

MATTHEW SHELDON  
Assistant Professor  
Department of Chemistry  
Department of Materials Science & Engineering  
Texas A&M University  
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## **EDUCATION**

University of California, Berkeley (Ph.D. Adviser: Paul Alivisatos)  
*Ph.D. in Chemistry*, May 15, 2010

Carleton College, Northfield, MN  
*B.A. in Chemistry*, Distinction in the Major, Magna Cum Laude, June 2004

## **POSITIONS HELD**

2014 – present                      Assistant Professor (Promoted to Associate Professor, August 1, 2022),  
Department of Chemistry, Texas A&M University

- Affiliated Faculty, Materials Science and Engineering Department
- Affiliated Faculty Expert, Texas A&M Energy Institute

2010 – 2014                          Post-Doctoral Fellow at the California Institute of Technology  
Department of Applied Physics, Materials Science (Harry Atwater)

## **HONORS AND AWARDS**

- Early-Career Award in Nanophotonics, *Nanophotonics* journal, 2021
- Featured Speaker, “Rising Stars in Plasmonics” Symposium, Sci X Conference, Palm Springs, CA, 2019
- Elected to Executive Committee, Topical Group on Energy Research and Applications (GERA), American Physical Society, 2019
- Emerging Investigator, *Journal of Chemical Communications*, 2018
- Gordon and Betty Moore Foundation, Inventor Fellow 2017 Award
- Kaneka Junior Faculty Award, 2017
- Nominee on behalf of Texas A&M University, Beckman Foundation 2017 Award
- Attendee, U.S. Kavli Frontiers of Science Symposium, 2016
- Nominee on behalf of Texas A&M University, Packard Fellowship 2016 Award
- Air Force Office of Scientific Research (AFOSR) Young Investigator Program (YIP) Award, 2015
- Attendee Cottrell Scholar New Faculty Workshop, 2014
- *Journal of Materials Chemistry* (JMC) Poster Award, MRS Annual Meeting, Spring 2010
- Outstanding Symposium Paper, Photocatalysis and Photoelectrochemistry Session, Materials Research Society Annual Meeting, Spring 2009
- Center of Integrated Nanomechanical Systems (COINS) Fellowship, 2005-2009
- Franz Exner Award for Excellence in Chemistry, Carleton College, 2004
- Summer Research Fellowship, Carleton College, 2003

**FUNDING**

<b>Project Title</b>	<b>Organization</b>	<b>Award Period</b>	<b>Total Amount</b>
<b>Federal / National</b>			
AI Enabled Portable Rapid Diagnostics Electrochemical Sensor for Jet Fuel Contamination Detection ( <b>Co-PI</b> , University Partner with Foothold Labs)	Air Force AFWERX Program, Phase II SBIR	01/10/2022 – 12/30/2022	\$200,000 to MS
Understanding Thermal Energy Scavenging in All-Inorganic Perovskite Nanocrystals, ( <b>PI</b> )	National Science Foundation	10/01/2021-08/31/2024	\$485,000
Expanding the Capabilities of SERS via Electronic Raman Spectroscopy, ( <b>PI</b> )	National Science Foundation	09/01/2021-08/31/2024	\$420,000
<b>State / Local</b>			
Nanophotonic Platforms for Polaritonic Chemistry, ( <b>PI</b> )	Robert A. Welch Foundation	05/01/2021 – 05/01/2024	\$240,000
Integrated Nanophotonics for Next-Generation Internet of Things (IoT), ( <b>Co-PI</b> )	Texas A&M University X-Grant	01/01/2020 – 08/01/2022	\$125,000 (\$22,351 to MS)
<b>Past</b>			
Plasmon Enhanced Optical Magnetism in Metal Nanostructures, ( <b>PI</b> ; with Co-PI Dong Hee Son)	National Science Foundation	06/01/2020-01/01/2022	\$155,000 (\$103,333 to MS)
Nanophotonic Rectifiers for Thermodynamically Ideal Solar Energy Conversion, <b>Inventor Fellows Award</b> , ( <b>PI</b> )	Gordon and Betty Moore Foundation	10/01/2017 – 10/01/2021	\$825,000
Defining Chemical Reaction Pathways via Resonant Thermal Substrates, ( <b>PI</b> )	Robert A. Welch Foundation	05/01/2018 – 05/01/2021	\$240,000
-supplemental bonus to Welch grant, ( <b>PI</b> )	Robert A. Welch Foundation	n/a	\$10,000
Hot Electron Enhanced Thermionic Emission (HEETE) Converters for All-Metal Optical Power Generation, <b>Young Investigator Program (YIP) Award</b> , ( <b>PI</b> )	Air Force Office of Scientific Research	04/01/2015 – 05/01/2019	\$370,924
Plasmonic Antennas for Photochemistry, ( <b>Co-PI</b> ; with Co-PI Francois Gabbai, PI Shima Hajimirza)	Texas A&M University T3 Award	06/01/2018 – 06/01/2019	\$30,000 (\$10,000 to MS)
Hot Carrier Up-Conversion Luminescence in Nanocrystal Heterostructures, ( <b>PI</b> )	Robert A. Welch Foundation	05/01/2015 – 05/01/2018	\$195,000
New Quantum Materials for Building the Next-generation Quantum Systems, ( <b>Co-PI</b> )	Texas A&M University X-Grant	06/01/2018 – 08/01/2021	\$125,000 (\$21,057 to MS)
Control of Photon and Charge Carrier Flow in Inorganic Perovskite Nanostructures ( <b>Co-PI</b> ; with Co-PIs Dong Hee Son, Xiaofeng Qian)	Texas A&M Strategic Research Initiative Seed Grant	10/01/2017 – 10/01/2018	\$50,000 (\$17,000 to MS)
Quantum Dot-Enabled Concentrating Solar Spectral Converters ( <b>Co-PI</b> ; with Co-PI Christi Madsen, Shiren Wang)	Texas A&M Energy Institute Seed Grant	11/01/2017 – 11/01/2018	\$50,000 (\$17,000 to MS)

## **PEER-REVIEWED PUBLICATIONS**

- Corresponding authors are marked with asterisks (\*)
- Citation data from Google Scholar: h-index: 17; total citations: 1705; avg. citations per item: 49

