

Daniel E. Austin, Ph.D.

Professor
Department of Chemistry and Biochemistry
Brigham Young University
C-311 BNSN, Provo, UT 84602
Phone: 801-422-1551, e-mail: austin@chem.byu.edu

Education

California Institute of Technology, Pasadena, CA

Ph.D. in Physical Chemistry (2003)

Dissertation: "Impact Ionization Mass Spectrometry of Cosmic Dust"

Brigham Young University, Provo, UT

B.S. in Chemistry, minors in Russian and Physics (1998)

Graduated *summa cum laude*, with University Honors and Honors in Chemistry

Professional Experience

Brigham Young University, Provo, UT

Asst. Professor (2005–2011); Assoc. Professor (2011–2016); Professor (2016–present)

Research areas include miniaturized mass spectrometers, chemical and biological processes in high-velocity impacts, and charge detection mass spectrometry

Goddard Space Flight Center, Greenbelt, MD

Visiting Scientist (2013–2014)

Worked on the Mars Organic Molecule Analyzer (MOMA) mass spectrometer for the European Space Agency's ExoMars mission

Sandia National Laboratories, Albuquerque, NM

Senior Member of Technical Staff (2002–2005)

Ion mobility spectrometer/mass spectrometer for explosive and contraband detection
Developed an array of microfabricated cylindrical ion trap mass analyzers

Awards and Honors

Izatt-Christensen Faculty Excellence in Research Award, Brigham Young University (2021)

Curt Brunnée Medal, International Mass Spectrometry Foundation (2018)

Karl G. Maeser Research and Creative Arts Award, Brigham Young University (2017)

International Journal of Mass Spectrometry, Outstanding Reviewer award (2013)

American Society for Mass Spectrometry Research Award (2008)

Pittsburgh Spectroscopy Society Starter Grant Award (2007)

Achievement Rewards for College Scientists (ARCS) Fellowship (2000–2002)

National Science Foundation Graduate Research Fellowship (1998–2001)

Dow Chemical Company Graduate Fellowship (2001)

Fannie and John Hertz Foundation Graduate Fellowship, finalist (1998)

Barry M. Goldwater Scholarship (1997–1998)

Professional Service and Leadership

American Society for Mass Spectrometry (ASMS)

Chair and Organizer of the 2016 Asilomar Conference on Mass Spectrometry

Co-chair (2014) and Chair (2015–2016) of the Ion Trap Interest Group

Co-chair (2009–2010) and Chair (2010–2011) of the Fundamentals Interest Group

Recipient of the 2008 ASMS Research Award

Member of the ASMS program committee (2011, 2012, 2023)

Member of the ASMS Research Award selection committee (2 years)

American Chemical Society (ACS)

Chair-Elect (2012–2013), Chair (2014–2015), Past-Chair (2016–2017), Central Utah
Section

Faculty Advisor for BYU ACS student chapter (2008–2012)

Editorial Board member, *International Journal of Mass Spectrometry* (2017–present)

Journal of the American Society for Mass Spectrometry (2022–present)

Reviewed >200 manuscripts for the following journals:

Journal of the American Chemical Society

Analytical Chemistry

Analyst

Journal of the American Society for Mass Spectrometry

Journal of Mass Spectrometry

International Journal of Mass Spectrometry

Mass Spectrometry Reviews

Journal of Geophysical Research – Planets

Planetary and Space Science

European Journal of Mass Spectrometry

Earth and Planetary Science Letters

Journal of Microelectromechanical Systems

Trends in Analytical Chemistry

Rapid Communications in Mass Spectrometry

Applied Spectroscopy

Chemical Physics Physical Chemistry

Journal of Inclusion Phenomena and Macrocyclic Chemistry

Chinese Journal of Chemistry

Journal of Difference Equations

Life

Journal of Colloid and Interface Science

Review of Scientific Instruments

EPJ Techniques and Instruments

PLoS ONE

Microsystems & Nanoengineering

Nano

Organized/presided at sessions of 19 conferences:

American Society for Mass Spectrometry annual conference (2010, 2011, 2015, 2016)
Pittsburgh Conference on Analytical Chemistry (2010, 2011, 2015, 2016)
Federation of Analytical Chemistry and Applied Spectroscopy Societies (2011)
Arrowhead Conference on Ion Chemistry and Mass Spectrometry (2007, 2008, 2011)
American Chemical Society Rocky Mountain Regional Meeting (2008)
Harsh Environment Mass Spectrometry Conference (2017)
Asilomar Conference on Mass Spectrometry (2008, 2016)
International Conference on Separation Science and Technology (2018)
Society for Laboratory Automation Conference (2020)
Gordon Research Conference on Ion Chemistry (2023)

Served on 34 review panels for NSF and NASA (2003–present), including 4 times as a panel chair and 9 times as a sub-panel chair on NASA review panels; served on 6 NASA mission transition briefing teams

Contributed to NASA's presentation to the U.S. Congressional Subcommittee on Science, Space, and Technology on the astrobiological exploration of Europa, Sept. 2016.

