Scott K. Cushing

Division of Chemistry and Chemical Engineering
California Institute of Technology
Pasadena, CA 91125

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EDUCATION:

2016-2018 **Dept. of Energy EERE Postdoctoral Fellow,**
Prof. Stephen Leone Group University of California, Berkeley, CA
Co-Appointment at Lawrence Berkeley National Laboratory

2011-2015 **Ph.D. in Physics, under Nick Wu and Alan Bristow**
West Virginia University, Morgantown, WV

2007-2011 **B.S in Physics, emphasis in Material Science and Chemistry**
West Virginia University, Morgantown, WV

POSITIONS:

2018-Present **Assistant Professor of Chemistry**
September 2018 to Present, Caltech, Pasadena, CA

2016-2024 **Senior Research Advisor for Pacific Integrated (PI) Energy**
March 2016 to August 2025, San Diego, CA

2025-Present **Co-founder of Quantelix**
April 2025 to present, Pasadena, CA

SELECTED HONORS AND AWARDS:

2025 JCP-DCP Future of Chemical Physics Lectureship
2025 C&EN Trailblazer 2025
2025 Moore Young Investigator Fellow
2025 JCP Best Experimental Paper Award by an Emerging Investigator
2025 Sloan Fellow
2024 DARPA YFA Fellow
2024 Camille-Dreyfus Teacher Scholar
2023 KNI Wheatley Fellow
2023 Research Corp. Scialog Fellow
2023 Emerging Young Investigator Issue for *ChemComm*
2022 W. M. Keck Foundation Award
2022 Shirley Malcom Prize for Excellence in Mentoring
2022 Cottrell Scholar
2022 Emerging Young Investigator Issue for *Journal of Physical Chemistry C*
2021 Invited Committee Member for National Academy of Sciences "Interface of Chemistry and Quantum Information Science"
2021 Invited Panelist for National Academy of Science's "Quantum Biology" Meeting
2021 **(**Early Career) Editor for *Electrochemical Society: Interface*
2020 Rose Hills Foundation Innovator
2020 Emerging Young Investigator for *Journal of Materials Chemistry*
2020 Emerging Young Investigator for *Journal of Chemical Physics*
2019 DOE Early Career Award

2019 AFOSR Young Investigator Program
2016 DOE EERE Postdoctoral Fellow
2015 Council of Graduate Schools, Top Scientific Thesis in United States and Canada
2015 *Nanotechnology* Top 10 Researcher Award
2014 ECS Energy and Technologies Division Top Graduate Student Award
2014 SPIE D. J. Lovell Award for Society's Top Graduate Student.
2014 Ones to Watch List by *Photonics Spectra Magazine*
2011 NSF Graduate Research Fellowship
2010 Barry M. Goldwater Scholarship

OUTREACH

- **Caltech – Connection:** Created program that connects Caltech graduate students with undergraduate students at local minority serving institutes (MSIs) to help with research, the transition to graduate school, and ultimately set up lifelong mentoring environments. The program currently includes an HBCU, and HSI, and four community colleges with 100 participants per year.
- **STEAM Video Series:** Helped develop program with West Virginia Public Broadcasting to better engage the public with cutting edge science.
- **Mental Health Community @ Caltech:** Responsible for organizing a supportive community around those that affiliate with or suffer from mental health issues.
- **NOGLSTP:** On scholarship and organizational committee for the National Organization for Gay and Lesbian Scientists and Technical Professionals
- **YouTube Series:** Helped start series dealing with invisible, mental, and visible disabilities in science.
- **Public podcasts** on solar energy research through PI Energy Podcast and disabilities on ChemTalk
- **ChemTalk Advisory Board –** Public charity non-profit, focused on STEM education, and the next generation of STEM workforce through free lessons, materials, and podcasts.

