

Jeffrey M. Pietryga

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EDUCATION

Ph.D., Chemistry, with a concentration in Inorganic Chemistry, University of Texas at Austin, Austin, TX, 2002
Thesis title: "Synthetic Approaches to Problems in Materials Science: Development of Novel Organometallic Compounds for Specific Applications"
Advisor: Professor Alan H. Cowley

BS in Chemistry, Honors Concentration, with High Honors, minor in Computer Science, University of Michigan-Flint, Flint, MI, 1997

EXPERIENCE

2015- **Deputy Group Leader**, Physical Chemistry and Applied Spectroscopy Group, Chemistry Division (C-PCS), Los Alamos National Laboratory

2012- **Affiliated Faculty**, Department of Chemical Engineering, New Mexico State University
Las Cruces, NM

2009- **Novel NanoMaterials Thrust Leader**, Center for Advanced Solar Photophysics, a DOE Energy Frontier Research Center, Los Alamos National Laboratory

2007-2015 **Technical Staff Member/R&D Scientist 3**, C-PCS, Los Alamos National Laboratory, Los Alamos, NM

2005-2007 **Intelligence Community Postdoctoral Research Fellow**, C-PCS, Los Alamos National Laboratory
Los Alamos, NM

2003-2005 **Postdoctoral Research Associate**, C-PCS, Los Alamos National Laboratory, Los Alamos, NM

1997-2002 **Graduate Research Assistant/Teaching Assistant**, University of Texas at Austin, Austin, TX

1994-1997 **Assistant Materials Analyst (Co-op)**, Delphi Automotive Systems, Flint, MI

PROFESSIONAL ACTIVITIES

- Group Representative, *Chemistry Division WSST*, 2012-2014
- Member, *American Chemical Society, Materials Research Society, American Physical Society*
- Reviewer, *Nature Communications, Journal of the American Chemical Society, ACS Nano, Chemistry of Materials, Journal of Physical Chemistry, Langmuir, ACS Photonics, ACS Applied Materials & Interfaces, Chemical Science, Coordination Chemistry Reviews*
- Proposal Reviewer, *National Science Foundation, Department of Energy Office of Basic Energy Sciences, ACS Petroleum Research Fund*

PUBLICATIONS >4600 citations, h-index= 36

(Google Scholar Profile: <http://scholar.google.com/citations?user=-XLjnegAAAAJ>)

54. Makarov, N.S.; Lin, Q.; **Pietryga, J.M.**; Robel, I. and V.I. Klimov, Auger Up-Conversion of Low-Intensity Infrared Light in Engineered Quantum Dots, *ACS Nano* **11**, Just Accepted (2017).

53. Liu, W.; Lin, Q.; Li, H.; Wu, K.; **Pietryga, J.M.** and V.I. Klimov, Mn²⁺-Doped Lead Halide Perovskite Nanocrystals with Dual-Color Emission Controlled by Halide Content, *J. Am. Chem. Soc.* **138**, ASAP (2016).

52. **Pietryga, J.M.**; Park, Y.S.; Lim, J.; Fidler, A.F.; Bae, W.K.; Brovelli, S. and V.I. Klimov, Spectroscopic and Device Aspects of Nanocrystal Quantum Dots, *Chem. Rev.* **116**, 10513-10622 (2016).