Department of Chemistry and Biochemistry, Brigham Young University

Analytical Area Chair (2022–present)
Faculty Search Committee Chair (2021–present)
Faculty Rank and Status Committee (2021–present)
Graduate Admissions Committee (2022–present)

Created and directed BYU's first Chemistry Study Abroad program, Europe, spring term 2024

Research Grants Awarded

Principal Investigator of over \$7M of external research funding

Collaborative Research: Development and Evaluation of a Miniature Coaxial Ion Trap Mass Analyzer for Portable Chemical Analysis, NSF
BYU PI, August 2020–August 2024

Circuit Board Charge Detector for Characterization of Martian Dust, NASA
PI, August 2017–August 2021

Microorganism Survivability in High-Velocity Impacts, NASA
PI, July 2015–June 2020

Planar Ion Trap Development, Perkin Elmer
Co-I, January 2018–December 2018

Experimental studies of chemical reactions in high-velocity molecular impacts, NASA
PI, July 2015–June 2018

Miniaturized mass spectrometry using lithographically patterned electrodes, NSF
PI, July 2014–June 2018

Planar Ion Trap Development, Perkin Elmer
PI, June 2015–December 2016

MRI: Acquisition of a Versatile Direct-write Micro-Patterning System, NSF
PI, January 2011–December 2012

Coaxial Ion Trap: Microfabricated Dual Mass Spectrometer for Planetary Exploration, NASA
PI, June 2010–May 2014

Surface Impact Survivability and Damage of Microorganisms, NASA
PI, August 2010–July 2011

Microfabricated Mass Spectrometer, Army SBIR, DoD
Co-PI, March 2010–September 2010

Improved Biomolecule Detection using Electrodynamic Post-acceleration, American Society
for Mass Spectrometry Research Award
PI, November 2007–August 2010

High-velocity impact dissociation and ionization of whole viruses: a route to real-time single
organism detection, Pittsburgh Spectroscopy Society
PI, May 2008–December 2008

Mapping Changes in the Lunar Surface, National Geographic Society
Co-I, March 2007–August 2007

The Open Storage Ring: A Mass-Mobility Spectrometer for *in situ* Characterization of
Planetary Atmospheres and Evolved Gases, NASA
PI, June 2007–May 2010

Courses Taught at BYU

Phys. Sci. 100	Physical Science (2024)
Chemistry 102	General Chemistry (2024)
Chemistry 195	Freshman Seminar (2012)
Chemistry 227	Principles of Analytical Chemistry (2006–2009, 2014)
Chemistry 297R	Research Training Experience (2018, 2020–2022)
Chemistry 391	Technical Writing using Chemical Literature (2014–18, 2021, 2023, 2024)
Chemistry 495	Senior Seminar (2019)
Chemistry 497R	Mentored Learning in Analytical Chemistry (2015, 2016, 2021–2024)
Chemistry 521	Instrumental Analysis Lecture (2009–2012, 2018–2021)
Chemistry 523	Instrumental Analysis Lab (2010–2013, 2015, 2019–2022)
Chemistry 594R	General Seminar (2019)
Chemistry 596R	Special Topics in Chemistry (2023, 2024)
Chemistry 629R	Mass Spectrometry (2016, 2018)
Chemistry 692R	Current Topics in Chemical Instrumentation (2017–18, 2020, 2023–24)
Chemistry 694	Scientific Writing and Ethics (2024)
Chemistry 729R	Special Topics in Mass Spectrometry (2005, 2008)