SCIENTIFIC SERVICE

- ***Chemical Physics:*** Editorial Advisory Board Member since 2025
- ***ECS: Interface:*** Contributing Editor since 2022, started *Reports from the Frontier* Section
- **ATTO XI Co-Organizer –** Early Career Advisory Committee
- **ACS CATL Co-Organizer** – ACS Fall 2023 Meeting
- **APS DCP Co-Organizer –** APS 2026 Fall Meeting
- **Electrochemical Society – EDT Solar Fuels**: Organization and chairing from 2015-present.
- **Chemistry-2021 Conference:** Advisory Board
- ***ChemElectroChem:*** Early Career Advisory Board
- **Invited talks** at GRC, ACS, SPIE, ECS, Pacific Chem, Telluride RSC, MRS, Analyticon
- **Journal referee** for Science, Nature Materials, Nature Photonics, Nature Communications, Optical Materials Express, Optica Quantum, Journal of the American Chemical Society, Journal of Physical Chemistry C, Journal of Physical Chemistry Letters, Journal of Chemical Physics, Nano Letters, Elsevier. **Grant reviewer** for DOE, AFOSR, NSF, NIH.

FUNDING:

External (PI): DOE Early Career Award, AFOSR Young Investigator Program, Cottrell Scholar, Camille-Dreyfus Teacher Scholar, W. M. Keck Foundation, Rose Hills Foundation Early Career Innovator, Baxter International, ACS PRF Doctoral New Investigator, DOE Quantum Chemistry and Materials (lead PI of 7 PI team across four institutions) / Funded Phase I and II, AFOSR DURIP, Scialog Fellow, DARPA Young Faculty Award, Sloan Fellowship, Moore Young Inventor Fellow

External (co-PI): DOE Liquid Sunlight Alliance, NSF RCN Quantum Biology, NIH-BIG, NSF-

CDMSA, DOE ERFC Nanoparticle Solar Fuel Reactors (Team Lead)

Internal (PI): Chen Neuroscience Institute (2), Rosen Bioengineering Center Pilot Grant, Resnick Institute Small grant award, KNI Wheatley Fellow Award, Beckman Institute Pilot Center, RI^2 Innovation Grant, Broadcom Innovation Funds

Workforce Development: Preer Family Donation for Caltech Connection / WAVE programs, NSF MNTCH-START (Co-PI), DOE LISA-CHASE Student ACS Symposium, Kavounas Family Donation for Caltech Connection

PATENTS:

1. Distributable Time Resolved Fluorescence Sensing Using Temporally Correlated Single Photons
   S. K. Cushing, N. Harper, B. P. Hickam, M. He, *Provisional Patent Submitted,* 5/11/2023

2. Laser Driven Ultrafast Impedance Spectrometer
   S. K. Cushing, K. Pham, *Provisional Patent Submitted*, 12/23/2022

3. An Entangled, Continuous Wave, Photon Source That Can Replace a Pulsed Laser In Non-Destructive, Multiphoton Or Nonlinear Optical Devices
   S. K. Cushing, M. He, S. Szoke, B. P. Hickam, *Application Number: 2021/0165300,* 6/03/2021

4. Metal Halide Based Thermionic Energy Conversion Devices
   S. K. Cushing, P. Layton, D. Keogh, *Application Number: 62632360,* 2/19/2019

5. High Absorption, photo induced resonance energy transfer electromagnetic energy collector
   P. Layton, D. Keogh, **S. K. Cushing**, *Application Number: 62596531,* 12/8/2018

STUDENT THESES:

1. Developing New Methods of Quantum Spectroscopy with Nonlinear Integrated Photonics
   Nathan Harper (2025)

2. Nonlinear Frequency Conversion in Lithium Niobate Nanophotonic Circuits for Quantum Spectroscopy
   Emily Hwang (2025)

3. Application of ultra-fast spectroscopy techniques to probe correlated ion hopping mechanisms in solid-state ion conductors
   Kim Pham (2025)

4. Development and Characterization of a Table-Top Laser-Produced Plasma Source for In-Situ and Time-Resolved Soft X-Ray Absorption Spectroscopy
   Danika Nimlos (2024)

5. Measuring Charge Carrier and Structural Photodynamics at Solar Energy Material Surfaces Using Transient Extreme Ultraviolet Reflection Spectroscopy.