51. Guo, S.; Fidler, A.F.; He, K.; Su, D.; Chen, G.; Lin, Q.; **Pietryga, J.M.** and V.I. Klimov, Shape-Controlled Narrow-Gap SnTe Nanostructures: From Nanocubes to Nanorods and Nanowires, *J. Am. Chem. Soc.* **137**, 15074-15077 (2015).
50. Ramasamy, K.; Kotula, P.G.; Fidler, A.F.; Brumbach, M.T.; **Pietryga, J.M.** and S.A. Ivanov, Sn_xGe_{1-x} Alloy Nanocrystals: A First Step toward Solution-Processed Group IV Photovoltaics, *Chem. Mater.* **27**, 4640-4649 (2015).
49. Robel, I.; Shabaev, A.; Lee, D.C.; Schaller, R.D.; **Pietryga, J.M.**; Crooker, S.A.; Efros, A.L. and V.I. Klimov, Temperature and Magnetic-Field Dependence of Radiative Decay in Colloidal Germanium Quantum Dots, *Nano Lett.* **15**, 2685-2692 (2015).
48. Lin, Q.; Makarov, N.S.; Koh, W.-k.; Velizhanin, K.A.; Cirloganu, C.M.; Luo, H.; Klimov, V.I. and **J.M. Pietryga**, The design and synthesis of heterostructured quantum dots with dual emission in the visible and infrared, *ACS Nano* **9**, 539-47 (2015).
47. Lim, J.; Jeong, B.G.; Park, M.; Kim, J.K.; Pietryga, J.M.; Park, Y.-S.; Klimov, V.I.; Lee, C.; Lee, D.C. and W.K. Bae, Influence of Shell Thickness on the Performance of Light-Emitting Devices Based on CdSe/Zn1-XCdXS Core/Shell Heterostructured Quantum Dots, *Adv. Mater.* **26**, 8034-8040 (2014).
46. Park, Y.-S.; Bae, W.K.; **Pietryga, J.M.** and V.I. Klimov, Auger Recombination of Biexcitons and Negative and Positive Trions in Individual Quantum Dots, *ACS Nano* **8**, 7288-7296 (2014).
45. Cirloganu, C.M.; Padilha, L.A.; Lin, Q.; Makarov, N.S.; Velizhanin, K.A.; Luo, H.; Robel, I.; **Pietryga, J.M.**, and V.I. Klimov, Enhanced Carrier Multiplication in Engineered Quasi-Type-II Quantum Dots, *Nat. Commun.* **5**, 4148 (2014).
44. McDaniel, H.; Kuposov, A.Y.; Draguta, S.; Makarov, N.S.; **Pietryga, J.M.** and V.I. Klimov, Simple yet Versatile Synthesis of CuInSe_xS_{2-x} Quantum Dots for Sunlight Harvesting, *J. Phys. Chem. C* **118**, 16987-16994 (2014).
43. **Pietryga, J.M.**; Hollingsworth, J.A.; Wang, F. and W.E. Buhro, Mid-Infrared Emitting Lead Selenide Nanocrystal Quantum Dots, *Inorg. Synth.* **36**, 198-202 (2014).
42. Park, Y.-S.; Bae, W.K.; Padilha, L.A.; **Pietryga, J.M.**; Klimov, V.I., Effect of the Core/Shell Interface on Auger Recombination Evaluated by Single-Quantum-Dot Spectroscopy, *Nano Lett.* **14**, 396-402 (2014).
41. McDaniel, H.; Fuke, N.; Makarov, N.S.; **Pietryga, J.M.** and V.I. Klimov, An integrated approach to realizing high-performance liquid-junction quantum dot-sensitized solar cells, *Nat. Commun.* **4**, 2887 (2013).
40. Bae, W.K.; Park, Y.-S.; Lim, J.; Lee, D.; Padilha, L.A.; McDaniel, H.; Robel, I.; Lee, C.; **Pietryga, J.M.** and V.I. Klimov, Controlling the influence of Auger recombination on the performance of quantum-dot light-emitting diodes, *Nat. Commun.* **4**, 2661 (2013).
39. Stewart, J.T.; Padilha, L.A.; Bae, W.K.; Koh, W.-k.; **Pietryga, J.M.** and V.I. Klimov, Carrier Multiplication in Quantum Dots within the Framework of Two Competing Energy Relaxation Mechanisms, *J. Phys. Chem. Lett.* **4**, 2061-2068 (2013).
38. Koh, W.-k.; Kuposov, A.Y.; Stewart, J.T.; Pal, B.N.; Robel, I.; **Pietryga, J.M.** and V.I. Klimov, Heavily doped *n*-type PbSe and PbS nanocrystals using ground-state charge transfer from cobaltocene, *Sci. Rep.* **3**, 2004 (2013).
37. Padilha, L.A.; Stewart, J.T.; Sandberg, R.L.; Bae, W.K.; Koh, W.-k.; **Pietryga, J.M.** and V.I. Klimov, Carrier Multiplication in Semiconductor Nanocrystals: Influence of Size, Shape and Composition, *Acc. Chem. Res.* **46**, 1261-1269 (2013).
36. Bae, W.K.; Padilha, L.A.; Park, Y.-S.; McDaniel, H.; Robel, I.; **Pietryga, J.M.** and V.I. Klimov, Controlled Alloying of the Core-Shell Interface in CdSe/CdS Quantum Dots for Suppression of Auger Recombination, *ACS Nano* **7**, 3411-3419 (2013).
35. Luther, J.M and **J.M. Pietryga**, Stoichiometry Control in Quantum Dots: A Viable Analog to Impurity Doping of Bulk Materials, *invited perspective, ACS Nano* **7**, 1845-1849 (2013).

