2015)
- *Scientific Reports*, Editorial Board (2013 - 2015)

#### **Invited Presentations and Seminars:**

- 06.2016 Fudan University, Department of Chemistry, Shanghai, China
- 06.2016 Nature Conference on Materials for Energy, Wuhan, China
- 04.2016 Notre Dame University, Department of Chemistry
- 04.2016 Pennsylvania State University, Department of Chemistry
- 04.2016 MIT, Center for Excitonics
- 03.2016 Rice University, Materials Science & Nanoengineering Department
- 01.2016 Ecole Polytechnique, Paris, France
- 01.2016 Universite de Liege, Liege, Belgium
- 12.2015 Pacifichem, Honolulu
- 12.2015 Materials Research Society National Meeting, Boston (two presentations)
- 11.2015 Composites at Lake Louise, Lake Louise, Canada
- 10.2015 stARTup Studio, Austin
- 09.2015 CICbiomaGUNE seminar, Donostia-San Sebastian, Spain
- 09.2015 CICenergiGUNE seminar, Vitoria-Gasteiz, Spain
- 09.2015 FQDots Conference, nanoGe, Santiago de Compostella, Spain
- 08.2015 American Chemical Society National Meeting, Boston, Massachusetts
- 07.2015 Aspen Ideas Festival, Aspen
- 05.2015 Electrochemical Society National Meeting, Chicago
- 05.2015 Washington University, St. Louis, Institute for Materials Science & Engineering
- 04.2015 Washington University, St. Louis, Department of Chemistry
- 03.2015 American Chemical Society National Meeting, Denver (two presentations)
- 03.2015 BASF 150<sup>th</sup> Anniversary Science Symposium, Ludwigshafen, Germany
- 03.2015 American Physical Society National Meeting, San Antonio
- 02.2015 Gordon Research Conference, Nanomaterials for Energy Technologies, Ventura
- 02.2015 CORE-CM seminar, Michigan State University
- 02.2015 Center for Nano- and Molecular Science, University of Texas at Austin
- 01.2015 Materials Science & Engineering Department, North Carolina State University
- 10.2014 KAUST, Applied Functional Materials Workshop, Saudi Arabia
- 10.2014 Wayne State University, Nano@Wayne seminar, Detroit, Michigan
- 09.2014 Center for NanoScience, Workshop: Walk and Talk at the Nanoscale, Venice, Italy
- 08.2014 American Chemical Society National Meeting, San Francisco, California
- 07.2014 Gordon Research Conference, Nanostructure Fabrication, University of New England
- 07.2014 Gordon Research Conference, Plasmonics, Sunday River Resort
- 06.2014 The Molecular Foundry, Lawrence Berkeley National Lab, Berkeley
- 05.2014 European Materials Research Society Spring Meeting, Lille, France (two presentations)
- 05.2014 Nanoscience with Nanocrystals (NaNaX), Bad Hofgastein, Austria
- 04.2014 Materials Research Society National Meeting, San Francisco, California
- 03.2014 American Chemical Society National Meeting, Dallas, Texas
- 02.2014 ARPA-E Energy Innovation Summit, Washington, DC
- 02.2014 Studio One: The Nature of Programming Matter, University of California, Berkeley

(plenary)