### **In Preparation:**

37) S. Wu, B. Zhao, A. Lee, M. Sheldon\*, "Mechanisms of Photothermalization in Metallic Nanostructures" *Annual Review of Physical Chemistry*, Volume 74, 2022 (*invited*)

### **Submitted:**

36) H. -C. Cheng, B. Zhao, Z. T. Brawley, D. H. Son, M. Sheldon\*. "Active Tuning of Plasmon Damping via Light Induced Magnetism." *Nano Letters*, 2022 (*requested revisions submitted*)  
see arXiv: <https://arxiv.org/abs/2201.07842>

### **Published:**

35) J.-R. Wen, F. A. Rodríguez Ortiz, A. Champ, M. Sheldon\*. "Kinetic Control for Continuously Tunable Lattice Parameters, Size, and Composition during CsPbX<sub>3</sub> (X=Cl, Br, I) Nanorod Synthesis." *ACS Nano*, 2022 (*accepted, in press*) <https://doi.org/10.1021/acsnano.2c02474>

34) Y. Xiao, M. Sheldon\*, M.A. Kats\*, "Super-Planckian emission can't really be 'thermal'" *Nature Photonics*, 2022 (*accepted, in press*)

33) R. J. Ratnaweera, F. A. Rodríguez Ortiz, N. Gripp, M. Sheldon\*. "Quantifying Order during Field-driven Alignment of Colloidal Semiconductor Nanorods." *ACS Nano*, 2022, 16, 3, 3834-3842.  
<https://doi.org/10.1021/acsnano.1c08488>

32) M. Negrito, M. Elinski, N. Hawthorne, M. Pedley, M. Han, M. Sheldon, R. Espinosa-Marzal, J. Batteas\*. "Using Patterned Self-Assembled Monolayers to Tune Graphene-Substrate Interactions." *Langmuir*, 2021, 37(33), 9996-10005. <https://doi.org/10.1021/acs.langmuir.1c01136>

31) S. Wu, O. H. Cheng, B. Zhao, N. Hogan, D.H. Son\*, M. Sheldon\*, "The connection between Plasmon Decay Dynamics and the Surface Enhanced Raman Spectroscopy background: Inelastic Scattering from Non-Thermal and Hot Carriers" *The Journal of Applied Physics*, 2021, 129, 173103  
<https://doi.org/10.1063/5.0032763>

30) Z. Brawley, D. Storm, D. Contreras, M. Pelton, M. Sheldon\*, "Angle-Independent Plasmonic Substrates for Multi-Mode Vibrational Strong Coupling with Molecular Thin Films." *Journal of Chemical Physics*, 2021, 154, 104305 <https://doi.org/10.1063/5.0039195>

29) A. R. Kutayiah, R. Ratnaweera, N. Gripp, S. Kumar, K. Easwaran, M. Sheldon\*, "Markov Methods for Modeling Complex Luminescence, Absorption, and Scattering in Nanophotonic Systems Out of Equilibrium." *Optics Express*, 2021, Vol. 29, Issue 3, pp. 4249-4269, <https://doi.org/10.1364/OE.416670>

28) B. J. Roman, N. Mireles Villegas, K. Lytle, M. Sheldon\*, "Optically Cooling CsPbBr<sub>3</sub> Nanoparticles." *Nano Letters*, 2020, 20, 12, 8874–8879 <https://doi.org/10.1021/acs.nanolett.0c03910>

- 27) O. H. Cheng, T. Qiao, M. Sheldon\*, and D. H. Son\*, "Size- and Temperature-dependent Photoluminescence Spectra of Strongly Confined CsPbBr<sub>3</sub> Quantum Dots", *Nanoscale*, 2020, 12, 13113-13118 (\* denotes co-corresponding author) <https://doi.org/10.1039/D0NR02711A>
- 26) J. Martin, R. Ratnaweera, S. Kumar, J. Wen, A. R. Kutayiah, M. Sheldon\*, " Detailed Balance Efficiencies for Luminescent Solar Concentrators with Aligned Semiconductor Nanorods: The Benefits of Anisotropic Emission" *The Journal of Nanophotonics for Energy*, 2020, 10, 025501  
<https://doi.org/10.1117/1.JPE.10.025501>
- 25) N. Hogan, M. Sheldon\*, "Comparing Steady State Photothermalization Dynamics in Copper and Gold", *Journal of Chemical Physics*, 2020, 152, 061101: <https://doi.org/10.1063/1.5139665>
- 24) O. H. Cheng, D. H. Son, M. Sheldon\*, "Light-Induced Magnetism in Plasmonic Au Nanoparticles", *Nature Photonics*, 2020, <https://doi.org/10.1038/s41566-020-0603-3>
- 23) (Cover, Feature Article) N. Hogan, S. Wu, M. Sheldon\*, "Photothermalization and Hot Electron Dynamics in the Steady State", *J. Phys. Chem. C*, 2020, 124, 4931-4945  
<https://pubs.acs.org/doi/full/10.1021/acs.jpcc.9b08916>
- 22) J. Wen, B. Roman, F. A. Rodriguez, N. Mireles, M. Sheldon\*, "Chemical Availability of Bromide Dictates CsPbBr<sub>3</sub> Nanocrystal Growth" *Chemistry of Materials*, 2019, 31, 20, 8551-8557  
<https://doi.org/10.1021/acs.chemmater.9b03709>
- 21) F. A. Rodriguez, B. Roman, N. Mireles, M. Sheldon\*, "The Role of Gold Oxidation State in the Synthesis of Au-CsPbX<sub>3</sub> Heterostructure or Lead-free Cs<sub>2</sub>Au(I)Au(III)X<sub>6</sub> Perovskite Nanoparticles", *Nanoscale*, 2019, 11, 18109 - 18115 DOI: <https://doi.org/10.1039/C9NR07222E>
- 20) S. Wu, N. Hogan, M. Sheldon\*, "Hot Electron Emission in Plasmonic Thermionic Emitters", *ACS Energy Letters*, 2019, 4, 2508-2513. DOI : <https://doi.org/10.1021/acseenergylett.9b01857>
- 19) B. Roman, M. Sheldon\*, "Six-fold Plasmonic Enhancement of Thermal Scavenging via CsPbBr<sub>3</sub> Anti-Stokes Photoluminescence", *Nanophotonics*, 2019, 8, 599-605.  
DOI: <https://doi.org/10.1515/nanoph-2018-0196>
- 18) B. Roman, M. Sheldon\*, "The Role of Mid-Gap States in All-Inorganic CsPbBr<sub>3</sub> Nanoparticle One Photon Up-Conversion", *Chemical Communications*, 2018, 54, 6851-6854 (*invited article*) DOI: <https://doi.org/10.1039/C8CC02430H>
- 17) S. Wu, M. Sheldon\*, "Optical Power Conversion via Tunneling of Plasmonic Hot Carriers", *ACS Photonics* 2018, 5, 6, 2516-2523  
DOI: <https://pubs.acs.org/doi/abs/10.1021/acsp Photonics.8b00347>
- 16) M. Sheldon (12 out of 13), H. Wang\*, "Nanoscale Artificial Plasmonic Lattices in Self-Assembled Vertically Aligned Nitride-Metal Hybrid Metamaterials", *Advanced Science* 2018, 5, 1800416  
DOI: <https://doi.org/10.1002/adv.201800416>