34. Padilha, L.A.; Bae, W.K.; Klimov, V.I.; **Pietryga, J.M.** and Richard D. Schaller, Response of Semiconductor Nanocrystals to Extremely Energetic Excitation, *Nano Lett.* **13**, 925-932 (2013).
33. Padilha, L.A.; Stewart, J.T.; Sandberg, R.L.; Bae, W.K.; Koh, W.-k.; **Pietryga, J.M.** and V.I. Klimov, Aspect Ratio Dependence of Auger Recombination and Carrier Multiplication in PbSe Nanorods, *Nano Lett.* **13**, 1092-1099 (2013).
32. McDaniel, H.; Fuke, N.; **Pietryga, J.M.** and V.I. Klimov, Engineered CuInSe_xS_{2-x} Quantum Dots for Sensitized Solar Cells, *J. Phys. Chem. Lett.* **4**, 355-361 (2013).
31. Bae, W.K.; Joo, J.; Padilha, L.A.; Won, J.; Lee, D.C.; Lin, Q.; Koh, W.-k.; Luo, H.; Klimov, V.I. and **J.M. Pietryga**, Highly Effective Surface Passivation of PbSe Quantum Dots through Reaction with Molecular Chlorine, *J. Am. Chem. Soc.* **134**, 20160-20168 (2012).
30. Pandey, A.; Brovelli, S.; Viswanatha, R.; Li, L.; **Pietryga, J.M.**; Klimov, V.I. and S.A. Crooker, Long-lived photoinduced magnetization in copper-doped ZnSe-CdSe core-shell nanocrystals, *Nat. Nanotechnol.*, **7**, 792-797 (2012).
29. Sandberg, R.L.; Padilha, L.A.; Qazilbash, M.M.; Bae, W.K.; Schaller, R.D.; **Pietryga, J.M.**; Stevens, M.J.; Baek, B.; Nam, S.W. and V.I. Klimov, Multiexciton Dynamics in Infrared-Emitting Colloidal Nanostructures Probed by a Superconducting Nanowire Single-Photon Detector, *ACS Nano* **6**, 9532-9540 (2012).
28. Khanal, B.P.; Pandey, A.; Li, L.; Lin, Q.; Bae, W.K.; Luo, H.; Klimov, V.I. and **J. M. Pietryga**, Generalized Synthesis of Hybrid Metal-Semiconductor Nanostructures Tunable from the Visible to the Infrared, *ACS Nano* **6**, 3832-3840 (2012).
27. Stewart, J. T.; Padilha, L.A.; Qazilbash, M.M.; **Pietryga, J.M.**; Midgett, A.G.; Luther, J.M.; Beard, M.C.; Nozik, A.J. and V.I. Klimov, Comparison of carrier multiplication yields in PbS and PbSe nanocrystals: The role of competing energy-loss processes, *Nano Lett.* **12**, 622-628 (2012).
26. Viswanatha, R.; **Pietryga, J.M.**, Klimov, V.I. and S.A. Crooker, Spin-polarized Mn²⁺ emission from Mn-doped colloidal nanocrystals, *Phys. Rev. Lett.* **107**, 067402 (2011).
25. Padilha, L.A.; Robel, I.; Lee, D.C.; Nagpal, P.; **Pietryga, J.M.** and V.I. Klimov, Spectral Dependence of Nanocrystal Photoionization Probability: The Role of Hot-Carrier Transfer, *ACS Nano* **5**, 5045-55 (2011).
24. Li, L.; Pandey, A.; Werder, D.J.; Khanal, B.K.; **Pietryga, J.M.** and V.I. Klimov, Efficient synthesis of highly luminescent copper indium sulfide based core/shell nanocrystals with surprisingly long-lived emission, *J. Am. Chem. Soc.* **133**, 1176-9 (2011).
23. McGuire, J.A.; Sykora, M.; Robel, I.; Padilha, L.A.; Joo, J.; **Pietryga, J.M.** and V.I. Klimov, Spectroscopic Signatures of Photocharging due to "Hot" Carrier Transfer in Solutions of Semiconductor Nanocrystals under Low-Intensity Ultraviolet Excitation, *ACS Nano* **4**, 6087-6097 (2010).
22. Schaller, R.D.; Crooker, S.A.; Bussian, D.A.; Pietryga, J.M.; Joo, J. and V.I. Klimov, Revealing the Exciton Fine Structure of PbSe Nanocrystal Quantum Dots Using Optical Spectroscopy in High Magnetic Fields. *Phys. Rev. Lett.* **105**, 067403 (2010).
21. Lee, D.C.; Robel, I.; **Pietryga, J.M.** and V.I. Klimov, Infrared-Active Heterostructured Nanocrystals with Ultralong Carrier Lifetimes. *J. Am. Chem. Soc.* **132**, 9960-2 (2010).
20. McGuire, J.A.; Sykora, M.; Joo, J.; **Pietryga, J.M.** and V.I. Klimov, Apparent Versus True Carrier Multiplication Yields in Semiconductor Nanocrystals. *Nano Lett.* **10**, 2049-57 (2010).
19. Sykora, M.; Kuposov, A.Y.; McGuire, J.A.; Schulze, R.K.; Tretiak, O.; **Pietryga, J.M.** and V.I. Klimov, Effect of Air Exposure on Surface Properties, Electronic Structure and Carrier Relaxation in PbSe Nanocrystals. *ACS Nano* **4**, 2021-34 (2010).
18. Joo, J.; **Pietryga, J.M.**; McGuire, J.A.; Jeon, S.; Williams, D.J.; Wang, H.-L. and V.I. Klimov, A Reduction Pathway in the Synthesis of PbSe Nanocrystal Quantum Dots. *J. Am. Chem. Soc.*, **131**, 10620-8 (2009).
17. Lee, D.C.; **Pietryga, J.M.**; Robel, I.; Werder, D.J.; Schaller, R.D. and V.I. Klimov. Colloidal synthesis of infrared-emitting germanium nanocrystals. *J. Am. Chem. Soc.* **131**, 3436-7 (2009).