Publications

- Gustafson, E.L.; Hales, K.E.; Caldwell, T.C.; Murray, H.V.; Austin, D.E. Charge detection mass spectrometry for the analysis of atmospheric dust on Mars. *ACS Earth and Space Chemistry*, **in press**.
- Sirbescu-Stanley, D.V.; Lemmer, K.M.; Austin, D.E.; Taylor, N.R. A simplified coaxial ion trap mass analyzer: characterization of the simplified toroidal ion trap with a rectilinear ion guide. *International Journal of Mass Spectrometry*, **in press**
- Clark, B.M.; Austin, D.E.; Baer, D.R.; Beisinger, M.C.; Easton, C.D.; Harmer, S.L.; Herrera-Gomez, A.; Hughes, A.E.; Major, G.H.; Skinner, W.M.; Linford, M.R. Following the Propagation of Erroneous X-ray Photoelectron Spectroscopy Peak Fitting Through the Literature. A Genealogical Approach. *Journal of Vacuum Science and Technology B*, **in press**.
- Pinder, J.W.; Malatinova, M.; Austin, D.E.; Šikola, T.; Prusa, S.; Linford, M.R. Much ado about nothing? Background anomalies without accompanying primary peaks in X-ray photoelectron spectroscopy and low energy ion scattering. *Surface and Interface Analysis*, **in press**.
- Lizarbe, A.J.; Lewis, G.; Murray, G.; Wright, K.S.; Austin, D.E.; Aspnes, D.E.; Linford, M.R. Introduction to the Hilbert Transform. Part 2 – How the Hilbert transform can remove the redundant, negative frequencies from functions. *Vacuum Technology and Coating*, **2024**, 24 (8), 22–24.
- Lizarbe, A.J.; Wright, K.S.; Austin, D.E.; Aspnes, D.E.; Linford, M.R. A few words by Conrad Boss on continuing education, and an introduction to the Hilbert Transform. *Vacuum Technology and Coating*, **2024**, 24 (7), 21–24.
- Lizarbe, A.J.; Wright, K.S.; Lewis, G.; Murray, G.; Austin, D.E.; Aspnes, D.E.; Linford, M.R. Fun with Fourier transforms. What is a band-limited function? And how the Sinc function has the remarkable ability to preserve or annihilate sinusoids in convolution. *Vacuum Technology and Coating*, **2024**, 24 (6), 22–24.
- De la Cruz, A.; Achtnich, T.; Décosterd, E.; Sevy, E.T.; Asplund, M.C.; Austin, D.E. High-speed rotor for microparticle impact studies. *Review of Scientific Instruments*, **2023**, 94, 063904.
- Allred, P.; Christie, E.; Song, Y.; Austin, D.E.; Chiang, S.H.; Hawkins, A. Flow-Through Charge Detection Mass Spectrometry to Categorize Micron-Sized Particles. *Review of Scientific Instruments*, **2023**, 94, 034104.
- Major, G.H.; Pinder, J.W.; Austin, D.E.; Baer, D.R.; Castle, S.L.; Čechal, J.; Clark, B.M.; Cohen, H.; Counsell, J.; Herrera-Gomez, A.; Govindan, P.; Kim, S.H.; Morgan, D.J.; Opila, R.L.; Powell, C.J.; Průša, S.; Roberts, A.; Rocca, M.; Shirahata, N.; Šikola, T.; Smith, E.F.; So, R.C.; Stovall, J.E.; Strunk, J.; Teplyakov, A.; Terry, J.; Weber, S.G.; Linford, M.R. Perspective on improving the quality of surface and material data analysis in

the scientific literature with a focus on x-ray photoelectron spectroscopy (XPS). *Journal of Vacuum Science & Technology A*, **2023**, *41* (3), 038501.

Gamage, R.W.; Hettikankanage, P.M.; Lyman, K.D.; Austin, D.E.; Taylor, N.R. Simplified coaxial ion trap: simulation-based geometry optimization, unidirectional ejection, and trapping conditions. *International Journal of Mass Spectrometry*, **2022**, *474*, 116801.

Hettikankanage, P.M. and Austin, D.E. Varying the aspect ratio of toroidal ion traps: Implications for design, performance, and miniaturization. *International Journal of Mass Spectrometry*, **2021**, *470*, 116703.

Austin, D.E. and Lammert, S.A. The Emerging Role of Portable Mass Spectrometry. *International Journal of Mass Spectrometry*, **2021**, *470*, 116721.

Rosza, J.; Song, Y.; Kerr, A.; Debaene, N.; Austin, D.E.; Chiang, S.H.; Hawkins, A.R. Optimizing the Noise Performance of Multi-electrode Image Charge Detectors Constructed on Printed Circuit Boards. *IEEE Transactions on Instrumentation and Measurement*, **2021**, *70*, 1503308.