Jonathan Michelsen (2024)

6. Exploring How Entangled Photon Correlations Can Enhance Spectroscopy
   Bryce Hickam (2023)

7. Entanglement-Enhanced Bioimaging and Sensing.
   Manni He (2023)

8. Understanding the Origins of Photoexcited XUV Spectra
   Isabel Klein (2022)

9. Entangled Photon Interferometry: Development of Photonic Systems Towards Quantum Spectroscopy
   Szilard Szoke (2021)

PUBLICATIONS: Google Scholar Profile; *~90 publications, cited ~11,000 times, h-index 40, i10-index=62*

Since Caltech as a Principal Investigator†

Entangled Photon Spectroscopy:

1. Temperature-tunable photon-pair source for multiplexed time-resolved fluorescence on a nanophotonic platform. A. Sengupta, N. A. Harper, E. Y. Hwang, **S. K. Cushing†.** *Optics Letters*. 50, 17, 5222-5225 (2025) https://doi.org/10.1364/OL.568600

2. Generation of UV-Vis correlated photon pairs using PP-LaBGeO5
   R. Tolentino, N. Harper, **S. K. Cushing†** *Optics Letters* 33, 49504-49513 (2025)
   https://doi.org/10.1364/OE.575802

3. Investigation of nanophotonic lithium niobate waveguides for on-chip evanescent wave sensing. N. A. Harper, E. Y. Hwang, P. A. Kocheril, **S. K. Cushing†** *Optics Letters, Accepted,* (2024)

4. Experimental Upper Bounds for Resonance-Enhanced Entangled Two-Photon Absorption Cross Section of Indocyanine Green. M. He, B. P. Hickam, N. Harper, **S. K. Cushing†** (2024), *Journal of Chemical Physics* 160, 094305 (2024). doi.org/10.1063/5.0193311 (**Featured Article, Best Article by an Emerging Investigator**)

5. Visible and near-IR entangled photon generation and UV second harmonic generation with lithium niobate nanophotonic waveguides for on-chip spectroscopy. E. Hwang, N. Harper, R. Sekine, L. Ledezma, A. Marandi, **S. K. Cushing†** *Proceedings of SPIE LASE,* 1286907 (2024) https://doi.org/10.1117/12.3000100

6. Progress towards on-chip entangled photon spectroscopy and bioimaging, M. He, E. Hwang, N. Harper, **S. K. Cushing†** *Proceedings of SPIE OPTO,* 128950O (2024) https://doi.org/10.1117/12.2693025

7. Highly efficient visible and near-IR photon pair generation with thin-film lithium niobate, N. Harper, E. Hwang, R. Sekine, L. Ledezma, C. Perez, A. Marandi, **S. K. Cushing†** *Optica*

Quantum 2(2), 103-109 (2024), https://doi.org/10.1364/OPTICAQ.507526

8. Entangled Photon Correlations Allow a Continuous-Wave Laser Diode to Measure Single Photon, Time-Resolved Fluorescence, N. Harper, B. P. Hickam, M. He, **S. K. Cushing†**, *Journal of Physical Chemistry Letters* 14 (2023), 5805. doi.org/10.1021/acs.jpclett.3c01266

9. Advancing Chemistry and Quantum Information Science: An Assessment of Research Opportunities at the Interface of Chemistry and Quantum Information Science in the United States. **S. K. Cushing,** *Contributor* to National Academies of Sciences, Engineering, and Medicine (2023). https://doi.org/10.17226/26850.

10. Tunable and efficient ultraviolet generation in nanophotonic lithium niobate, E. Hwang, N. Harper, R. Sekine, L. Ledezma, A. Marandi, **S. K. Cushing†**, *Optics Letters*, 48, 3917-3920 (2023). doi.org/10.1364/OL.491528. **(Highlighted by Optica)**

11. Single-Photon Scattering Can Account for the Discrepancies among Entangled Two-Photon Measurement Techniques, B. P. Hickam, M. He, N. Harper, S. Szoke, **S. K. Cushing†,** *Journal of Physical Chemistry Letters* (2022) 10.1021/acs.jpclett.2c00865

12. *Quantum Science Concepts in Enhancing Sensing and Imaging Technologies: Applications for Biology*, edited by A. F. Johnson, S. M. Moss, A. Bremer, F. Sharples; **S.K. Cushing**† as a contributor, ISBN 978-0-309-46534-2 (2021), DOI 10.17226/26139

13. Designing High-Power, Octave Spanning Entangled Photon Sources for Quantum Spectroscopy S. Szoke, M. He, B. P. Hickam, **S. K. Cushing**†, *Journal of Chemical Physics,* 154 (2021), 244201 **(Invited special issue on "Quantum Light")**

14. Entangled Light-Matter Interactions and Spectroscopy, S. Szoke, H. Liu, B. P. Hickam, M. He, **S. K. Cushing**†, *Journal of Materials Chemistry C, 8* (2020), 10732. (**Invited Young Career Paper)**

Transient X-Ray Spectroscopy:

15. Experimentally Mapping the Phase Diagrams of Photoexcited Small Polarons. J. L. Mendes and **S. K. Cushing**†, (2025). doi.org/10.48550/arXiv.2512.17869.