16. McGuire, J.A.; Joo, J.; **Pietryga, J.M.**; Schaller, R.D. and V.I. Klimov, New aspects of carrier multiplication in semiconductor nanocrystals. *Acc. Chem. Res.* **41**, 1810-9 (2008).
15. **Pietryga, J.M.**; Zhuravlev, K.K.; Whitehead, M.; Klimov, V.I. and R.D. Schaller, Evidence for Barrierless Auger Recombination in PbSe Nanocrystals: A Pressure-Dependent Transient Absorption Study. *Phys. Rev. Lett.* **101**, 217401 (2008).
14. Wang, F.; Yu, H.; Jeong, S.; **Pietryga, J.M.**; Hollingsworth, J.A.; Gibbons, P.C. and W.E. Buhro, The Scaling of the Effective Band Gaps in Indium-Arsenide Quantum Dots and Wires. *ACS Nano* **2**, 1903-13 (2008).
13. **Pietryga, J.M.**; Werder, D.J. ; Williams, D.J.; Casson, J.L.; Schaller, R.D.; Klimov, V.I. and J.A. Hollingsworth, Utilizing the lability of lead selenide to produce heterostructured nanocrystals with bright, stable infrared emission. *J. Am. Chem. Soc.* **130**, 4879-85 (2008).
12. Schaller, R.D.; **Pietryga, J.M.** and V.I. Klimov, Carrier Multiplication in InAs Nanocrystal Quantum Dots with an Onset Defined by the Energy Conservation Limit. *Nano Lett.* **7**, 3469-76 (2007).
11. Jiang, X.; Schaller, R.D.; Lee, S.B.; **Pietryga, J.M.**; Klimov, V.I. and A.A. Zakhidov, PbSe Nanocrystal/Conducting Polymer Solar Cells with 2 Microns Infrared Response. *J. Mater. Res.* **22**, 2204-10 (2007).
10. Zhuravlev, K.K.; **Pietryga, J.M.**; Sander, R.K. and R.D. Schaller, Optical Properties of PbSe Nanocrystal Quantum Dots Under Pressure. *Appl. Phys. Lett.* **90**, 043110 (2007).
9. Sapra, S.; Nanda, J.; **Pietryga, J.M.**; Hollingsworth, J.A. and D.D. Sarma, Unraveling internal structures of highly luminescent PbSe Nanocrystallites using variable-energy synchrotron radiation photoelectron spectroscopy. *J. Phys. Chem. B.* **110**, 15244-15250 (2006).
8. Schaller, R.D.; Sykora, M.; **Pietryga, J.M.** and V.I. Klimov, Seven excitons at a cost of one: Redefining the limits for conversion efficiency of photons into charge carriers. *Nano Lett.* **6**, 424-429 (2006).
7. Maskaly, G.R.; Petruska, M.A.; Nanda, J.; Bezel, I.V.; Schaller, R.D.; Htoon, H.; **Pietryga, J.M.** and V.I. Klimov, Amplified spontaneous emission in semiconductor-nanocrystal/synthetic-opal composites: optical-gain enhancement via a photonic crystal pseudogap. *Adv. Mater.* **18**, 343-7 (2006).
6. **Pietryga, J.M.**; Jones, J.N.; Macdonald, C.L.B.; Moore, J.A. and A.H. Cowley, Titanium(IV) complexes with amidinate and/or hydrazido ligands. *Polyhedron* **25**, 259-265 (2006).
5. Schaller, R. D.; **Pietryga, J. M.**; Goupalov, S. V.; Petruska, M. A.; Ivanov, S. A. and V.I. Klimov, Breaking the phonon bottleneck in semiconductor nanocrystals via multiphonon emission induced by intrinsic nonadiabatic interactions. *Phys. Rev. Lett.* **95**, 196401 (2005).
4. **Pietryga, J.M.**; Schaller, R.D.; Werder, D.J.; Stewart, M.H.; Klimov, V.I. and J.A. Hollingsworth, Pushing the band gap envelope: Mid-infrared emitting colloidal PbSe quantum dots. *J. Am. Chem. Soc.* **126**, 11752-3 (2004); *reprinted in Journal of the Intelligence Community Research and Development, April 2007.*
3. **Pietryga, J.M.**; Jones, J.N.; Mullins, L.A.; Wiacek, R.J. and A.H. Cowley, An unprecedented mode of ligation for a bridged amido-cyclopentadienide (constrained geometry) ligand; π -olefinic interactions with gallium and indium. *Chem. Commun.* **2003**, 2072-3 (2003).
2. Wiacek, R.J.; Macdonald, C.L.B.; Jones, J.N.; **Pietryga, J.M.** and A.H. Cowley, The contrasting behaviour of bridged amido-cyclopentadienyl (constrained geometry) group 15 chlorides and cations derived therefrom. *Chem. Commun.* **2003**, 430-1 (2003).
1. **Pietryga, J.M.**; Gorden, J.D.; Macdonald, C.L.; Voigt A; Wiacek, R.J. and A.H. Cowley, Main group "constrained geometry" complexes. *J. Am. Chem. Soc.* **123**, 7713-4 (2001).