15) A. Pravitasari, M. Negrito, K. Light, W. Chang, S. Link, M. Sheldon, J. Batteas\*, "Using Particle Lithography to Tailor the Architecture of Au Nanoparticle Plasmonic Nanoring Arrays" *The Journal of Physical Chemistry B* 2017, 122(2), 730–736.

DOI: <https://pubs.acs.org/doi/10.1021/acs.jpcc.7b06357>

14) B. Roman, J. Otto, C. Galik, R. Downing, M. Sheldon\*, "Au Exchange or Au Deposition: Dual Reaction Pathways in Au-CsPbBr<sub>3</sub> Heterostructure Nanoparticles", *Nano Letters* 2017, 17, 5561-5566. DOI:

<https://pubs.acs.org/doi/abs/10.1021/acs.nanolett.7b02355>

13) A. Nadarajah, M. Sheldon\*, "Optoelectronic Phenomena in Au Metal Nanostructures Due to the Inverse Faraday Effect", *Optics Express* 2017, 25, 12753-12764

DOI: <https://doi.org/10.1364/OE.25.012753>

12) D. Parobek, B. Roman, Y. Dong, H. Jin, E. Lee, M. Sheldon\*, D. H. Son\*, "Exciton-to-Dopant Energy Transfer in Mn-Doped Cesium Lead Halide Perovskite Nanocrystals", *Nano Letters* 2016, 16 (12), pp 7376–7380 (\* denotes co-corresponding author)

DOI: <https://pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b02772>

11) M. Sheldon (15 out of 18), H. Wang\*, "Self-Assembled Epitaxial Au-Ceramic Vertically Aligned Nanocomposites for Nanoscale Metamaterials" *Nano Letters* 2016, 16 (6), pp 3936–3943

DOI: [pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b01575](https://pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b01575)

#### **Publications in collaboration with postdoctoral mentor, with significant work performed at TAMU:**

10) J. van de Groep, M. Sheldon, H. Atwater, A. Polman, "Thermodynamic Theory of the Plasmoelectric Effect" *Nature: Scientific Reports* 2016, 6, 23283

DOI: <https://doi.org/10.1038/srep23283>

9) A. Brown, M. Sheldon, H. Atwater, "Electrochemical Tuning of the Dielectric Function of Au Nanoparticles" *ACS Photonics* 2015, 2 (4), 459-464 DOI: <https://pubs.acs.org/doi/abs/10.1021/ph500358q>

8) S. Peng, M. Sheldon, H. Atwater, "Ultraviolet Surface Plasmon-Mediated Oxidation of Hydrazine as a Source for Low-Temperature Nitride Deposition." *Applied Physics Letters* 2015,106(023102)

DOI: <https://doi.org/10.1063/1.4905593>

7) M. Sheldon, J. van de Groep, A. Brown, A. Polman, H. Atwater, "Plasmoelectric Potentials in Metal Nanostructures." *Science* 2014, 356(6211), 828-831 DOI: <https://doi.org/10.1126/science.1258405>

#### **Publications prior to independent career at TAMU:**

6) C. Eisler, Z. Abrams, M. Sheldon, X. Zhang, H. Atwater, "Spectral Width and Radiative Reemission Effects on Spectrum-Splitting Multiple Absorber Solar Cell Efficiency." *Applied Physics Letters* 2014

5) C. Eisler, M. Sheldon, H. Atwater, "Enhanced Performance of Small GaAs Solar Cells via Edge and Surface Passivation with Trioctylphosphine Sulfide" *Proceedings of the 38th IEEE Photovoltaic Specialist Conference (PVSC)*, March 2012, Austin, TX, USA

4) M. Sheldon, C. Eisler, H. Atwater, "GaAs Passivation with Trioctylphosphine Sulfide for Enhanced Solar Cell Efficiency and Durability." *Advanced Energy Materials* 2012 vol. 2 (3) 339-344

3) J. Dionne, L. Sweatlock, M. Sheldon, H. Atwater, A. P. Alivisatos, "Silicon-based Plasmonics for On-Chip Photonics." *Journal of Selected Topics in Quantum Electronics* 2010 vol. 16 (1)

2) M. Sheldon, P. E. Trudeau, T. Mokari, L. Wang, A. P. Alivisatos, "Enhanced Semiconductor Nanocrystal Conductance via Solution Grown Contacts." *Nano Letters* 2009, 9, 3676-3682

1) P. E. Trudeau, M. Sheldon, V. Altoe, A. P. Alivisatos, "Electrical Contacts to Individual Colloidal Semiconductor Nanorods." *Nano Letters* 2008, 8, 1936-1939

**Other publications, not peer reviewed:**

2) M. Pelton\*, M. Sheldon\*, J. Khurgin\*, "Plasmon-Exciton Coupling", *Nanophotonics* 2019, 8, 513 (forward from co-editors of special issue) DOI: <https://doi.org/10.1515/nanoph-2019-0065>

1) M. Sheldon\*, "The Plasmoelectric Effect: A New Strategy for Converting Optical Energy into Electricity" on 2Physics.com: <http://www.2physics.com/2014/11/the-plasmoelectric-effect-new-strategy.html>