16. Coherent and Dynamic Small Polaron Delocalization in CuFeO2 J. L. Mendes, S. Bhattacharyya, C. Huang, J. M. Michelsen, I. M. Klein, F. Babbe, T. Sayer, T. Li, J. K. Cooper, H. Liu, N. S. Ginsberg, A. Montoya-Castillo, **S. K. Cushing†** (2025). *Just Accepted Journal of Physical Chemistry Letters*, https://arxiv.org/abs/2510.16222

17. Optical Spectroscopic Determination of Photoexcited Small-Polaron Hopping in Transition Metal Oxide Photocatalysts M. Sachs, L. Verga, V. Kunzelmann, A. Kafizas, I. Sharp, **S. K. Cushing†**, A. Walsh, J. Durrant. *Just Accepted Chemical Science* (2025) 10.26434/chemrxiv-2025-bhf0z

18. Gerischer Electrochemistry Today J. B. Sambur, et. al. ACS Energy Letters (2025), 10, 6578 https://doi.org/10.1021/acsenergylett.5c02966

19. Resonant Self-Diffraction of Femtosecond Extreme Ultraviolet Pulses in Cobalt A. A. Maznev, W. Lee, **S. K. Cushing†**, D. De Angelis, D. Fainozzi, L. Foglia, C. Gutt, N. Jaouen, F. Kammerbauer, C. Masciovecchio, R. Mincigrucci, K. A. Nelson, E. Paltanin, J. S. Pelli-Cresi, V. Polewczyk, D. Ksenzov, F. Bencivenga (2025) https://arxiv.org/abs/2505.07168

20. The role of effective mass and long-range interactions in the band-gap renormalization of photo-excited semiconductors. C. C. Reeves, **S. K. Cushing†**, V. Vlcek. *Phys. Rev. B* 112, 075105, doi.org/10.1103/bpqy-f2pk

21. Dynamic Competition Between Orbital and Exchange Interactions Selectively Localizes Electrons and Holes Through Polarons. J. L. Mendes, H. J. Shin, J. Y. Seo, N. L. Lee, Y. J. Choi, J. B. Varley, **S. K. Cushing†,** *Journal of the American Chemical Society* (2025), 147, 19, 16018-16026 doi.org/10.1021/jacs.4c16837

22. Approaching the Lower Temporal Limit of Laser-Produced Plasma Sources for Table-Top Soft X-ray NEXAFS Measurements, D. Nimlos, A. Arellano, **S. K. Cushing†**, *Chem Phys Chem* (2024) http://dx.doi.org/10.1002/cphc.202400857

23. Oxidizing role of Cu co-catalysts in unassisted photocatalytic CO₂ reduction using p-GaN/Al2O3/Au/Cu heterostructures. M. Zoric, P. Basera, L. Palmer, A. Aitbekova, N. Powers-Riggs, H. Lim, W. Hu, A. T. Garcia-Esparza, H. Sarker, F. Abild-Pedersen, H. Atwater, **S. K. Cushing†**, M. Bajdich, A. Cordones *ACS Nano (2024), 18 19538*) doi.org/10.1021/acsnano.4c02088

24. Coherent charge hopping suppresses photoexcited small polarons in ErFeO3 by antiadiabatic formation mechanism. Y.-J. Kim, J. L. Mendes, Y. J. Choi, **S. K. Cushing†,** *Science Advances (2023)*, 10 (2023), DOI: 10.1126/sciadv.adk4282

25. Determining Quasi-Equilibrium Electron and Hole Distributions from Plasmonic Photocatalysts using Photomodulated X-ray Absorption Spectroscopy. L. D. Palmer, W. Lee, C. L. Dong, R.-S. Liu, N. Wu, S**. K. Cushing†** *ACS Nano* (2023), doi/10.1021/acsnano.3c08181.