PATENTS/APPLICATIONS

Schaller, R.D.; Zhuravlev, K.K.; **Pietryga, J.M.**; Whitehead, M. and R.K. Sander, Real Time Measurement of Shock Pressure, U.S. Patent No. 8,135,244, issued 3/13/2012.

Hollingsworth, J.A. and **J.M. Pietryga**, Surface-Treated Lead Chalcogenide Nanocrystal Quantum Dots, U.S. Patent Application No. 20080057311, filed 8/31/2006.

INVITED PRESENTATIONS

31. "The Engineering of quantum dots for efficient solar energy capture," **Pietryga, J.M.**, *invited talk*, American Physical Society March Meeting, Mar. 14-18, **2016**, Baltimore, MD.
30. "Engineering nanomaterials for high-efficiency solar energy conversion," **Pietryga, J.M.**, *invited colloquium*, The Institute of Physics "Gleb Wataghin", State University of Campinas, Oct. 2, **2015**, Campinas, Brazil.
29. "Carrier multiplication engineering in nanomaterials: Toward high-efficiency solar energy conversion," **Pietryga, J.M.**, *invited talk*, XIV Brazilian MRS meeting (SBMat), Sept. 27 – Oct. 1, **2015**, Rio de Janeiro, Brazil.
28. "Engineering nanomaterials for high-efficiency solar energy conversion," **Pietryga, J.M.**, *invited seminar*, Korea Institute of Science and Technology, Aug. 24, **2015**, Seoul, South Korea.
27. "Engineering nanomaterials for high-efficiency solar energy conversion," **Pietryga, J.M.**, *invited seminar*, Seoul National University, Aug. 21, **2015**, Seoul, South Korea.
26. "Carrier multiplication engineering in nanomaterials: Toward high-efficiency solar energy conversion," **Pietryga, J.M.**, *invited seminar*, KIMM-KAIST Workshop "Quantum Dots: Promises and Challenges II", Korea Institute of Machinery and Materials, Aug. 20, **2015**, Daejeon, South Korea.
25. "Quantum-dot composites for light-emitting and light-harvesting applications." **Pietryga, J.M.**, *invited talk*, 15th International Meeting on Information Display, Aug. 18 – 21, **2015**, Daegu, South Korea
24. "Nanocrystal surfaces: A chemist's perspective." **Pietryga, J.M.**, *invited talk*, Nanomaterials: Computation, Theory, and Experiment, June 29-July 3, **2015**, Telluride, CO.
23. "The Development of Heavy-Metal-Free Quantum Dots for Optoelectronic Applications." **Pietryga, J.M.**, *invited talk*, Materials Research Society Spring Meeting, April 6-10, **2015**, San Francisco, CA.
22. "The Design and Synthesis of Quantum Dots for Advanced Light-Emitting Applications." **Pietryga, J.M.**, *invited talk*, Materials Research Society Spring Meeting, April 6-10, **2015**, San Francisco, CA.
21. "Using nanomaterials to harness the power of the sun: Research at CASP." **Pietryga, J.M.**, *invited lecture*, LANL National Security Education Center Summer Series, June 18, **2014**, Los Alamos, NM.
20. "Improving the Performance of Quantum Dot Light-Emitting Diodes through Nanoscale Engineering." **Pietryga, J. M.**; Bae, W.K.; Park, Y.-S.; Robel, I.; Klimov, V.I., *invited talk*, 225th Electrochemical Society Meeting, May 11-15, **2014**, Orlando, FL.
19. "Making better quantum-dot solar cells through chemistry." **Pietryga, J.M.**, *invited seminar*, Korea Institute for Science and Technology, Nov. 20, **2013**, Seoul, South Korea.
18. "Chemical Approaches toward Realizing the Full Potential of Quantum Dots in Solar Cells." **Pietryga, J.M.**, *invited seminar*, Korea Advanced Institute for Science and Technology, Nov. 19, **2013**, Daejeon, South Korea.
17. "Making better quantum-dot solar cells through chemistry." **Pietryga, J.M.**, *invited seminar*, Chungbuk National University, Nov. 18, **2013**, Jeonju, South Korea.
16. "Making better quantum-dot solar cells through chemistry." **Pietryga, J.M.**, *invited seminar*, Seoul National University, Nov. 15, **2013**, Seoul, South Korea.
15. "Chemical Approaches to the Development of Nanomaterials with Advanced Functionality for Next-generation Photovoltaics." **Pietryga, J.M.**, *invited talk*, 2nd International Conference on Advanced Electromaterials, Nov. 12-15, **2013**, Jeju, South Korea.