**PATENTS**

M. Sheldon, H. Atwater, "The Plasmoelectric Effect: Conversion of Optical Power into DC Electrical Power by Plasmonic Nanostructures in All-Conductor Circuits." *patent awarded*, September 2018

M. Sheldon, C. Eisler, H. Atwater, "GaAs Surface Passivation Using Sulfur- and Selenium- Functionalized Surfactants." *patent awarded*, June 2012

**PRESENTATIONS DURING INDEPENDENT CAREER AT TAMU**

**Invited Seminars**

32) Chemistry Department Seminar, Pennsylvania State University, State College, Pennsylvania, April 2021

31) Polariton Chemistry Webinar, Department of Chemistry, University of California, San Diego, March 2021

30) Chemistry Department Seminar, Cornell University, Ithaca, New York, December 2019

29) Chemistry Department Seminar, University of California, Davis, November 2019

28) "Putting Light to Work: Controlling Temperature in Nanoscale Heat Engines" – Photonics at the Thermodynamic Limit EFRC Meeting, Stanford University, Palo Alto, CA, September 2019

27) Materials Science Department Seminar, Nanyang Technological University, Singapore, August 2019

26) Materials Science Department Seminar, Massachusetts Institute of Technology, May 2019

25) "Nanomaterials and Light: New Opportunities in Energy Research" Chemistry Department Seminar, University of Washington, Seattle, April 2019

- 24) "Nanomaterials and Light: New Opportunities in Energy Research" Chemistry Department Seminar, University of Pittsburgh, April 2019
- 23) "Nanomaterials and Light: New Opportunities in Energy Research" Chemistry Department Seminar, University of Texas, Austin, March 2019
- 22) "Photocurrent, Photovoltage, and Optical Magnetism in Plasmonic Metals", Institute for Quantum Science & Engineering (IQSE) and Atomic and Molecular Optics (AMO) group, Physics Department, TAMU, College Station, TX, March 2019
- 21) "Nanomaterials and Light: New Opportunities in Energy Research" Chemistry Department Seminar, University of North Carolina, Chapel Hill, March 2019
- 20) "Nanomaterials and Light: New Opportunities in Energy Research" Center for Chemistry at Space-Time Limit, University of California, Irvine, January 2019
- 19) "Nanomaterials and Light: New Opportunities in Energy Research" Princeton Institute for the Science and Technology of Materials (PRISM) and the Princeton Center for Complex Materials (PCCM), Princeton University, January 2019
- 18) "Nanomaterials and Light: New Opportunities in Energy Research" Physics Department Seminar, Texas A&M University, College Station, Texas, Fall 2018
- 17) "Nanomaterials and Light: New Opportunities in Energy Research" National Renewable Energy Laboratory, Materials Science Division, Golden, Colorado, Fall 2018
- 16) "Nanomaterials and Light: New Opportunities in Energy Research" Chemistry Department Seminar, University of Colorado, Boulder, Fall 2018
- 15) "Nanomaterials and Light: New Opportunities in Energy Research" Materials Science & Engineering Department Seminar, University of Wisconsin, Madison, Fall 2018
- 14) "Nanomaterials and Light: New Opportunities in Energy Research" Mid-Term Review Seminar, Department of Chemistry, Texas A&M University, 2017
- 13) "Nanophotonics for Energy Applications" Chemistry Department, Rice University, Houston, TX, 2017
- 12) "Plasmonic Nanomaterials for Optical-to-Electrical Energy Conversion" Physics Department, Baylor University, Waco, TX, 2017
- 11) "Nanomaterials for Solar Energy" Kaneka Junior Faculty Award Lecture, Texas A&M University, College Station, TX, 2017
- 10) "Nanophotonics for Solar Energy" Department of Electrical Engineering, Texas A&M University, College Station, TX, 2017
- 9) "Plasmonic Nanomaterials for Optical-to-Electrical Energy Conversion" Center for High Technology Materials, University of New Mexico, Albuquerque, NM, 2016

- 8) "Plasmonic Nanomaterials for Optoelectronic Energy Conversion" Department of Chemistry, Washington University, St. Louis, MO, 2016
- 7) "Metals as a Photovoltaics Materials Platform" Clean Energy Institute, University of Washington, Seattle, WA, 2016
- 6) "Plasmonic and Hybrid Nanomaterials for Solar Energy" Department of Material Science and Engineering, Texas A&M University, College Station, TX, 2015
- 5) "Nanomaterials for Solar Energy" Department of Chemistry, Carleton College, Northfield, MN, 2015
- 4) "Metals as a Photovoltaics Materials Platform" Department of Chemistry, Department of Chemical Engineering, University of Minnesota, Minneapolis, MN, 2015
- 3) "Metals for Solar Energy" Department of Electrical Engineering, University of Houston, Houston, TX, 2015
- 2) "Metals for Photovoltaics" Department of Chemistry, Roanoke College, Roanoke, Virginia, 2015
- 1) "Metals for Photovoltaics" Department of Chemistry, Washington & Lee University, Lexington, Virginia, 2015

#### **Invited Conference Talks**

- 28) "*Probing Plasmonic Photochemistry*" ACS Southwest regional Meeting, Austin, TX, November 2021
- 27) "*Plasmonic Platforms for Polaritonic Chemistry*" SciX 2201 Annual Meeting, September 2021
- 26) "*Optical Cooling and Upconversion with CsPbBr<sub>3</sub> Nanoparticles*", CLEO Optical Society of America Meeting, San Jose, CA, *scheduled* May 2021
- 25) "*Optical Cooling with CsPbBr<sub>3</sub> Nanoparticles*", SPIE OPTO Meeting, San Francisco, CA, March 2021
- 24) "*Electronic Raman spectroscopy for analyzing hot electrons*", SciX, Reno, NV, October 2020
- 23) "*Title TBD*" Metamaterials, Metadevices, and Metasystems Session, SPIE Meeting, San Diego, CA, *re-scheduled August 2021 due to COVID-19*
- 22) "*Decoupling electronic and vibrational temperature in solar energy converters*" Photoinduced Energy Conversion Symposium, ACS Fall Meeting, San Francisco, CA, August 2020
- 21) *Title TBD* – Plasmonics and Nanophotonics Gordon Research Conference, Newry, ME, *re-scheduled July 2022 due to COVID-19*
- 20) *Title TBD* - Noble Metal Nanoparticles Gordon Research Conference, Mount Holyoke College, MA, *re-scheduled June 2022 due to COVID-19*
- 19) *Title TBD* - ACS Spring Meeting, Philadelphia, PA, *re-scheduled March 2021 due to COVID-19*