01.2014 Middle Eastern Technical University, Ankara, Turkey  
10.2013 Norwegian University of Science and Technology, Trondheim, Norway  
09.2013 Department of Chemistry, Texas A&M University, College Station, Texas  
09.2013 American Chemical Society National Meeting, Indianapolis  
08.2013 Transatlantic Frontiers of Chemistry, Seeon, Germany  
07.2013 ICMAT, Singapore  
05.2013 BASF, Ludwigshafen, Germany  
04.2013 Ludwig Maximilian University, Department of Chemistry, Munich, Germany  
04.2013 Max Planck Institute for Chemical Energy Conversion, Muelheim, Germany  
04.2013 Max Planck Institute for Solid State Research, Stuttgart, Germany  
04.2013 Massachusetts Institute of Technology, Materials Science and Engineering Department  
04.2013 University of Texas at Austin, Chemical Engineering Department  
04.2013 Materials Research Society Spring Meeting, San Francisco  
03.2013 University of California, Berkeley, Nanoscale Science and Engineering seminar  
02.2013 University of California, Berkeley, Chemical Engineering Department  
02.2013 Cornell University, Materials Science and Engineering Department, Ithaca  
02.2013 University of Washington, Materials Science and Engineering Department, Seattle  
11.2012 ALS/CXRO Seminar Series, Berkeley  
11.2012 Seoul National University, Department of Chemical and Biological Engineering, Seoul  
11.2012 KAIST, EEWS Department, Daejeon  
11.2012 Yonsei University, Department of Chemistry, Seoul  
11.2012 Stanford University, Optics and Electronics seminar, Palo Alto, California  
10.2012 Advanced Light Source Workshop on mesoscale science beamline, Berkeley  
10.2012 Molecular Foundry Workshop on Nanoscale Battery Materials, Berkeley  
10.2012 Bay Area Photovoltaics Consortium Annual Meeting, Berkeley (plenary)  
09.2012 University of California, Berkeley, Department of Chemistry  
08.2012 Dow Chemical, Midland, MI  
08.2012 Tenth International Meeting on Electrochromism, Holland, MI (plenary)  
06.2012 Gordon Research Conference, Inorganic Chemistry, University of New England  
06.2012 Istituto Italiano di Tecnologia, Genoa, Italy  
06.2012 CIMTEC, Montecatini Terme, Italy  
04.2012 Princeton University, Department of Chemistry  
04.2012 University of California, Los Angeles, CNSI  
02.2012 University of California, Santa Barbara, Materials Department  
01.2012 SPIE Photonics West, BIOS, San Francisco, California  
11.2011 Marin Science Seminar, San Rafael, California  
10.2011 ARPA-E, US Department of Energy, Washington, DC  
09.2011 European Materials Research Society Meeting, Warsaw  
08.2011 American Chemical Society National Meeting, Denver  
07.2011 Gordon Research Conference, Clusters, Nanocrystals, & Nanostructures, Mount Holyoke  
07.2011 Argonne National Laboratory, Center for Nanoscale Materials  
05.2011 LBNL Carbon Cycle 2.0 Seminar, Berkeley  
05.2011 University of California, San Diego, Nanoengineering Department  
04.2011 University of California, Berkeley, EECS Solid State Seminar  
04.2011 California Institute of Technology, Forum on Nanotechnology for Sustainability  
02.2011 University of California, Santa Barbara, MROP  
09.2010 Istituto Italiano di Tecnologia, Genoa, Italy  
08.2010 LBNL Summer Lecture Series, Berkeley  
06.2010 Crystal Growth West, South Lake Tahoe, California  
05.2010 DNV Materials Forum, Columbus, Ohio  
01.2010 University of California, Santa Barbara, Materials Department  
09.2009 European Phase Change and Ovonic Science conference, Aachen, Germany, Selected

as "Best Presentation."

06.2009 NSRC contractors meeting, Annapolis, Maryland  
04.2009 MRS Spring Meeting, San Francisco  
01.2009 Oregon State University, Eugene  
10.2008 University of California, Berkeley, Nanoscience seminar series  
09.2008 LBNL, The Molecular Foundry  
09.2008 European Phase Change and Ovonic Science Conference, Prague  
04.2008 SUNY, Stonybrook, Department of Physics and Astronomy  
04.2008 MRS Spring Meeting, San Francisco  
10.2007 CCNY, New York, Department of Chemistry  
11.2006 Palo Alto Research Center (PARC)  
03.2003 International Symposium on Compound Semiconductors (ISCS), San Diego  
03.2003 Nanoscale Science Research Centers Workshop, Washington, DC