Muyizere, T.; Zheng, Y.; Liu, H.; Zhao, J.; Li, J.; Lu, X.; Austin, D.E.; Zhang, Z.P. Metal salt assisted paper spray mass spectrometry for soft ionization of GAP polymers in negative ion mode. *Analyst*, **2020**, *145*, 34–45.

Li, J.; Zheng, Y.; Zhao, J.; Austin, D.E.; Zhang, Z.P. Matrix-assisted nanoelectrospray mass spectrometry for soft ionization of metal(I)-protein complexes. *Analyst*, **2020**, *145*, 1646–1656.

Gao, J. and Austin, D.E. Mechanistic investigation of charge separation in electrospray ionization using microparticles to record droplet charge state. *Journal of the American Society for Mass Spectrometry*, **2020**, *31*, 2044–2052.

Gustafson, E.L.; Murray, H.V.; Caldwell, T.; Austin, D.E. Accurately mapping image charge and calibrating ion velocity in charge detection mass spectrometry. *Journal of the American Society for Mass Spectrometry*, **2020**, *31*, 2161–2170.

Song, Y.; Kinnison, W.; Rosza, J.; Austin, D.E.; Hawkins, A.R.; Chiang, S.H. A Compact Measurement Technique for Detector Capacitance of Charge Amplifiers. *Proc. IEEE International Symposium of Circuits and Systems*, **2020**, 20779517. doi: 10.1109/ISCAS45731.2020.9181160

Song, Y.; Rosza, J.; Magalhaes, J.; Smith, S.; Karlinsey, B.; Kinnison, W.; Gustafson, E.L.; Austin, D.E.; Hawkins, A.R.; Chiang, S.H. A solid-state charge detector with gain calibration using photocurrent. *IEEE Transactions on Instrumentation and Measurement*, **2020**, *69*, 9398–9407.

Gamage, R.W. and Austin, D.E. The effects of electrode misalignments on the performance of a miniaturized linear wire ion trap mass spectrometer. *International Journal of Mass Spectrometry*, **2020**, *453*, 116344. (IJMS Best Student Paper Award)

- Avval, T.G.; Gamage, R.W.; Maehl, S.; Fairley, N.; Austin, D.E.; Linford, M.R. Application of Laplace's equation in comparing the electric potentials of hemispherical and cylindrical energy analyzers. *Vacuum Technology and Coating*, **2020**, *21*(10), 34–37.
- Webb, D.; Song, Y.; Rosza, J.; Gustafson, E.L.; Austin, D.E.; Hawkins, A.R.; Chiang, S.H. Low-noise, Low-power Pulse Shaper for Particle Detection, *Proc. IEEE 63rd International Midwest Symposium on Circuits and Systems (MWSCAS)*, **2020**, pp. 301–304. doi: 10.1109/MWSCAS48704.2020.9184626.
- Rosza, J.; Song, Y.; Webb, D.; Debaene, N.; Kerr, A.; Gustafson, E.L.; Caldwell, T.; Murray, H.V.; Austin, D.E.; Chiang, S.H.; Hawkins, A.R. A Verified Simulation Method for Image Charge Detection with Non-cylindrical Electrodes. *IEEE Transactions*, **2020**, *91*, 053302.
- Rosza, J.; Song, Y.; Webb, D.; Debaene, N.; Kerr, A.; Gustafson, E.L.; Caldwell, T.; Murray, H.V.; Austin, D.E.; Chiang, S.W.; Hawkins, A.R. Simulation and measurement of image charge detection with printed-circuit-board detector and differential amplifier. *Review of Scientific Instruments*, **2020**, *91*, 053302.
- Song, Y.; Rosza, J.; Magalhaes, J.; Smith, S.; Karlinsky, B.; Kinnison, W.; Gustafson, E.; Austin, D.E.; Hawkins, A.R.; Chiang, S.H. Design of Common-Mode Feedback for High-Gain Charge Amplifier. *IEEE Proc. Intermountain Engineering, Technology and Computing*, **2020**, 20154011. doi: 10.1109/IETC47856.2020.9249065.
- Turner, B.M.; Anupriya; Osburn-Staker, S.; De la Cruz, A.; Crowther, P.; Sweet, L.R.; Sevy, E.T.; Austin, D.E. A microchannel thermalization inlet design to reduce molecular fragmentation in orbital and flyby closed-source mass spectrometers. *Planetary and Space Science*, **2019**, *172*, 1–7.
- Zheng, Y.; Decker, T.K.; Wang, X.; Lammert, S.A.; Hawkins, A.R.; Austin, D.E. Extended mass range detection with a microscale planar linear ion trap mass spectrometer. *International Journal of Mass Spectrometry*, **2019**, *440*, 1–3.
- Decker, T.K.; Zheng, Y.; Ruben, A.J.; Wang, X.; Lammert, S.A.; Austin, D.E.; Hawkins, A.R. A microscale planar linear ion trap mass spectrometer. *Journal of the American Society for Mass Spectrometry*, **2019**, *30*, 482–488.
- Decker, T.K.; Zheng, Y.; McClellan, J.S.; Ruben, A.J.; Lammert, S.A.; Austin, D.E.; Hawkins, A.R. Double resonance ejection using novel RF phase tracking circuitry in a miniaturized planar linear ion trap mass spectrometer. *Rapid Communications in Mass Spectrometry*, **2018**, *32*, 2024–2030.
- Tian, Y.; Decker, T.K.; McClellan, J.S.; Bennett, L.; Li, A.; De la Cruz, A.; Andrews, D.; Lammert, S.A.; Hawkins, A.R.; Austin, D.E. Improved miniaturized linear ion trap mass spectrometer using lithographically patterned plates and tapered ejection slit. *Journal of the American Society for Mass Spectrometry*, **2018**, *29*, 213–222.
- Tian, Y.; Decker, T.K.; McClellan, J.S.; Wu, Q.H.; De la Cruz, A.; Hawkins, A.R.; Austin, D.E. Experimental observation of the effects of translational and rotational electrode