- 18) "Ultrafast Light-induced Magnetism and Non-reciprocity in Plasmonic Au Nanoparticles" SPIE OPTO Meeting, San Francisco, CA, February 2020
- 17) "Rising Stars in Plasmonics" Symposium, SciX, Palm Springs, CA, October 2019
- 16) "1,000-Fold Enhancement of Ultrafast Light-Induced Magnetism in Plasmonic Au Nanoparticles" Metamaterials, Metadevices, and Metasystems Session, SPIE Meeting, San Diego, CA, August 2019
- 15) "1,000-Fold Enhancement of Ultrafast Light-Induced Magnetism in Plasmonic Au Nanoparticles" - Meta '19 Conference, Lisbon, Portugal, July 2019
- 14) "Optical Cooling with CsPbBr<sub>3</sub>" - "Nanophotonics out of Equilibrium" Workshop, Telluride Science Research Center, Telluride, CO, July 2019
- 13) "Nanoscale Heat Engines" - "Solar Solutions to Energy and Environmental Problems" Workshop, Telluride Science Research Center, Telluride, CO, July 2019
- 12) "Raman Spectroscopic Indicators of the Electronic and Phononic Temperature in Plasmonic Absorbers", International Conference on Raman Spectroscopy (ICORS), Jeju, South Korea, 2018
- 11) "Detailed Balance Efficiencies for Luminescent Solar Concentrators with Aligned Semiconductor Nanorods", New Concepts in Solar and Thermal Radiation Conversion and Reliability Session, SPIE Meeting, San Diego, CA, 2018
- 10) "Decoupling Electronic and Phononic Temperature in Plasmonic Absorbers" Metamaterials, Metadevices, and Metasystems Session, SPIE Meeting, San Diego, CA, 20178
- 9) (*Discussion Leader, Keynote Session*) "Plasmons Supported by Non-Noble Metals", Noble Metal Nanoparticles Gordon Research Conference, Mount Holyoke College, MA, 2018
- 8) "All-Inorganic CsPbX<sub>3</sub> Metal-Semiconductor Heterostructure Nanoparticles" Telluride Science Research Center, Telluride, CO, 2018
- 7) "Hot Carrier Up-Conversion Luminescence in Nanocrystal Heterostructures", MRS Fall Meeting, Boston, MA, 2017
- 6) "Unidirectional Tunneling via Asymmetric Plasmonic Resonances", SPIE Meeting, San Diego, CA, 2017
- 5) "Hot Electron Enhanced Thermionic Emission (HEETE) converters for all-metal optical power generation." Meta '17 Conference, Incheon, Seoul, South Korea, 2017
- 4) "Advanced Microscopies for Nanophotonics", SciX Conference, Reno, NV, 2017
- 3) "Power Conversion via Unidirectional Tunneling of Plasmonic Hot Electrons" Southwest Regional Meeting of the American Chemical Society, Galveston, TX, 2017

2) "Plasmonic Nanomaterials for Optoelectronic Energy Conversion" American Physical Society Spring Meeting, Baltimore, MD, 2016

1) "Circularly Polarized Light-Induced Magnetization in Plasmonic Noble Metal Nanostructures" International Conference on Computational & Experimental Engineering and Sciences, Reno, NV, 2015

### **Contributed Conference Talks**

9) "Cation Exchange and Metal Deposition Reactions in CsPbX<sub>3</sub> Nanoparticles", Spring MRS Meeting, Phoenix, AZ, 2018

8) "All-Metal Optical Power Conversion via Tunneling of Plasmonic Hot Electrons", Spring ACS Meeting, New Orleans, LA, 2018

7) "Hot Carrier Up-Conversion Luminescence in Nanocrystal Heterostructures", Fall ACS Meeting, Washington DC, 2017

6) "Detailed balance efficiencies for luminescent solar concentrators with aligned semiconductor nanorods", Fall ACS Meeting, Washington DC, 2017

5) Hot Electron Enhanced Thermionic Emission (HEETE) Converters for All-Metal Optical Power Generation, SciX, Reno, NV, 2017

4) "Optical Power Conversion via Unidirectional Tunneling of Plasmonic Hot Electrons", Spring MRS Meeting, Phoenix AZ

3) "Hot Electron Enhanced Thermionic Emission (HEETE) Converters for All-Metal Optical Power Generation", Spring MS meeting, Phoenix AZ

2) "Light-Induced Static Magnetization in Plasmonic Nanostructures" Annual Spring Meeting of the Materials Research Society, San Francisco, CA", 2015

1) "Plasmonic Magnetization During Circularly Polarized Excitation" Annual Meeting of the International Society for Optics and Photonics (SPIE), San Diego, CA, 2015

### **Presentations at Funding Agency Meetings**

4) (*Poster*) "Plasmonic Strategies for Control of Hot Electron Dynamics and Photo-Thermal Emission" AFOSR Program Review, Department of the Interior Building, Washington DC, 2019

3) (*Talk*) "Photothermal Spectroscopy and Unidirectional Tunneling of Hot Carriers in Resonant Plasmonic Geometries", AFOSR Program Review, Albuquerque, NM, 2018

2) (*Talk*) "Nanophotonic Rectifiers for Thermodynamically Ideal Solar Energy Conversion" Gordon and Betty Moore Foundation offices, Palo Alto, CA, 2017

1) (*Poster*) "Hot Electron Enhanced Thermionic Emission (HEETE) Converters for All-Metal Optical Power Generation" AFOSR Program Review, Kirtland AFB, Albuquerque, NM, 2017