26. Time-resolved chemically selective spectroscopic investigation of the α-Fe2O3/Al redox reaction, J. S. Pelli Cresi, E. Principi, W. Lee, F. Bencivenga, D. De Angelis, L. Foglia, D. Garzella, G. Kurdi, M. Manfredda, N. Denys, A. Simoncig, **S. K. Cushing†**, R. Mincigrucci, C. Masciovecchio (2023), https://doi.org/10.21203/rs.3.rs-3328823/v1. *In Revision Nat. Comm.*

27. Direct confirmation of a pressure-induced electronic topological transition in cadmium, J. K. Hinton, D. Schacher, W. Lee, G. A. Smith, E. Siska, C. Park, P. B. Ellison, **S. K. Cushing†**, C. Schwartz, K. V. Lawler, A. Salamat, *Physical Review B.* 110, 205118 (2024) 10.1103/PhysRevB.110.205118

28. Measuring photoexcited electron and hole dynamics in ZnTe and modeling excited state core-valence effects in transient XUV reflection spectroscopy, H. Liu, J. M. Michelsen, J. L. Mendes, I. M. Klein, S. R. Bauers, J. M. Evans, Andriy Zakutayev, **S. K. Cushing**†, *Journal of Physical Chemistry Letters* (2023), 10.1021/acs.jpclett.2c03894

29. Ab Initio Calculations of XUV Ground and Excited States for First-Row Transition Metal Oxides, I. M. Klein, A. Krotz, W. Lee, J. M. Michelsen, **S. K. Cushing†**, *Journal of Physical Chemistry C* (2023), 10.1021/acs.jpcc.2c06548 (**Invited Special Issue)**

30. Ab Initio Prediction of Excited State and Polaron Effects in Transient XUV Measurements of α-Fe_2O_3, I. M. Klein, H. Liu, D. Nimlos, A. Krotz, **S. K. Cushing†,** *Journal of the American Chemical Society* (2022), 144, 12834.

31. Element-specific electronic and structural dynamics using transient X-ray spectroscopy, H. Liu, I. M. Klein, J. M. Michelsen, **S. K. Cushing**†, *Chem,* 10 (2021), 2569-2584. (**Invited Perspective)**

32. Layer-Resolved Ultrafast XUV Measurement of Hole Transport in a Ni-TiO2-Si Photoanode, **S. K. Cushing**†, I. J. Porter, B. R. Lamoureux, A. Lee, B. M. Marsh, S. Szoke, M. E. Vaida, S. R. Leone, *Science Advances*, 6 (2020), eaay6650

33. Characterization of Carrier Cooling Bottleneck in Silicon Nanoparticles by Extreme Ultraviolet (XUV) Transient Absorption Spectroscopy,
J. Porter, A. Lee, **S. K. Cushing**†, H.-T. Chang, J. C. Ondry, A. P. Alivisatos, S. R. Leone, *J. Phys. Chem. C,* 125, 17 (2021), 9319–9329

34. Electron thermalization and relaxation in laser-heated nickel by few-femtosecond core-level transient absorption spectroscopy,
H.-T. Chang, A. Guggenmos, **S. K. Cushing**†, Y. Cui, N. U. Din, S. R. Acharya, I. J. Porter, U. Kleineberg, V. Turkowski, T. S. Rahman, D. M. Neumark, S. R. Leone, *Physical Review B,* 103 (2020), 064305.

35. Transient extreme ultraviolet measurement of element-specific charge transfer dynamics in multiple-material junctions,
J. M. Michelsen, W. T. Denman, **S. K. Cushing**†, *SPIE Photonics West*, 10926 (2019), 109262A.

