Austin P. Spencer

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Physical chemist with more than a decade of research experience in ultrafast spectroscopy and materials characterization. Investigated photophysics in chemical systems ranging from nanomaterials and proteins to organic polymers and small molecules.

- Experienced ***team project manager*** with proven mentoring and leadership skills.
- Strong record of ***effective communication*** through research presentations and scientific writing, with ***16 peer-reviewed publications*** (and counting).
- ***Adaptable*** to varying projects, mastering new skills as needed to complete an assignment.
- Extensive experience in ***instrument design and development***, including optics, software, and electronics.

Education

Ph.D., Chemistry August 2014
University of Colorado Boulder

B.S., Chemistry with Honors and Distinction; minor in Computer Science May 2009
University of North Carolina at Chapel Hill

Experience

Postdoctoral Researcher February 2018–present
Northwestern University, Department of Chemistry; Advisor: Lin X. Chen

- Led graduate students in the development and execution of collaborative research projects.
- Spearheaded a new project to study energy transfer in solar energy harvesting materials.
- Designed and built a time-resolved spectroscopy instrument and trained students in its use.

Postdoctoral Researcher August 2014–February 2018
Northwestern University, Department of Chemistry; Advisor: Elad Harel

- Advised graduate and undergraduate students on project development and publication of results, and trained them on experimental techniques.
- Designed and built highly-cited time-resolved spectroscopies, including 4D electronic–Raman spectroscopy, single-shot 2D spectroscopy, and compressive sensing detection.
- Probed electronic–vibrational coupling in CdSe quantum dots and photosynthetic proteins, demonstrating the strong interactions between excitons and phonons.

Research Assistant August 2009–August 2014
University of Colorado Boulder, Department of Chemistry and Biochemistry; Advisor: David M. Jonas

- Studied charge carrier dynamics in colloidal InAs and PbS quantum dots, exposing interactions between excitons within the same nanoparticle.
- Developed computational simulations for the modeling of multidimensional spectra.

Undergraduate Researcher December 2007–May 2009
University of North Carolina at Chapel Hill, Department of Chemistry; Advisor: Tomas Baer
Eötvös Loránd University (Budapest, Hungary); Advisor: Bálint Sztáray
- Investigated UV photodissociation and thermochemistry of halo-alkanes and halo-silanes.

Technical skills

- **Spectroscopy** – two-dimensional electronic – transient absorption – UV-Vis – photoelectron
- **Optics and Lasers** – ultrafast optics – interferometry – laser pulse characterization (spatial, temporal, and spectral) – pulse shaping
- **Materials** – semiconductor nanomaterials (quantum dots) – organic photovoltaic polymers and small molecules – photosynthetic protein complexes
- **Experiment/instrument development** – robust optical design – high-speed data acquisition – technique characterization, calibration, and documentation
- **Software development** – instrument control and real-time synchronization – data acquisition – modular, object-oriented design
- **Analytical methods** – mass spectrometry – NMR – chromatography (HPLC, GC)
- **Data analysis and modeling** – signal and image processing – global analysis methods – linear and nonlinear optimization
- **Programming** – MATLAB – LabVIEW – C – Linux/Bash – Python – Mathematica – Fortran – Java
- **Electronic engineering** – analog – digital – microcontrollers – PCB design – test & measurement

Awards and Recognitions

Cover & Feature article in *The Journal of Physical Chemistry C*[4] November 2018
"Four-Dimensional Coherent Spectroscopy of Complex Molecular Systems in Solution"

Featured in *Science*: 4D electronic–Raman spectroscopy[9] June 2017
J. Goodknight, A. Aspuru-Guzik. Taking six-dimensional spectra in finite time. *Science* **2017**, *356*, 1333–1333; DOI: 10.1126/science.aan2842

Summer Undergraduate Research Fellowship Summer 2008
University of North Carolina at Chapel Hill

Eagle Scout

Publications

1. M. S. Kirschner, Y. Jeong, A. P. Spencer, N. E. Watkins, X.-M. Lin, G. C. Schatz, L. X. Chen, R. D. Schaller. Phonon-induced plasmon-exciton coupling changes probed via oscillation-associated spectra. *Appl. Phys. Lett.* **2019**, *115*, 111903; DOI: 10.1063/1.5116836
2. P. E. Ohno, H. Chang, A. P. Spencer, Y. Liu, M. D. Boamah, H.-f. Wang, F. M. Geiger. Beyond the Gouy–Chapman Model with Heterodyne-Detected Second Harmonic Generation. *J. Phys. Chem. Lett.* **2019**, *10*, 2328–2334; DOI: 10.1021/acs.jpclett.9b00727
3. A. P. Spencer, W. K. Peters, N. R. Neale, D. M. Jonas. Carrier Dynamics and Interactions for Bulk-Like Photoexcitation of Colloidal Indium Arsenide Quantum Dots. *J. Phys. Chem. C* **2018**; DOI: 10.1021/acs.jpcc.8b09671