### COLLABORATORS DURING INDEPENDENT CAREER AT TAMU

- Andrea Alù, Department of Electrical Engineering, City University of New York, New York
- James Batteas, Department of Chemistry, TAMU
- Kenny Easwaran, Department of Philosophy, TAMU
- Francois Gabbai, Department of Chemistry, TAMU
- Shima Hajimirza, Department of Mechanical Engineering, TAMU
- Zubin Jacob, Department of Physics, Purdue University
- Mikhail Kats, Department of Electrical Engineering, University of Wisconsin, Madison
- Xiaoqin (Elaine) Li, Department of Physics, University of Texas, Austin
- Stefan Link, Department of Chemistry, Rice University
- Christi Madsen, Department of Electrical Engineering, TAMU
- Matthew Pelton, Department of Physics, University of Maryland Baltimore County
- Jacob Khurgin, Department of Electrical and Computer Engineering, Johns Hopkins University
- Albert Polman, FOM Institute, AMOLF, Amsterdam, The Netherlands
- Dong Hee Son, Department of Chemistry, TAMU
- Xiaofeng Qian, Department of Materials science & Engineering, TAMU
- Haiyan Wang, Department of Electrical Engineering, Purdue University

### EDUCATIONAL ACTIVITIES

#### **Courses Taught**

- Fall 2014: CHEM 101: Fundamentals of Chemistry I
- Fall 2015: CHEM 601: Analytical Chemistry I (team taught with Prof. Sarbajit Banerjee, Chemistry)
- Fall 2015: CHEM 489: Materials Chemistry (**new course developed**, team taught with Prof. Sarbajit Banerjee, Chemistry)
- Spring 2016: CHEM 101: Fundamentals of Chemistry I
- Fall 2016: CHEM 601: Analytical Chemistry I (team taught with Prof. Sarbajit Banerjee, Chemistry)
- Fall 2016: CHEM 489: Materials Chemistry (team taught with Prof. Sarbajit Banerjee, Chemistry)
- Spring 2017: CHEM 101: Fundamentals of Chemistry I
- Fall 2017: CHEM 601: Analytical Chemistry I (team taught with Prof. Sarbajit Banerjee, Chemistry)
- Fall 2017: CHEM 468: Materials Chemistry of Inorganic Materials (**new course developed**, team taught with Prof. Sarbajit Banerjee, Chemistry)
- Spring 2018: CHEM 101: Fundamentals of Chemistry I
- Fall 2019: CHEM 119: Fundamentals of Chemistry I (*for chemistry majors*)
- Fall 2020: CHEM 107: Fundamentals of Chemistry I (*for engineering majors*)
- Spring 2021: CHEM 107: Fundamentals of Chemistry I (*for engineering majors*)
- Fall 2021: CHEM 107: Fundamentals of Chemistry I (*for engineering majors*)

**Postdoctoral Research Associates Supervised:**

- Ryan Kutayah, (August 2019 – June 2021)
- Athavan Nadarajah, (January 2015 – August 2016)
  - Currently a lecturer, Department of Physics, University of Melbourne

**PhD Students Supervised:**

- Jarret Martin, MS (Fall 2014 – Spring 2016)
  - now at Samsung, Austin TX
- Benjamin Roman, PhD (June 2015 - October 2020 )
  - Currently, Postdoctoral Fellowship with Delia Milliron, UT Austin
  - Best Oral Presentation Award, Texas A&M Conference on Energy, 2017
  - Graduate Merit Fellowship from Association of Former Students
  - Presentations:
    - (*contributed*) “Optical Cooling with CsPbBr<sub>3</sub> Perovskite Nanocrystals via One Photon Up-Conversion Luminescence” – Materials Research Society Meeting, April 2019
    - (*contributed*) “Hybrid Metal-Semiconductor Nanoparticles for One and Two Photon Luminescence Up-conversion” – TAMU Conference on Energy, September 2018
    - (*contributed*) “Hybrid Metal-Semiconductor Nanoparticles for Hot Electron Luminescence Up-conversion” – ACS National Meeting, New Orleans, March 2018
    - (*contributed*) “Au Exchange or Au deposition: Control of morphology in Au-CsPbBr<sub>3</sub> heterostructure nanoparticles” – ACS National Meeting, Washington DC, August 2017
    - (*contributed*) “Hybrid Au-CsPbBr<sub>3</sub> Nanoparticles for Optoelectronic Application” – TAMU Conference on Energy, September 2017
    - (*contributed*) “Heterostructured Perovskite Nanocrystals for Applications in Optical Energy Conversion”, Texas A&M Conference on Energy. September 2016
- Nicki Hogan, PhD (June 2015- July 2020)
  - Graduated, currently “Technical Solutions Engineer” at Epic Software, Madison, Wisconsin
  - Best Poster Award, Gordon Research Conference, Noble Metal Nanoparticles, June 2018
  - Outstanding Teaching Assistant Award, May 2016
  - Honorable Mention, International Precious Metals Institute, Student Award, May 2016
  - Presentations:
    - (*contributed*) “Plasmonic Metal Nanostructures for Use in Solar-Thermal Thermionic Optical Power Converters” – Materials Research Society Meeting, April 2019
    - (*invited, best poster talk*) “Plasmonic selective absorbers for all-metal optical power generation” Noble Metal Nanoparticles GRC, June 2018
    - (*contributed*) “Decoupling Phononic and Electronic Temperatures in Thermionic Power Converters” - Materials Research Society Meeting, April 2019
- Shengxiang (Joey) Wu, PhD (August 2015-October 2020)
  - Graduated, Postdoctoral Fellow with Peter Nordlander, Rice University; and
  - Presentations:
    - (*contributed*) “All-Metal Thermionic Power Converter Based on Thermionic Emission and Tunneling in Plasmonic Nanostructures” – Materials Research Society Meeting, April 2019