Ultrafast Electron and Battery Spectroscopy:

36. The Role of THz Phonons in the Ionic Conduction Mechanism $Li_7La_3Zr_2O_{12}$ Polymorphs.
A. K. Lin, N. A. Spear, G. A. Blake, G. A, **S. K. Cushing**†, (2025)
https://arxiv.org/abs/2512.22427v1

37. Imaging nanoscale carrier, thermal, and structural dynamics with time-resolved and ultrafast electron energy-loss spectroscopy
W. Lee, L. D. Palmer, T. E. Gage, **S. K. Cushing†** *Chem. Phys. Rev.* 6, 041303 (2025)
https://doi.org/10.1063/5.0289128

38. Electron Energy Loss Spectroscopy,
N. J. Heller, A. J. Washington, **S. K. Cushing†**, (2025) *ACS in Focus*
DOI:10.1021/acsinfocus.7e9010

39. The dynamical role of optical phonons and sub-lattice screening in a solid-state ion conductor. K. H. Pham, V. Begum-Hudde, A. K. Lin, N. A. Spear, J. McClellan, M. W. Zuerch, A. Schliefe, K. A. See, **S. K. Cushing†**, *J. Am. Chem. Soc.* (2025), 147, 30, 26456–26467.

https://doi.org/10.1021/jacs.5c06064

40. Towards Nanoscale and Element-Specific Lattice Temperature Measurements using Core-Loss Electron Energy-Loss Spectroscopy . L. D. Palmer, W. Lee, J. F. Jr. Fajardo, A. A. Talin, T. E. Gage, **S. K. Cushing†,** *ACS Phys Chem Au* (2025) doi/10.1021/acsphyschemau.5c00044

41. Direct observation of Rh and La dopant positions in SrTiO3 nanoparticles with atomic-scale electron microscopy. J. T. Mulvey, R. P. Prasad, Z. Chen, L. Palmer, B. Layne, K. Watanabe, M. Xu, A. Talin, X. Pan, A. Kudo, **S. K. Cushing†**, S. Ardo, J. P. Patterson *ACS Appl. Mater.* Interfaces (2025), doi.org/10.1021/acsami.5c15338

42. Laser-driven ultrafast impedance spectroscopy for measuring complex ion hopping processes, K. H. Pham, **S. K. Cushing†** *Review of Scientific Instruments, 95* (2024) https://doi.org/10.1063/5.0182323

43. Many-body phonon-ion conduction in solid electrolyte driven by THz modes, K. H. Pham, K. Gordiz, J. M. Michelsen, H. Liu, D. Vivona, Y. Shao-Horn, A. Henry, K. A. See, **S. K. Cushing†** (2025), https://arxiv.org/abs/2305.01632.

44. Ultrafast Formation of Charge Transfer Trions at Molecular-Doped 2D MoS2 Interfaces. Y. Jinga, K. Liangb, N. S. Muira, H. Zhoub, Z. Lib, J. M. Palasza, J. Sorbiea, C. Wanga, **S. K. Cushing†**, C. P. Kubiak, Z. Sofer, S. Li, W. Xiong. *Angew. Chem. Int. Ed. Engl.* (2024) DOI:10.1002/anie.202405123

45. Using Electron Energy-Loss Spectroscopy to Measure Nanoscale Electronic and Vibrational Dynamics in a TEM, Y.-J. Kim, L. D. Palmer, W. Lee, N. J. Heller, **S. K. Cushing†,** *Journal Chemical Physics,* 159 (2023), 050901 (**Cover Article)**

46. Molecular hot spots in surface-enhanced Raman scattering, M. Li*, **S. K. Cushing*†**, G. Zhou, N. Wu, *Nanoscale,* 12 (2020), 22036 **(2020 Hot Paper)**

47. Plasmonic hot carriers skip out in femtoseconds, **S. K. Cushing†**, *Nature Photonics*, 11 (2017), 745 **-Invited News and Views**

Not as a Principal Investigator

*two bolded names indicate shared first authorship

Transient X-Ray Spectroscopy:

48. Differentiating Photoexcited Carrier and Phonon Dynamics in the Δ, L, and Γ Valleys of Si(100) with Transient Extreme Ultraviolet Spectroscopy, **S. K. Cushing,** A. Lee, I. J. Porter, L. M. Carneiro, M. Zürch, H.-T. Chang, S. R. Leone, *Journal of Physical Chemistry C,* 123 (2019), 3343-3352.

49. Retrieval of the complex-valued refractive index of germanium near the M4,5 absorption edge, C. J. Kaplan, P. M. Kraus, E. M. Gullikson, L. J. Borja, **S. K. Cushing**, M. Zürch, H.T. Chang, D. M. Neumark, S. R. Leone, *Journal of the Optical Society of America B,* 36 (2019), 1716-1720.