4. A. P. Spencer, W. O. Hutson, E. Harel. Four-Dimensional Coherent Spectroscopy of Complex Molecular Systems in Solution. *J. Phys. Chem. C* **2018**; DOI: 10.1021/acs.jpcc.8b09184
5. S. Irgen-Gioro, A. P. Spencer, W. O. Hutson, E. Harel. Coherences of Bacteriochlorophyll a Uncovered Using 3D-Electronic Spectroscopy. *J. Phys. Chem. Lett.* **2018**, *9*, 6077–6081; DOI: 10.1021/acs.jpclett.8b02217
6. A. P. Spencer, W. O. Hutson, S. Irgen-Gioro, E. Harel. Exciton–Phonon Spectroscopy of Quantum Dots Below the Single-Particle Homogeneous Line Width. *J. Phys. Chem. Lett.* **2018**, 1503–1508; DOI: 10.1021/acs.jpclett.8b00065
7. W. O. Hutson, A. P. Spencer, E. Harel. Ultrafast Four-Dimensional Coherent Spectroscopy by Projection Reconstruction. *J. Phys. Chem. Lett.* **2018**, 1034–1040; DOI: 10.1021/acs.jpclett.8b00122
8. A. P. Spencer, R. J. Hill, W. K. Peters, D. Baranov, B. Cho, A. Huerta-Viga, A. R. Carollo, A. C. Curtis, D. M. Jonas. Sample exchange by beam scanning with applications to noncollinear pump–probe spectroscopy at kilohertz repetition rates. *Rev. Sci. Instrum.* **2017**, *88*, 064101; DOI: 10.1063/1.4986628
9. A. P. Spencer, W. O. Hutson, E. Harel. Quantum coherence selective 2D Raman–2D electronic spectroscopy. *Nat. Commun.* **2017**, *8*, 14732; DOI: 10.1038/ncomms14732
10. W. O. Hutson, A. P. Spencer, E. Harel. Isolated Ground-State Vibrational Coherence Measured by Fifth-Order Single-Shot Two-Dimensional Electronic Spectroscopy. *J. Phys. Chem. Lett.* **2016**, 3636–3640; DOI: 10.1021/acs.jpclett.6b01733
11. A. P. Spencer, B. Spokoyny, S. Ray, F. Sarvari, E. Harel. Mapping multidimensional electronic structure and ultrafast dynamics with single-element detection and compressive sensing. *Nat. Commun.* **2016**, *7*, 10434; DOI: 10.1038/ncomms10434
12. A. P. Spencer, B. Spokoyny, E. Harel. Enhanced-Resolution Single-Shot 2DFT Spectroscopy by Spatial Spectral Interferometry. *J. Phys. Chem. Lett.* **2015**, 945–950; DOI: 10.1021/acs.jpclett.5b00273
13. A. P. Spencer, H. Li, S. T. Cundiff, D. M. Jonas. Pulse Propagation Effects in Optical 2D Fourier-Transform Spectroscopy: Theory. *J. Phys. Chem. A* **2015**, *119*, 3936–3960; DOI: 10.1021/acs.jpca.5b00001
14. B. Cho, V. Tiwari, R. J. Hill, W. K. Peters, T. L. Courtney, A. P. Spencer, D. M. Jonas. Absolute Measurement of Femtosecond Pump–Probe Signal Strength. *J. Phys. Chem. A* **2013**, *117*, 6332–6345; DOI: 10.1021/jp4019662
15. H. Li, A. P. Spencer, A. Kortyna, G. Moody, D. M. Jonas, S. T. Cundiff. Pulse Propagation Effects in Optical 2D Fourier-Transform Spectroscopy: Experiment. *J. Phys. Chem. A* **2013**, *117*, 6279–6287; DOI: 10.1021/jp4007872
16. N. S. Shuman, A. P. Spencer, T. Baer. Experimental Thermochemistry of SiCl3R (R = Cl, H, CH3, C2H5, C2H3, CH2Cl, SiCl3), SiCl3+, and SiCl3•. *J. Phys. Chem. A* **2009**, *113*, 9458–9466; DOI: 10.1021/jp9054186
17. A. P. Spencer, *TPEPICO Spectroscopy of SiCl4, SiCl3CH3, SiCl3CH2Cl, SiCl3C2H3, and SiCl3C2H5: Thermochemistry of Trichlorosilane Derivatives*, Honors Thesis, University of North Carolina at Chapel Hill, Chapel Hill, NC, **2009**. URL