- Maelani Negrito, PhD (June 2015- May 2022)
  - Co-Supervised with Prof. James Batteas (TAMU, Chemistry)
  - Chemistry Doctoral Scholarship Award
  - Elected Co-Chair, Gordon Research Seminar in Tribology, Summer 2020
  - Presentations:
    - (*contributed*) “Comparing Full-Wave Optical Modeling of Plasmonic Coupling Within Au Nanoparticle Nanoring Arrays to Structures Fabricated via Particle Lithography” – ACS National Meeting, New Orleans, March 2018
- Oscar Hsu-Cheng Cheng, PhD (August 2015- May 2021)
  - Co-Supervised with Prof. Dong Hee Son (TAMU, Chemistry)
  - Bruno. J. Zwolinski Endowed Graduate Fellowship Award in Physical Chemistry
  - Best Poster Winner, Physical Chemistry Division, ACS Fall Meeting 2019
  - North America Taiwanese Engineering & Science Association (NATEA) Scholarship
  - Presentations:
    - (*contributed*) “1000-Fold Enhancement of Light-Induced Magnetism in Gold Nanoparticles”, Student Research Conference, TAMU 2019
- Je-Ruei Wen, PhD (August 2016- )
  - Presentations:
    - (*contributed talk*) “Phase Evolution During CsPbBr<sub>3</sub> Perovskite Nanocrystal Growth”, ACS National Meeting, Orlando, April 2019
    - (*poster at GRC*) “Preparation of Alkylammonium Bromide Hollow Nanocubes”, Colloidal Semiconductor Nanocrystals Gordon Research Conference, 2018
- Freddy Rodriguez Ortiz, PhD (August 2017 - )
  - Presentations:
    - (*contributed*) “The Role of Gold Oxidation State in the Synthesis of Au-CsPbX<sub>3</sub> heterostructure or Lead-free Cs<sub>2</sub>Au<sub>2</sub>X<sub>6</sub> nanoparticles”, ACS National Meeting, Orlando, April 2019
- Rivi Ratnaweera, PhD (August 2017- )
  - Presentations:
    - (*contributed talk*) “Dipole-emitting semiconductor nanorods for luminescent solar concentrators” – ACS National Meeting, Philadelphia, Spring 2020 (*delayed due to Covid-19*)
    - (*contributed talk*) “Quantification of meso- and macro-scale ordering of colloidal semiconductor nanorods in the presence of AC electric fields” – ACS Spring 2021 National Meeting & Exposition
- Nicholas Gripp, MS, Materials Science & Engineering Student (June 2017 – June 2019)
  - Currently a Materials Engineer at Sparx Engineering, Manvel, TX
- Noel Mireles Villegas, PhD (June 2018- )
  - Graduate Diversity Fellowship from Office of Graduate and Professional Studies, TAMU, 2018
- Zachary Brawley, PhD, Materials Science & Engineering Student (June 2018- )

- College of Engineering Graduate Fellowship, 2018
- Honorable Mention, International Precious Metals Institute, Student Award, April 2019
- (Poster) "Plasmonic substrates for modified reaction rates via strong coupling," *Gordon Research Conference on Plasmonic and Nanophotonics, Topic: Nanoscale light-matter interaction for sustainability*, July 2020 (re-scheduled due to COVID-19)
- (scheduled) "Plasmonic Substrates for Modified Reaction Chemistry via Vibrational Strong Coupling," *95th ACS Colloid and Surface Science Symposium (Virtual)*, June 2021
- 
- Annika Lee, PhD (October 2019- )
  - First Year Chemistry Teaching Award (2020)
- Kylie Lytle, PhD (June 2019- )
- Ju Eun (June) Yim, PhD (October 2020- )
- Giselle Bauer, PhD (October 2021- )

**Undergraduate Student Researchers:**

- Katie McCain, TAMU, Fall 2014
- Christopher Galik, TAMU, Fall 2014 through Summer 2016
- Jennifer Miller, visiting REU student, Summer 2015
- Rachel Downing, visiting REU student, Summer 2016
- Joseph Otto, TAMU, Spring 2016 through Fall 2016
- David Dacres, visiting REU student, Summer 2017
- Richard Reyes, visiting REU student, Summer 2018
- Rebecca Rosamond, TAMU, Spring 2018
- Nicholas Porcellino, TAMU, Spring 2018 – Summer 2019
- Maya Costales, visiting summer undergraduate from Carleton College, Summer 2019
- Gabriel Vazquez Lizardi, visiting REU student, Summer 2019
- Diego Contreras Mora, TAMU, Spring 2019 – Summer 2021
- Anna Champ, TAMU, Spring 2021 - present
- Joshua Johns, TAMU, Summer 2022 - present

**Visiting Scholars:**

- Clément Oudard, French Exchange Student, IMT Mines Alès, Summer 2017
- Yann Ibanez, French Exchange Student, Université de Haute-Alsace, Summer 2018

**Member of dissertation/thesis committee for the following students not in my laboratory:**

- Thomas E. OLoughlin - PHD in CHEM
- Zhuotong. Liu - PHD in CHEM
- Justin L. Andrews - PHD in CHEM
- Yue Zhu - PHD in CHEM
- Jialuo. Li - PHD in CHEM
- Michael. Poltash - PHD in CHEM
- Fabian F. Eberle - PHD in CHEM
- Ratnamala. Mandal - PHD in CHEM
- David. Parobek - PHD in CHEM
- Rachel D. Davidson - PHD in CHEM

- Jeremy A. Willman - PHD in CHEM
- Daniel L. Stevens - PHD in CHEM
- Carol M. Ly - MS in CHEM
- Tian Qiao - PHD in CHEM
- Doyun Kim - PHD in CHEM
- Zachary D. Buen - PHD in CHEM
- Xueting Tang - PHD in CHEM
- Joseph K. Puthenpurayil - PHD in CHEM
- Quentarius D. Moore - PHD in CHEM
- Javed Ali - PHD in ELEN
- Qianfan Chen - PHD in PHYS
- Ziwei Fan- PhD in Aerospace Engineering
- Connor Orrison - PHD in CHEM
- Chih-Wei Wang - PHD in CHEM
- Piyashi Sengupta – PHD in CHEM
- Daniel Bronner – PHD in CHEM

### **SERVICE ACTIVITIES**

#### **Departmental:**

- Physical Division Chair, (Fall 2021 – Present)
- Academic Operations Council (AOC) Committee, (Fall 2021 – Present)
- Departmental Diversity/Climate Committee, (2020- present)
- Graduate Curriculum Committee, (2015-present)
- Admission and Recruitment Committee, (2015- 2020)
  - Includes on-site recruitment: SACNAS National Meeting, ACS Southwest Regional Meeting, Hope College Schaap Chemistry Symposium 2017, etc.
- Organic Faculty Hire Search Committee (Fall 2014)
- Analytical/Physical Faculty Hire Search Committee (Fall 2017)
- Analytical/Physical Faculty Hire Search Committee (Fall 2018)
- Faculty Coordinator, Graduate Student Seminar Series (CHEM 681), (Fall 2017)
- Faculty Laboratory Sections Director, (CHEM 112 /117), (Spring 2018)