- misalignment on a planar linear ion trap mass spectrometer. *Journal of the American Society for Mass Spectrometry*, **2018**, *29*, 1376–1385.
- Decker, T.K.; Tian, Y.; McClellan, J.S.; Bennett, L.; Lammert, S.A.; Austin, D.E.; Hawkins, A.R. Optimal fabrication methods for miniature coplanar ion traps. *Rapid Communications in Mass Spectrometry*, **2018**, *32*, 289–294.
- Wang, X.T.; Zheng, Y.; Shi, J.; Gong, X.Y.; Yue, J.; Han, W.W.; Jiang, Y.; Austin, D.E.; Fang, X.; Zhang, Z.P. Elucidating the reaction mechanisms between triazine and hydrogen sulfide with pH variation using mass spectrometry. *Analytical Chemistry*, **2018**, *90*, 11138–11145.
- Higgs, J.; Warnick, K.F.; Austin, D.E. Field optimization of toroidal ion trap mass analyzers using toroidal multipoles. *International Journal of Mass Spectrometry*, **2018**, *425*, 10–15.
- Barney, B. and Austin, D.E. Kinetic energy loss of bouncing *Bacillus subtilis* spores determined using image-charge detection. *Journal of Biological Physics*, **2017**, *43*, 481–492.
- Li, A.; Higgs, J.; Austin, D.E. Chaotic motion of single ions in a toroidal ion trap mass analyzer. *International Journal of Mass Spectrometry*, **2017**, *421*, 95–103.
- Wang, T.; Zheng, Y.; Wang, X.; Austin, D.E.; Zhang, Z.P. Sub-ppt mass spectrometric detection of therapeutic drugs in complex biological matrices using polystyrene-microsphere-coated paper spray. *Analytical Chemistry*, **2017**, *89*, 7988–7995.
- Wang, T.; Zheng, Y.; Wang, X.; Wang, Q.; Ke, C.-Y.; Austin, D.E.; Han, X.; Zhang, Z.P. Abnormal adsorption and desorption behaviors of pharmaceutical drugs on polystyrene microspheres. *Advances of the Royal Society of Chemistry (RSC Advances)*, **2017**, *7*, 19639–19644.
- Wu, Q.H.; Li, A.; Tian, Y.; Decker, T.; Hawkins, A.R.; Austin, D.E. A miniaturized linear wire ion trap with electron ionization and single photon ionization sources. *Journal of the American Society for Mass Spectrometry*, **2017**, *28*, 859–865.
- Wu, Q.H.; Li, A.; Tian, Y.; Zare, R.N.; Austin, D.E. Miniaturized linear wire ion trap mass analyzer. *Analytical Chemistry*, **2016**, *88*, 7800–7806.
- Barney, B.; Pratt, S.N.; Austin, D.E. Survivability of bare, individual *Bacillus subtilis* spores to high-velocity surface impact: implications for microbial transfer through space. *Planetary and Space Science*, **2016**, *125*, 20–26.
- Higgs, J.M.; Petersen, B.V.; Lammert, S.A.; Warnick, K.F.; Austin, D.E. Radiofrequency trapping of ions in a pure toroidal potential distribution. *International Journal of Mass Spectrometry*, **2016**, *395*, 20–26.
- Wu, Q.; Tian, Y.; Li, A.; Austin, D.E. Simulations of electrode misalignment effects in two-plate linear ion traps. *International Journal of Mass Spectrometry*, **2015**, *393*, 52–57.