14. "The surprising importance of multi-carrier dynamics on the efficiency of quantum-dot light-emitting diodes." **Pietryga, J.M.**, *invited seminar*, New Mexico State University, Sept. 27, **2013**, Las Cruces NM.
13. "The surprising influence of metal impurities on the optical and magnetic properties of semiconductor nanocrystals." **Pietryga, J.M.**, *invited talk*, Advances In Photoreactions: When Spin-Orbit Coupling, Optical Excitation, and Motion of Nuclei are of Equal Importance, June 25-29, **2013**, Telluride, CO.
12. "Third-generation Photovoltaics Based on Semiconductor Nanocrystals: Recent Progress and Current Challenges." **Pietryga, J.M.**; Bae, W.K.; Koh, W.-k. and V. I. Klimov, *invited talk*, Materials Research Society Spring Meeting, April 1-5, **2013**, San Francisco, CA.
11. "Colloidal nanocrystals as the building blocks for 3rd-generation solar cells." **Pietryga, J.M.**, *invited seminar*, Department of Chemical Engineering, New Mexico State University, Nov. 9, **2012**, Las Cruces, NM.
10. "The surface chemistry of lead chalcogenide nanocrystals: Constructing a better photovoltaic material one atomic layer at a time." **Pietryga, J.M.**, *invited talk*, 2012 Center for Revolutionary Solar Photoconversion Joint Research Symposium and Annual Meeting, Aug. 28-31, **2012**, Boulder, CO.
9. "Colloidal Nanomaterials as the Building Blocks for Next-Generation Solar Cells." **Pietryga, J.M.**, *invited talk*, 2011 American Institute of Chemical Engineers Annual Meeting, Oct. 16-21, **2011**, Minneapolis, MN.
8. "An Overview of the Center for Advanced Solar Photophysics." **Pietryga, J.M.**, *invited talk*, 2011 Center for Revolutionary Solar Photoconversion Annual Meeting, Sept. 11-13, **2011**, Golden, CO.
7. "The chemistry of solar-relevant nanocrystal quantum dots." **Pietryga, J.M.**, *invited seminar*, Center for Advanced Solar Photophysics 2011 Summer Workshop, July 8-9, **2011**, Irvine, CA.
6. "Development of novel nanomaterials as the building blocks for next-generation solar cells." **Pietryga, J.M.**, Lee, D.C.; Robel, I. and V.I. Klimov, *invited talk*, American Vacuum Society 57th International Symposium and Exhibition, Oct. 17-22, **2010**, Albuquerque, NM.
5. "The influence of structure on carrier dynamics in a new class of infrared-active nanoheterostructures." **Pietryga, J.M.**, Lee, D.C.; Robel, I. and V.I. Klimov, *invited talk*, Functionalized Nanomaterials: Bio helps Nano, April 26-28, **2010**, Santa Fe, NM.
4. "Nanotechnology Discussion," Rio Grande Section of the American Industrial Hygiene Association, *invited panelist*, July 23, **2009**, Albuquerque, NM.
3. "The synthesis and characterization of the world's greatest infrared fluorophores." **Pietryga, J.M.**, *invited seminar*, GE Global Research, Oct. 19, **2007**, Niskayuna, NY.
2. "Cadmium-stabilized lead selenide nanocrystals for use in solar cells." **Pietryga, J.M.**; Casson, J.L.; Schaller, R.D.; Klimov, V.I. and J.A. Hollingsworth, *invited talk*, American Chemical Society 234th National Meeting and Exposition, Aug. 19-23, **2007**, Boston, MA.
1. "Stable, highly luminescent infrared nanocrystal quantum dots: synthesis and application." **J.M. Pietryga**, *invited talk*, Community Academic Research Summit, co-sponsored by DIA and NGA, June 11-13, **2007**, Williamsburg, VA.

SYMPOSIA AND CONFERENCES ORGANIZED

20 Years of Quantum Dots at Los Alamos. **J.M. Pietryga** (chair, Program Committee), April 12-16, **2015**, Santa Fe, NM.

"The interplay of structure and carrier dynamics in energy-relevant nanomaterials." **J.M. Pietryga** (lead organizer), with R. D. Schaller, W.K. Bae, and L. Huang, 2015 Materials Research Society Spring Meeting, Apr. 6-10, **2015**, San Francisco, CA.

"Emerging developments in nanomaterials for energy applications." **J.M. Pietryga** and M.G. Kanatzidis, co-organizers, American Chemical Society 243rd National Meeting and Exposition, Mar. 25-29, **2012**, San Diego, CA.

“The Materials Chemistry of Solar Energy Capture.” **J.M. Pietryga** and J.M. Papanikolas, co-organizers, American Chemical Society 242nd National Meeting and Exposition, Aug. 28-Sept. 1, **2011**, Denver, CO.

