Curriculum Vitae

James E. Patterson

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ACADEMIC RANK

Professor, Department of Chemistry and Biochemistry, Brigham Young University, Provo, Utah, 2024 - present

Associate Professor, Department of Chemistry and Biochemistry, Brigham Young University, Provo, Utah, 2013 – 2024.

Assistant Professor, Department of Chemistry and Biochemistry, Brigham Young University, Provo, Utah, 2007 – 2013.

EDUCATION AND TRAINING

Post-doctoral Research Associate, Institute for Shock Physics, Washington State University, Pullman, Washington, 2004 – 2007.
Spectroscopic (vibrational and electronic) investigation of the initiation dynamics of energetic molecular crystals (RDX).
Yogendra M. Gupta, Institute Director; Zbigniew A. Dreger, Senior Research Scientist

Ph.D. Chemistry (Physical), University of Illinois at Urbana-Champaign, Urbana, Illinois, 2004.
Dissertation Title – "Ultrafast Molecular Dynamics at a Shock-Compressed Metal-Liquid Interface"
Dana D. Dlott, dissertation advisor

M.S. Chemistry (Analytical), Brigham Young University, Provo, Utah, 1998.
Thesis Title – "Optical and Computational Investigation of Plasma Flow in an Inductively Coupled Plasma-Mass Spectrometer"
Paul B. Farnsworth, thesis advisor

B.S. Chemistry, Magna Cum Laude, Mathematics Minor, Brigham Young University, Provo, Utah, 1996.

PUBLICATIONS (while at BYU; numbering includes prior work)

38. James E. Patterson*, Haley N. Hunsaker, Laurel C. Smith, Rebecca L. Sansom, Matthew C. Asplund*, Modified Iodine Clock Reaction to Introduce the Concept of Activity, *Journal of Chemical Education*, **2024**, *101*(9), 4051-4056.

37. James E. Patterson*, The Nonresonant Sum-Frequency Response: The Not-So-Silent Partner, *The Journal of Chemical Physics*, **2024**, *161*(6), 060901.

36. Shane M. Drake, Alexander J. Farnsworth, Gabriele Pinto, Gabriel Meyer, James E. Patterson*, Mount for Spectroscopic Analysis of Samples Under Sustained Tensile Stress, *Review of Scientific Instruments*, **2024**, *95*(7), 073911.

35. Alexander J. Farnsworth, Kayla M. Holland, Aaron L. Zaugg, Fetutasi Pauga, Shane M. Drake, Paul B. Savage*, James E. Patterson*, Enhanced Shear Strength of a Medical Adhesive Due to an Antimicrobial Additive, *SN Applied Sciences*, **2023**, *5*, 373.

34. Kayla M. Holland, Aldair Alejandro, Daisy J. H. Ludlow, Paige K. Petersen, Melodie A. Wright, Caitlin C. Chartrand, David J. Michaelis*, Jeremy A. Johnson*, James E. Patterson*, Characterization of Organic Crystals for Second Harmonic Generation, *Optics Letters*, **2023**, *22*(15), 5855-5858.

33. Alexander J. Farnsworth, Shawn C. Averett, Matthew C. Asplund, James E. Patterson*, Temporal Profile of Nonresonant Sum-Frequency Signal from Single-Crystal Silicon Depends on Crystal Orientation, *Applied Spectroscopy*, **2023**, *77*(3),239-245.

32. Eric R. Homer*, Oliver K. Johnson, Darcey Britton, James E. Patterson, Eric T. Sevy, Gregory B. Thompson, A classical equation that accounts for observations of non-Arrhenius and cryogenic grain boundary migration. *NPJ Computational Materials*, **2022**, *8*, 157.

31. Kaylee N. Rellaford, Dallin L.Smith, Alexander J. Farnsworth, Shane M. Drake, Hoon Lee, James E. Patterson*, Use of Nonlinear Optics for Assessment of Cable Polymer Aging. *International Journal of Prognostics and Health Management*, **2021**, *12*(2), 2966.

30. Kaylee N. Rellaford, Shawn C. Averett, Alexander J. Farnsworth, Derrik D. Adams, Scott D. Smith, David T. Fullwood, James E. Patterson*; Characterization of Mechanical Deformation in Aluminum by Optical Second Harmonic Generation. *Measurement Science and Technology*, **2021**, *32*, 075202.

29. Matthew C. Asplund, Jeremy A. Johnson, James E. Patterson; The 2018 Nobel Prize in Physics: Optical Tweezers and Chirped Pulse Amplification. *Analytical and Bioanalytical Chemistry*, **2019**, *411*, 5001-5005.