- Chadderdon, S.; Shumway, L.; Powell, A.; Li, A.; Austin, D.E.; Hawkins, A.R.; Selfridge, R.H.; Schultz, S.M. Ion trap electric field measurements using slab coupled optical fiber sensors. *Journal of the American Society for Mass Spectrometry*, **2014**, *25*, 1622–1627.
- Higgs, J.M. and Austin, D.E. Ion motion in toroidal radiofrequency ion traps. *International Journal of Mass Spectrometry*, **2014**, *363*, 40–51.
- Tian, Y.; Li, A.; Higgs, J.M.; Barney, B.L.; Austin, D.E. How far can ion trap miniaturization go? Parameter scaling, space charge limits, and future prospects. *Journal of Mass Spectrometry*, **2014**, *49*, 233–240.
- Li, A.; Hansen, B.J.; Powell, A.; Hawkins, A.R.; Austin, D.E. Miniaturization of a planar-electrode linear ion trap mass spectrometer. *Rapid Communications in Mass Spectrometry*, **2014**, *28*, 1338–1344.
- Pratt, S. and Austin, D.E. Bacterial spores survive electrospray charging and desolvation. *Journal of the American Society for Mass Spectrometry*, **2014**, *25*, 712–721.
- Barney, B.; Daly, R.T.; Austin, D.E. A Multi-stage image charge detector made from printed circuit boards. *Review of Scientific Instruments*, **2013**, *84*, 114101.
- Hansen, B.J.; Niemi, R.J.; Hawkins, A.R.; Lammert, S.A.; Austin, D.E. A lithographically patterned discrete planar electrode linear ion trap mass spectrometer. *Journal of Microelectromechanical Systems*, **2013**, *22*, 876–883.
- Daly, R.T.; Kerby, J.; Austin, D.E. Electrospray charging of minerals and ices for hypervelocity impact research. *Planetary and Space Science*, **2013**, *75*, 182–187.
- Kerby, J.; Daly, R.T.; Austin, D.E. Electrical charging of chondritic meteorite particles, other minerals, and ices for hypervelocity impact research. *Earth, Planets, Space (EPS)*, **2013**, *65*, 157–165.
- Taylor, N. and Austin, D.E. A simplified toroidal ion trap mass spectrometer. *International Journal of Mass Spectrometry*, **2012**, *321/322*, 25–32.
- Austin, D.E.; Shen, A.H.T.; Beauchamp, J.L.; Ahrens, T.J. Time-of-flight mass spectrometry of mineral volatilization: toward composition analysis of shocked mineral vapor. *Review of Scientific Instruments*, **2012**, *83*, 044502, 1–6.
- Selck, D.A.; Woodfield, B.F.; Boerio-Goates J.; Austin, D.E. Simple, low-cost mass spectrometric analyzer for thermogravimetry. *Rapid Communications in Mass Spectrometry*, **2012**, *26*, 78–82.
- Peng, Y. and Austin, D.E. New approaches for miniaturizing ion trap mass analyzers. *Trends in Analytical Chemistry*, **2011**, *30*, 1560–1567.
- Peng, Y.; Hansen, B.J.; Quist, H.; Zhang, Z.P.; Hawkins, A.R.; Austin, D.E. Coaxial ion trap: concentric toroidal and quadrupole trapping regions in one mass analyzer. *Analytical Chemistry*, **2011**, *83*, 5578–5584.