CONTRIBUTED PRESENTATIONS

28. “The design and optimization of quantum dot films for high-energy applications,” Lin, Q.; Lim, J.; Yun, H.J.; Fidler, A.F.; Makarov, N.S.; Kunde, G.J.; Lewellen, J.W.; Moody, N.A.; Klimov, V.I.; Robel, I. and **J.M. Pietryga**, *poster*, Colloidal Semiconductor Nanocrystals (Gordon Research Conference), July 31-Aug. 5, **2016**, West Dover, VT.
27. “Efficient Harvesting of Solar Energy using Quantum-dot Luminescent Solar Concentrators,” **Pietryga, J.M.**; Li, H.; Baker, T.A.; Lim, J.; McDaniel, H.; Klimov, V.I.; *oral*, 249th American Chemical Society National Meeting and Exposition, March 22-26, **2015**, Denver, CO.
26. “Probing the Role of Dimensionality in Colloidal Lead Chalcogenide Nanostructures.” **Pietryga, J.M.**; Lin, Q.; Koh, W.-K.; Fidler, A.F.; Makarov, N.S.; Klimov, V.I., *oral*, Materials Research Society Fall Meeting, Nov. 30 – Dec. 5, **2014**, Boston, MA.
25. “Enhanced carrier multiplication efficiency in nanoengineered quantum dots.” **Pietryga, J.M.**; Cirloganu, C.M.; Lin, Q.; Padilha, L.A.; Velizhanin, K.A.; Makarov, N.S.; Robel, I. and V.I. Klimov, *poster*, Colloidal Semiconductor Nanocrystals (Gordon Research Conference), July 20-25, **2014**, Smithfield RI.
24. “Unravelling the role of Auger recombination in the performance of light-emitting diodes based on nanoengineered colloidal quantum dots.” **Pietryga, J.M.**; Bae, W.K.; Park, Y.-S.; Lim, J.; Padilha, L.A.; Klimov, V.I., *poster*, 30 Years of Colloidal Quantum Dots, May 26-28, **2014**, Paris, France.
23. “The influence of Auger recombination on the performance of quantum-dot light-emitting diodes.” **Pietryga, J.M.**; Bae, W.K.; Park, Y.-S.; Robel, I.; Klimov, V.I., *oral*, American Physical Society March Meeting, Mar. 3-7, **2014**, Denver, CO.
22. “Improving the Performance of Quantum-Dot Light-Emitting Diodes by Controlling Auger Recombination.” **Pietryga, J.M.**; Bae, W.K.; Park, Y.-S.; McDaniel, H. and V.I. Klimov, *oral*, Materials Research Society Fall Meeting, Dec. 1-6, **2013**, Boston MA.
21. “Probing the gamma-scintillation process in semiconductor nanomaterials using ultrafast transient cathodoluminescence.” **Pietryga, J.M.**; Padilha, L.A.; Bae, W.K.; Klimov, V.I. and R.D. Schaller, *oral*, SPIE Defense, Security and Sensing 2013, April 29 – May 3, **2013**, Baltimore, MD.
20. “Using Ultrafast Transient Cathodoluminescence to Probe the Gamma-ray Transduction Process in Quantum-Dot Scintillators.” **Pietryga, J.M.**, Padilha, L.A.; Bae, W. K., Klimov, V.I. and R.D. Schaller, Materials Research Society Spring Meeting, April 1-5, **2013**, San Francisco, CA.
19. “Optimization of solution-processed semiconductor nanocrystal films and composites for gamma-ray scintillation.” Padilha, L.A., Bae, W.K., Schaller, R.D. and **Pietryga, J.M.**, *oral*, Materials Research Society Spring Meeting, April 9-13, **2012**, San Francisco, CA.
18. “The development of solution-processed semiconductor nanocrystal films as gamma-ray scintillators.” Padilha, L.A., Bae, W.K., Schaller, R.D. and **Pietryga, J.M.**, *oral*, Materials Research Society Fall Meeting, Nov. 28 – Dec. 2, **2011**, Boston, MA.
17. “The effect of structure on carrier separation in a series of infrared-emitting type-II nanoheterostructures.” **Pietryga, J.M.**, Lee, D.C.; Robel, I. and V.I. Klimov, *oral*, American Physical Society March Meeting, March 15-19, **2010**, Portland, OR.
16. “Infrared-emitting Type-II Heterostructured Semiconductor Nanocrystals.” **Pietryga, J.M.**; Lee, D.C.; Robel, I. and V.I. Klimov, *oral*, Materials Research Society Fall Meeting, Nov. 30 - Dec. 4, **2009**, Boston, MA.
15. “Synthesis of infrared-active heterostructured semiconductor nanocrystals for photovoltaic applications.” **Pietryga, J.M.**; Lee, D.C.; Robel, I. and V. I. Klimov, *oral*, American Chemical Society 238th National Meeting and Exposition, Aug. 16-20, **2009**, Washington, DC.