#### **College / University:**

- University Radiation Safety Committee, (2021- present)
- Faculty and Staff Interaction Team (FASIT) Committee, (2016- present)
- Speaker / Mentor, Regents Scholars Program (2014- present)
  - 1<sup>st</sup> generation undergraduate STEM major cohort
- Research Information System Task Force (administration software replacement) Committee, (2017)
- Student Invited Speaker, Texas A&M Undergraduate Researchers Club, 2017:
  - Delivered talk: “Nanomaterials and Light”
- Student Invited Speaker, Texas A&M Energy Club, 2016:
  - Delivered talk: “Nanotechnology, Thermodynamics, and the Future of Solar Energy”
- Speaker, DOW professional Development Panel, (Spring 2015)

#### **National / International:**

- Symposium Co-Organizer, “Light-matter interactions at the nanoscale”

- Symposium held during Conference on Lasers and Electro-Optics Europe (CLEO/Europe), Munich Germany, June 2023
- Focus Session Co-Organizer, “Nano Chemical Physics”
  - Focus Session held during the 2023 March APS Meeting, Las Vegas, NV
- Meeting Co-Organizer, Surface Plasmon Photonics 10 (SPP 10)
  - International conference meets every other year in new location (delayed by Covid-19); hosted at Rice University, Houston, Texas, May 2023
- Symposium Co-Organizer, “Nanosized Photocatalysts—From Fundamentals to Applications”
  - Symposium held during the 2023 Spring MRS Meeting, San Francisco, CA
- Symposium Co-Organizer, “Quantum Nanophotonic Materials, Devices, and Systems”
  - 3-day symposium held during the SPIE 2022 Fall Meeting in San Diego
- Workshop Co-Organizer, “Solar Solutions to Environmental Problems”, 2022
  - 1-week workshop at the Telluride Science Research Center
- Symposium Co-Organizer, ACS Colloids and Surface Science Symposium” June 2021
  - Co-organizer of “Plasmonics” track, 3-day meeting
- Symposium Co-Organizer, Photovoltaics Specialists Conference (PVSC), Area 1: “Fundamentals and New Concepts for Future Technologies”
  - Week-long symposium held during the PVSC June 2021 International Meeting, Orlando Florida
- Symposium Co-Organizer, “Quantum Nanophotonic Materials, Devices, and Systems”
  - 3-day symposium held during the SPIE 2021 Fall Meeting in San Diego
- Symposium Co-Organizer, “Quantum Nanophotonic Materials, Devices, and Systems”
  - 3-day symposium held during the SPIE 2020 Fall Meeting in San Diego
- Student Invited Speaker, Young Researcher Conference, (June 2019)
  - Nominated representative for LGBTQ, by Alliance for Diversity in Science & Engineering (ADSE)
- Guest Journal Editor, Nanophotonics, 2018-2019
  - Co-Organizer for special issue on the topic “Plasmon-Exciton Coupling”
- Symposium Co-Organizer, “Quantum Nanophotonic Materials, Devices, and Systems”
  - 3-day symposium held during the SPIE 2019 Fall Meeting in San Diego
- Workshop Co-Organizer, “Nanophotonics Out-of-Equilibrium”, 2019
  - 1-week workshop at the Telluride Science Research Center
- Symposium Co-Organizer, “Quantum Nanophotonics”, SPIE meeting, 2018
  - 3-day symposium held during the SPIE 2018 Fall Meeting in San Diego
- Workshop Co-Organizer, “Exciton-Plasmon Coupling”, 2018
  - 1-week workshop at the Telluride Science Research Center
- Participant, NSF Undergraduate Council on Research, Washington DC, 2015

**Journals (manuscript reviewer):**

- ACS Catalysis
- ACS Energy Letters
- ACS Nano
- ACS Omega
- ACS Photonics
- Advanced Materials
- Advanced Optical Materials
- Applied Physics Letters
- Chemical Communications
- Chemical Reviews
- Chemistry of Materials
- Crystals
- Inorganic Chemistry Frontiers
- Journal of Applied Physics
- Journal of Materials Science: Materials in Electronics
- Journal of Physical Chemistry
- Journal of Physics: Condensed Matter



- Materials Chemistry
- Materials Today: Energy
- MRS Advances
- Nano Letters
- Nanophotonics
- Nanoscale
- Nanotechnology
- Nature Communications
- Nature Materials
- Nature: Scientific Reports
- Optics Express
- Optics Letters
- Science
- Science Advances

**Grant Proposal Reviewer:**

- Air Force Office of Scientific Research (2015- )
- Pakistan – U.S. Science and Technology Cooperation Program (2015)
- Petroleum Research Fund of the American Chemical Society (2016- )
- Department of Energy, Basic Energy Sciences (2017- )
- TAMU Energy Institute (2017- )
- National Science Foundation, Division of Materials Research (2018- )
- French National Research Agency (2019)
- National Science Foundation, Division of Chemistry (2022- )
- ETH Zurich Research Commission (2022- )

**Professional Membership:**

- American Chemical Society
- American Physical Society
  - Elected to Executive Committee, Topical Group on Energy Research and Applications (GERA), 2019- 2021, re-elected 2021
- Materials Research Society
- Optical Society of America
- SPIE
- International Precious Metals Institute

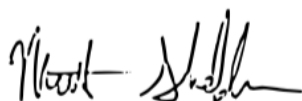
**Outreach:**

- Speaker, Volunteer Organizer: Science Café, Bryan, TX, (2016 – present)
  - Monthly casual public science forum, with presentations and Q&A
  - Website: <https://www.facebook.com/groups/259732216983/>
- Public Lecturer, Activity Organizer: Chemistry Open House, TAMU (2015 – present)
  - Yearly community open house hosted in TAMU Chemistry Department
  - Coordinated lab tours, student-led science demos
  - Public lecture, “Nanotechnology, Thermodynamics, and the Future of Solar Energy”, 2017

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*This CV submitted is most current and correct as of the date of this signature.*

Signature:



Date: May 13, 2022