- Wang, M.; Quist, H. E.; Hansen, B.J.; Peng, Y.; Zhang, Z.P.; Hawkins, A.R.; Rockwood, A.L.; Austin, D.E.; Lee, M.L. Performance of a halo ion trap mass analyzer with exit slits for axial ejection. *Journal of the American Society for Mass Spectrometry*, **2011**, *22*, 369–378.
- Zhang, Z.P.; Quist, H.; Peng, Y.; Hansen, B.J.; Wang, J.; Hawkins, A.R.; Austin, D.E. Effects of higher-order multipoles on the performance of a two-plate quadrupole ion trap mass analyzer. *International Journal of Mass Spectrometry*, **2011**, *299*, 151–157.
- Austin, D.E. and Lammert, S.A. “Mass Analyzer Miniaturization,” in the *Encyclopedia of Mass Spectrometry*, vol 7. Elsevier: Amsterdam.
- Austin, D.E.; Hansen, B.J.; Peng, Y.; Zhang, Z.P. Multipole expansion in quadrupolar devices comprised of planar electrode arrays. *International Journal of Mass Spectrometry*, **2010**, *295*, 153–158.
- Clark, J.; Call, S.T.; Austin, D.E.; Hansen, J.C. Computational study of hydroxy isoprene peroxy radical-water complexes. *Journal of Physical Chemistry A*, **2010**, *114*, 6534–6541.
- Austin, D.E. Mass spectrometry on a chip – or between two. *G.I.T. Laboratory Journal Europe*, **2010**, *5–6*, 20–22.
- Austin, D.E. and Lammert, S.A. “Ion Traps with Circular Geometries,” Chapter 7 in Volume 4 of *Practical Aspects of Trapped Ion Mass Spectrometry*, Todd, J.F.J. and March, R., Eds. CRC Press, **2010**.
- Austin, D.E. Miniaturization of Analytical Systems: Principles, Designs and Applications—Book Review. *Journal of the American Chemical Society*, **2010**, *132*, 6864.
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- Austin, D.E.; Peng, Y.; Hansen, B.J.; Miller, I.W.; Rockwood, A.; Hawkins, A.R.; Tolley, S.E. Novel ion traps using planar resistive electrodes: implications for miniaturized mass analyzers. *Journal of the American Society for Mass Spectrometry*, **2008**, *19*, 1435–1441.
- Austin, D.E.; Wang, M.; Tolley, S.E.; Maas, J.D.; Hawkins, A.R.; Rockwood, A.L.; Tolley, H.D.; Lee, E.D.; Lee, M.L. Halo ion trap mass spectrometer. *Analytical Chemistry*, **2007**, *79*, 2927–2932.
- Cruz, D.; Chang, J.P.; Fico, M.; Guymon, A.J.; Austin, D.E.; Blain, M.G. Design, microfabrication, and analysis of micrometer-sized cylindrical ion traps. *Review of Scientific Instruments*, **2007**, *78*, 015107.
- Austin, D.E.; Cruz, D.; Blain, M.G. Simulations of ion trapping behavior in micrometer-sized cylindrical ion traps. *Journal of the American Society for Mass Spectrometry*, **2006**, *17*, 430–441.

Austin, D.E. and Hunka, D.E. An ion mobility spectrometer mass spectrometer (IMS-MS) for improved detection of contraband. SAND report #2005-6360, **2005**, Sandia National Laboratories, Albuquerque, NM.

Austin, D.E.; Manning, H.L.K.; Bailey, C.L.; Beauchamp, J.L. A compact time-of-flight mass spectrometer for high-flux cosmic dust analysis. *Journal of Geophysical Research – Planets*, **2004**, *109*, E07S07. doi:10.1029/2003JE002184.

Blain, M.G.; Riter, L.S.; Cruz, D.; Austin, D.E.; Wu, G.; Plass, W.R.; Cooks, R.G. Towards the hand-held mass spectrometer: design considerations, simulation, and fabrication of micrometer-scaled cylindrical ion traps. *International Journal of Mass Spectrometry*, **2004**, *236*, 91–104.

Austin, D.E.; Grimm, R.L.; Manning, H.L.K.; Bailey, C.L.; Farnsworth, J.E.; Ahrens, T.J.; Beauchamp, J.L. Hypervelocity microparticle impact studies using a novel cosmic dust mass spectrometer. *Journal of Geophysical Research – Planets* **2003**, *108*(E5), 503. doi:10.1029/2002JE001947.

Austin, D.E.; Ahrens, T.J.; Beauchamp, J.L. Dustbuster: a compact impact-ionization time-of-flight mass spectrometer for in situ analysis of cosmic dust. *Review of Scientific Instruments*, **2002**, *73*, 185–189.