50. Hot Phonon and Carrier Relaxation in Si(100) Determined by Transient Extreme Ultraviolet Spectroscopy,
S. K. Cushing, M. Zürch, P. M. Kraus, L. M. Carneiro, A. Lee, H.-T. Chang, C. J. Kaplan, S. R. Leone, *Structural Dynamics,* 5 (2018), 054302.
- Featured Article

51. Photoexcited Small Polaron Formation in Goethite (α-FeOOH) Nanorods Probed by Transient Extreme Ultraviolet Spectroscopy,
I. J. Porter, **S. K. Cushing**, L. M. Carneiro, A. Lee, J. C. Ondry, J. C. Dahl, H. T. Chang, A. P. Alivisatos, S. R. Leone, *Journal of Physical Chemistry Letters*, 9 (2018), 4120-4124.

52. The Ultrafast X-ray Spectroscopic Revolution in Chemical Dynamics,
P. M. Kraus, M. Zürch, **S. K. Cushing**, D. M. Neumark, S. R. Leone, *Nature Reviews Chemistry,* 2 (2018), 82.
- Invited Review

53. Femtosecond tracking of carrier relaxation in Germanium with extreme ultraviolet transient reflectivity,
C. J. Kaplan, P. M. Krauss, A. D. Ross, M. Zürch, **S. K. Cushing**, M. F. Jager, H.T. Chang, E. M. Gullikson, D. M. Neumark, S. R. Leone, *Physical Review B*, 97 (2018), 205202.

54. Excitation wavelength dependent small polaron trapping of photoexcited carriers in α-Fe2O3,
L. M. Carneiro*, S. K. Cushing*, C. Liu, Y. Su, P. Yang, A. P. Alivisatos, S. R. Leone, *Nature Materials* 16 (2017), 819.

55. Direct and simultaneous observation of ultrafast electron and hole dynamics in germanium,
M. Zürch, H.-T. Chang, L. J. Borja, P. M. Kraus, **S. K. Cushing**, A. Gandman, C. J. Kaplan, M. H. Oh, J. S. Prell, D. Prendergast, C. D. Pemmaraju, D. M. Neumark, S. R. Leone, *Nature Communications* 8 (2017), 15734.

56. Ultrafast carrier thermalization and trapping in silicon-germanium alloy probed by extreme ultraviolet transient absorption spectroscopy,
M. Zürch, H.-T. Chang, P. M. Kraus, **S. K. Cushing**, L. J. Borja, A. Gandman, C. J. Kaplan, M. H. Oh, J. S. Prell, D. Prendergast, C. D. Pemmaraju, D. M. Neumark, S. R. Leone, *Structural Dynamics,* 4 (2017), 044029.

57. Measuring the Surface Photovoltage of a Schottky Barrier Under Intense Light Conditions: Zn/p-Si(100) by Laser Time-Resolved Extreme Ultraviolet Photoelectron Spectroscopy,
B. M. Marsh, M. E. Vaida, **S. K. Cushing**, B. R. Lamoureux, S. R. Leone, *Journal of Physical Chemistry C*, 121 (2017) 21904.

58. Valley-dependent carrier and lattice dynamics in silicon measured by transient XUV spectroscopy,
S. K. Cushing, L. M. Carneiro, M. Zürch, P. M. Kraus, C. J. Kaplan, H. T. Chang, S. R. Leone, *CLEO: Applications and Technology,* ATh3C-5 (2017).

Plasmonics:

59. Plasmonic hot carriers skip out in femtoseconds,
S. K. Cushing, *Nature Photonics*, 11 (2017), 745
-**Invited News and Views**

60. Tunable Nonthermal Distribution of Hot Electrons in a Semiconductor Injected from a Plasmonic Gold Nanostructure,
S. K. Cushing, C. J. Chen, C. L. Dong, X. T. Kong, A. O. Govorov, R. S. Liu, N. Wu, *ACS Nano,* 12 (2018), 7117.