28. Dhananjay I. Patel, Catherine G. McKenas, Dhruv Shah, Matthew R. Lockett, James E. Patterson, Matthew R. Linford; Multi-Instrument Characterization of Carbon Nanodot Materials: Description of Two More Analytical Technics (ToF-SIMS and Raman) with Specific Considerations Related to Research in the Lockett Group at UNC Chapel Hill, *Part 3*. *Vacuum Technology & Coating*, June **2018**, 24-28.

27. Shawn C. Averett, Steven K. Stanley, Joshua J. Hanson, Stacey J. Smith, James E. Patterson*; Surface Spectroscopic Signatures of Mechanical Deformation in HDPE. *Applied Spectroscopy*, **2018**, *72*(7), 1057-1068.

26. Shawn C. Averett, Angela R. Calchera, James E. Patterson*; Polarization and Phase Characteristics of Non-resonant Sum Frequency Generation Response from a Silicon (111) Surface. *Optics Letters*, **2015**, *40*(21), 4879-4882.

25. Alexander D. Curtis, Angela R. Calchera, Matthew C. Asplund, James E. Patterson*; Observation of Sub-Surface Phenyl Rings in Polystyrene with Vibrationally Resonant Sum-Frequency Generation. *Vibrational Spectroscopy*, **2013**, *68*, 71-81.

24. Angela R. Calchera, Alexander D. Curtis, James E. Patterson*; Plasma Treatment of Polystyrene Thin Films Affects More Than the Surface. *ACS Applied Materials & Interfaces*, **2012**, *4*, 3493-3499.

23. Eric R. Mansfield, Danielle S. Mansfield, James E. Patterson*, Thomas A. Knotts, IV*; Effects of Chain Grafting Positions and Surface Coverage on Conformations of Model RPLC Stationary Phases. *Journal of Physical Chemistry C*, **2012**, *116*, 8456-8464.

22. Arthur D. Quast, Nathan C. Wilde, Sam S. Matthews, Scott T. Maughan, Steven L. Castle, James E. Patterson*; Improved Assignment of Vibrational Modes in the C-H Stretch Region for Surface Bound C_{18} Silanes, *Vibrational Spectroscopy*, **2012**, *61*, 17-24.

21. Arthur D. Quast, Alexander D. Curtis, Brent A. Horn, Steven R. Goates, James E. Patterson*; Role of Nonresonant Sum-Frequency Generation in the Investigation of Model Liquid Chromatography Systems, *Analytical Chemistry*, **2012**, *84*, 1862-1870.

20. Alexander D. Curtis, Matthew C. Asplund, James E. Patterson*; Use of Variable Time-Delayed Sum-Frequency Generation for Improved Spectroscopic Analysis. *Journal of Physical Chemistry C*, **2011**, *115*, 19303-19310.

19. Alexander D. Curtis, Scott R. Burt, Angela R. Calchera, James E. Patterson*; Limitations in the Analysis of Vibrational Sum-Frequency Spectra Arising from the Nonresonant Contribution. *Journal of Physical Chemistry C*, **2011**, *115*, 11550-11559.

18. Arthur D. Quast, Feng Zhang, Matthew R. Linford, James E. Patterson*; Back-Surface Gold Mirrors for Vibrationally Resonant Sum-Frequency Generation (VR-SFG) Spectroscopy Using 3-Mercaptopropyltrimethoxysilane as an Adhesion Promoter. *Applied Spectroscopy*, **2011**, *65*, 634-641.

17. Ming Yu, Qingsong Wang, James E. Patterson, Adam T. Woolley*; Multilayer Polymer Microchip Capillary Array Electrophoresis Devices with Integrated On-Chip Labeling for High-Throughput Protein Analysis. *Analytical Chemistry*, **2011**, *83*, 3541-3547.

16. Alexander D. Curtis, Sarah B. Reynolds, Angela R. Calchera, James E. Patterson*; Understanding the Role of Nonresonant Sum-Frequency Generation from Polystyrene Thin Films. *Journal of Physical Chemistry Letters*, **2010**, *1*, 2435-2439.

PATENTS

3. James E. Patterson, Shawn C. Averett; Nondestructive Optical Testing Systems and Related Methods for Predicting Material Failure, Serial No. 15/305,836, Filing Date: July 13, 2015; Issued May 6, 2019.

2. Shawn C. Averett, James E. Patterson; Provisional Patent – SHG nondestructive testing for strain and dislocations in metals, Application Number 61/846,734, Filing Date: July 16, 2013.

1. Angela R. Calchera, Alexander D. Curtis, James E. Patterson; Provisional Patent – Ordering of bulk material by exposure to low-temperature plasma, Application Number 61/634,489, Filing Date: Feb 29, 2012.

RESEARCH GRANTS AND AWARDS

Characterization of Damage Accumulation in Titanium with Optical Second Harmonic Generation, Acushnet Company, Aug 2021 – Dec 2021, $10,995.