Recent Invited Talks at National and International Professional Meetings

Austin, D.E.; Turner, B.; Sevy, E.T.; Asplund, M.C.; Hansen, L. “Hypervelocity Impact Dissociation in Planetary Mass Spectrometry,” presented at the 2022 SciX Conference, October 2022, Covington, KY. (invited talk)

Austin, D.E. “Microscale Linear Ion Trap for Portable Mass Spectrometry,” presented at the Society for Laboratory Automation Conference, January 2020, San Diego, CA. (invited talk)

Austin, D.E. “Lithographically Patterned Electrodes for Miniaturized Ion Trap Mass Spectrometers and Other Ion Optics Devices,” presented at the International Mass Spectrometry Conference, August 2018, Florence, Italy. (invited plenary lecture)

Austin, D.E. “Electrode Misalignment on a Planar Linear Ion Trap Mass Spectrometer, and Implications for Portable GC-MS,” presented at the International Conference on Separation Science and Technology, April 2018, Dubai, U.A.E. (invited talk)

Austin, D.E.; Wu, Q.; Zare, R.N.; Li, A.; Tian, Y.; Hawkins, A.R.; Andrews, D.; Decker, T.; McClellan, J. “Miniaturized Wire Ion Trap,” presented at the Pittsburgh Conference on Analytical Chemistry, March 2017, Chicago, IL. (invited talk)

Austin, D.E. “Sub-millimeter linear ion traps to address space-charge limits in portable mass spectrometry,” presented at the International Chemical Congress of the Pacific Basin Societies (Pacifichem), December 2015, Honolulu, HI. (invited talk)

- Austin, D.E. "Progress in Portable Mass Spectrometry," presented at the Pittsburgh Conference on Analytical Chemistry, March 2015, New Orleans, LA. (invited talk)
- Li, A.; Hansen, B.J.; Tian, Y.; Powell, A.T.; Hawkins, A.R.; Austin, D.E. "Sub-mm linear ion trap mass spectrometer made using ceramic plates," presented at the 248th American Chemical Society National Meeting, August 2014, San Francisco, CA. (invited talk)
- Austin, D.E. "Ion Trap Mass Analyzers: The Next Steps," presented at the Ion Trap Interest Group workshop of the 62nd Conference of the American Society for Mass Spectrometry, June 2014, Baltimore, MD. (invited talk)
- Austin, D.E. "Converging ion traps for miniaturized mass spectrometers," presented at the Pittsburgh Conference on Analytical Chemistry (Pittcon), March 2013, Philadelphia, PA. (invited talk)
- Austin, D.E. Peng, Y.; Zhang, Z.; Hansen, B.J.; Hawkins, A.R. "Ion Trap Mass Analyzers Consisting of Lithographically Patterned Plates," presented at the meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, October 2011, Reno, NV. (invited talk)
- Austin, D.E. "Mass Spectrometry on a Chip—or Between Two," presented at the 3rd Annual Meeting of the Center for Analytical Instrument Development, Purdue University, June 2010. (invited talk)
- Austin, D.E. Presentation at the U.S. Department of Energy (DOE) Separations and Analysis Contractors' Meeting, April 2010, Baltimore, MD. (invited talk)
- Hansen, B.J.; Quist, H.E.; Hawkins, A.R.; Zhang, Z.; Peng, Y.; Wang, M.; Lee, M.L.; Austin, D.E. "Quadruple Ion Traps Realized by Planar Microfabricated Electrodes for Compensation of High Order Multipole Effects," presented at the Pittsburgh Conference on Analytical Chemistry, February/March 2010, Orlando, FL. (invited talk)
- Austin, D.E. "Microfabricated Planar Electrode Ion Traps: Combining Accuracy with Simplicity for Miniaturization," presented at the Pittsburgh Conference on Analytical Chemistry, February/March 2010, Orlando, FL. (invited talk)
- Austin, D.E.; Peng, Y.; Wang, M.; Hansen, B.; Lee, M.L.; Lee, E.D.; Hawkins, A.R.; Tolley, S. "New Types of Ion Traps Using Planar Non-Equipotential Electrodes," presented at the Pittsburgh Conference on Analytical Chemistry, February 2008, New Orleans, LA. (invited talk)

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- Tolley, S.E.; Austin, D.E.; Hawkins, A.R.; Lee, E.D. "Coaxial Hybrid Radio Frequency Ion Trap Mass Analyzer," U.S. Patent #7,723,679, filed 25 February 2008, issued 25 May 2010.
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