61. Progress and Perspectives of Plasmon-Enhanced Solar Energy Conversion,
S. K. Cushing and N. Wu, *Journal Physical Chemistry Letters*, 7 (2016), 666-675.
- **Invited Perspective, Journal Front Cover**

62. Distinguishing surface effects of gold nanoparticles from plasmonic effect on photoelectrochemical water splitting by hematite,
J. Li, **S. K. Cushing**, D. Chu, P. Zheng, J. Bright, C. Castle, A. Manivannan, N. Q. Wu, *Journal of Materials Research*, 31 (2016), 1608-1615.

63. Investigation of Plasmonic Effect in Air-processed PbS/CdS Core-shell Quantum Dot based Solar Cells
B. A. Gonfa, M. R. Kim, P. Zheng, **S. K. Cushing**, Q. Qiao, N. Wu, M. A. El Khakani and D. Ma, *Journal of Materials Chemistry A*, 4 (2016), 13071-13080.

64. Plasmon-induced resonance energy transfer for solar energy conversion,
J. Li*, S. K. Cushing*, F. Meng, T. R. Senty, A. D. Bristow, N. Wu, *Nature Photonics,* 9 (2015), 601-607.
- **Featured at Ars Technica**

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*Upcoming Invited Presentations are denoted by **

GRC on Noble Metal Nanoparticles	June 2026
GRC on Solid-State Studies in Ceramics	June 2026
ECS Spring Meeting*	May 2026
Seminar at UC Berkeley*	Apr 2026
Seminar at University of Pennsylvania*	Mar 2026
APS Global Physics Summit 2026*	Mar 2026
Seminar at Yale*	Feb 2026
MRS Fall Meeting 2025	Nov 2025
NSF Workshop on Ultrafast Photochemistry and Photocatalysis	Oct 2025
University of Chicago	Oct 2025
LLNL Independent Assessment	Sep 2025
SLAC Ultrafast Electron Diffraction Workshop	Aug 2025
ACS Fall 2025	Aug 2025
ECS Fall 2025	May 2025
Seminar at University of Chicago	Mar 2025
ACS Spring Meeting 2025	Mar 2025
APS Global Summit 2025	Mar 2025
Seminar at Northwestern	Mar 2025
Seminar at UC Santa Barbara	Feb 2025
Seminar at Colorado State University	Jan 28,2025

ARO Energy Sciences & Plasma-Driven Electrochemistry	Jan 2025
Seminar at University of Illinois Urbana-Champaign	Dec 2024
Seminar at UC San Diego	Dec 2024
2nd Gerischer Electrochemistry Today Symposium	Aug 2024
Cottrell Scholars Conference	Jul 2024
Spring ECS Meeting 2024	May 2024
Seminar at MIT	Mar 2024
Seminar at Princeton	Mar 2024
Seminar at UC Berkeley	Jan 2024
ACS Fall 2025	Aug 2023
Seminar at UCLA	Jun 2023
Seminar at University of Colorado, Boulder	Apr 2023
MRS Spring 2023	Apr 2023
GRC Quantum Biology	Mar 2023
Seminar at Stanford University	Feb 2023
Seminar at USC	Oct 2022
ECS Fall 2022	Oct 2022
CLEO 2022	May 2022
ACS Spring 2022	Mar 2022
Seminar at UC Santa Cruz	Nov 2019
ECS Fall 2019	Oct 2019
ACS Fall 2019	Aug 2019
ISMS Conference	Jun 2019
ECS Spring 2019	May 2019
SPIE 2019	Feb 2019

Committees

Name of Committee	Department	Year
Chemical Physics Seminar Faculty Co-Chair	CCE	2018-2025
Graduate Admissions Committee	CCE	2018-2026
Safety Committee	CCE	2018; 2019
Curriculum Committee	CCE	2018-2025
Graduate Studies	CCE	2018-2026

Computing Resources	CCE	2018-2020
Undergraduate Studies	CCE	2018-2023
Diversity	CCE	2020-2022
Diversity, Equity, and Inclusion	CCE	2023-2025
Bond- Faculty Advisor	CCE	2025-2026
Center for Diversity Faculty Advisory Committee	Institute	2018-2023
Presidential Postdoctoral Fellowship	Institute	2023-2024
Sharon M. Malcom Award	Institute	2023-2024
Institutional Action Planning	Institute	2023-2024
Applied Physics/Material Science Faculty Search	Institute	2023-2025