Determination of the Effects of Thermal and Mechanical Stress on PBX Binder Materials, Naval Surface Warfare Center, Indian Head EOD Technology Division (IHEODTD), May 2019 – Dec 2021, $444,686.

Use of Nonlinear Optics for Assessment of Cable Polymer Aging, Electric Power Research Institute (EPRI), May 2019 – Aug 2019, $13,875.

Nonlinear Optics for the Determination of Early Stage Fatigue, Electric Power Research Institute (EPRI), May 2019 – Aug 2019, $18,365.

Use of Second Harmonic Generation for Determination of Aluminum Sensitization, Office of Naval Research, Sept 2017 – Dec 2017, $9600.

Molecular Basis of Adhesion, Air Force Office of Scientific Research Young Investigator Research Program (YIP) Award, 2008, March 2009 – May 2012, $299,995.

POSTDOCTORAL AND GRADUATE STUDENTS MENTORING

Postdoctoral Researcher

Qingsong Wang, Jan 2009 – Dec 2010

Doctoral Students

Melissa N. Lumogdang, Jan 2021 – present

Shane M. Drake, Jan 2020 – Aug 2023
Dissertation Title – "Raman Characterization of Elastomeric Materials"

Alexander J. Farnsworth, Jan 2020 – Aug 2023
Dissertation Title – "Detailed Characterization of Material Deformation"

Kaylee N. Rellaford, July 2016 – Dec 2021
Dissertation Title – "Non-Linear Characterization of Stressed Materials"

Shawn C. Averett, Dec 2011 – Aug 2017
Dissertation Title – "Advancements in the Understanding of Nonlinear Optics and Their Use in Material Analysis"

Angela R. Calchera, Dec 2008 – Dec 2013
Dissertation Title – "Obstacles and Solutions to Studying Functional Adhesives Using Vibrational Sum-Frequency Generation Spectrosocpy"

Alexander D. Curtis, Dec 2007 – June 2012
Dissertation Title – "Refining Vibrationally Resonant Sum-Frequency Generation Spectroscopy for Studies of Interfacial Interactions"

Masters Students

Arthur D. Quast, Dec 2009 – Aug 2011
Thesis Title – "Investigaing a Model Reversed-Phase Liquid Chromatography Stationary Phase with Vibrationally Resonant Sum Frequency Generation Spectroscopy"

L. Robert Baker, Aug 2007 – July 2008
Thesis Title – "Spectroscopic Study of Compressible Mobile Phase and Stationary Phase Behavior in Chromatography"

Honors Students

Alexander J. Farnsworth, Dec 2018
Thesis Title – "Nonlinear Optical Characterization of Solids"

Jessica L. Jenkins, Aug 2014
Thesis Title – "Molecular-level Interactions Responsible for Retention in Liquid Chromatography"

TEACHING

Course Development

Chem 467 – Physical Chemistry for Engineers, 2009.

Textbook Authorship

Physical Chemistry for Engineers: A Guided Tour, Cognella Academic Publishing, 2019.
Sole author

Chemical Principles: The Quest for Insight, 8th Edition, Macmillan, 2023
Contributing author with Peter Atkins, Loretta Jones, Leroy Laverman, and Kelley Young

CITIZENSHIP

Professional

Society for Applied Spectroscopy
Faculty advisor for BYU Student Section of SAS, 2009 – present.
FACSS/SciX, symposium organizer and session chair, 2012.
Regional and Technical Affairs Committee, Member, March 2014 – 2017.
Chair of Intermountain Regional Section, Chair, 2017 – present.
Governing Board, Member (as Regional Section Chair), 2017 – present.
Awards Committee, Chair-Elect – 2018.
Awards Committee, Chair – 2019.

American Chemical Society, Central Utah Section
Chair Elect, 2010.
Chair, 2011.
Past Chair, 2012 and 2013.

Pacific Conference on Spectroscopy and Dynamics
Executive Committee Member, 2019 – present.

Department of Chemistry and Biochemistry

Graduate Recruiting Committee, Member, 2007 – 2013.
Graduate Admissions Committee, Member, 2007 – 2013.
Physical Chemistry Laboratory Coordinator, 2008 – 2012.
General Chemistry Coordinator, 2013 – 2016.
Teaching and Curriculum Committee, Member, 2013 – 2016.
Teaching and Curriculum Committee, Chair, 2016 – present.
Faculty Search Committee, Member, 2021 – present.

College of Physical and Mathematical Sciences

College Review Committee, 2014 – present.
College Curriculum Council, Member (as department committee chair), 2016 – present.

Brigham Young University

General Education Design Committee, Brigham Young University, Member, Mar – Oct 2019.