14. "Carrier behavior in a quantum-confined material under high applied pressures: Fundamental insights." **Pietryga, J.M.**; Zhuravlev, K.K.; Klimov, V.I. and R.D. Schaller, *oral*, Materials Research Society Fall Meeting, Dec. 1-5, **2008**, Boston, MA.
13. "Heterostructured nanocrystal quantum dots based on lead chalcogenides." **Pietryga, J.M.**; Lee, D.C.; Hollingsworth, J.A. and V.I. Klimov, *oral*, American Chemical Society 236th National Meeting and Exposition, Aug. 17-21, **2008**, Philadelphia, PA.
12. "Utilizing the lability of lead chalcogenides to produce heterostructured nanocrystals with bright, stable infrared emission." **Pietryga, J.M.** and J.A. Hollingsworth, *oral*, Particles 2008, May 10-13, **2008**, Orlando, FL.
11. "Stable, highly luminescent infrared nanocrystal quantum dots." **J.M. Pietryga**, *oral*, Intelligence Community Research Fellowship Program Colloquium, Apr. 30-May 3, **2007**, Chantilly, VA.
10. "PbSe nanocrystal quantum dots at high pressures: Competition between bulk and confinement effects." **Pietryga, J.M.**; Schaller, R.D.; Zhuravlev, K.K.; Sander, R.K. and V.I. Klimov, *oral*, 2006 Materials Research Society Fall Meeting, Nov. 27-Dec. 1, **2006**, Boston, MA.
9. "Cadmium-treated PbSe nanocrystal quantum dots: Bright, air-stable infrared emitters." **Pietryga, J.M.**; Casson, J.L.; Werder, D.J.; Klimov, V.I. and J.A. Hollingsworth, *oral*, American Chemical Society 232nd National Meeting and Exposition, Sept. 10-14, **2006**, San Francisco, CA.
8. "Amplified spontaneous emission in the single-exciton regime using colloidal type II core/shell nanocrystals." Ivanov, S.A.; **Pietryga, J.M.**; Bezel, I.V.; Nanda, J.; Piryatinski, A.; Achermann, M. and V. I. Klimov, *oral*, 4th International Conference on Quantum Dots, May 1-5, **2006**, Chamonix-Mont Blanc, France.
7. "Bright, stable infrared emission from Cd-enhanced PbSe nanocrystal quantum dots." **Pietryga, J.M.**; Casson, J.L.; Werder, D.J.; Nanda, J.; Klimov, V.I. and J.A. Hollingsworth, *poster*, 4th International Conference on Quantum Dots, May 1-5, **2006**, Chamonix-Mont Blanc, France.
6. "Stable, highly luminescent infrared nanocrystal quantum dots." **J.M. Pietryga**, *poster*, Intelligence Community Research Fellowship Program Colloquium, Apr. 17-19, **2006**, McLean, VA.
5. "Bright, stable high-energy PbSe nanocrystal quantum dots." **Pietryga, J.M.**; Casson, J.L.; Nanda, J.; Schaller, R.; Klimov, V.I. and J.A. Hollingsworth, *oral*, 2005 Materials Research Society Fall Meeting, Nov. 28-Dec. 2, **2005**, Boston, MA.
4. "Synthesis of stable near- to mid-infrared emitting PbSe nanocrystals in high yield." **Pietryga, J.M.**; Schaller, R.D.; Nanda, J.; Salazar, K.V.; Casson, J.L.; Klimov, V.I. and J.A. Hollingsworth, *oral*, 2005 Materials Research Society Spring Meeting, Mar. 28-Apr. 1, **2005**, San Francisco, CA.
3. "PbSe Nanocrystal Quantum Dots: From Liquid Crystal Formers to Mid-IR Emitters." **Pietryga, J.M.**; Schaller, R.D.; Jeong, S.; Stewart, M.H.; Nanda, J.; Klimov, V.I. and J.A. Hollingsworth, *poster*, 3rd International Conference on Quantum Dots, May 10-13, **2004**, Banff, Alberta, Canada.
2. "Pushing the band gap envelope: PbSe quantum dots emitting at 3 microns and beyond." **Pietryga, J.M.**; Hollingsworth, J.A.; Klimov, V.I.; Schaller, R.D.; Stewart, M.H. and J. Nanda, *oral*, American Chemical Society 227th National Meeting and Exposition, Mar. 28-Apr. 1, **2004**, Anaheim, CA.
1. "Structural variation in titanium hydrazides." **J.M. Pietryga** and A.H. Cowley, *oral*, American Chemical Society 223rd National Meeting and Exposition, Apr. 7-11, **2002**, Orlando, FL.

HONORS AND AWARDS

- Distinguished Performance Award, Large Team, "Applied Cathode Enhancement and Robustness Technology (ACERT) Team", 2016
- Los Alamos Leadership Institute, 2016

- Los Alamos Achievement Award, Individual, “In recognition of outstanding contributions to the CASP Renewal Project”, 2014
- Endorsed by the LANL New Manager On-Ramp Program, 2013
- Los Alamos Achievement Award, Team, “For outstanding contribution as a member of the Quantum Dot Emitters Field Test Team.” 2006
- IC Postdoctoral Research Fellowship, 2005
- Los Alamos Achievement Award, Individual, “For outstanding contributions to the infrared nanocrystal quantum dot (NQD) project.” 2005
- Faraday Fellowship for Teaching Excellence, 2002
- Dorothy Banks Fellowship, 2001
- NSF Graduate Fellowship Award Honorable Mention, 1998
- Leon Morgan Fellowship, 1997-1998
- Welch Foundation Fellowship, 1997-1998
- Harry H. Blecker Scholarship in Chemistry, 1996
- Honors Program Travel Award, 1996
- Angell Scholar, 1994-1997
- UAW/Nationsbank/Saturn Corp. Scholarship, 1994-1996
- ACS Polymer Division Award for Achievement in Organic Chemistry, 1994
- Branstrom Freshman Prize, 1994
- Class Honors, 1993-1997
- Honors Program Scholarship, 1993-1997
- Flint Scholar; 1993-1997
- National Merit Scholarship, 1993