

AARON R. HAWKINS

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EDUCATION

Ph.D. Electrical and Computer Engineering (1998)

University of California, Santa Barbara Santa Barbara, CA

- Dissertation Title: Silicon-Indium-Gallium-Arsenide Avalanche Photodetectors
- Advisor: John E. Bowers

M.S. Electrical and Computer Engineering (1996)

University of California, Santa Barbara Santa Barbara, CA

B.S. (Honors) Applied Physics (1994)

California Institute of Technology Pasadena, CA

ACADEMIC EXPERIENCE

Department Chair (2018 - Present)

Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT

Associate Department Chair (2012 - 2018)

Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT

- Chair Rank & Status Committee (2012 – 2018)
- Chair Faculty Hiring Committee (2012 – 2018)

Professor (2008-Present)

Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT

- Teach undergraduate and graduate classes
- Supervise and guide master's and doctoral students' thesis work
- Supervise and guide undergraduate research and senior level projects
- Establish and direct Microengineering research program

Associate Professor (2002-2008)

- Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT

Director of Integrated Microfabrication Laboratory (cleanroom) (2002-Present)

Brigham Young University, Provo, UT

- Manage professional staff working in laboratory
- Oversee capital equipment and supply expenditures for laboratory
- Oversee student training, documentation, and research and teaching direction for laboratory
- Laboratory is a 2500 ft², class 10 cleanroom
- Since 2002, 23 new machines or systems have been brought on-line in this facility

COURSES TAUGHT

New Student Seminar (ECEn191)* – undergraduate level

includes laboratory portion

Introduction to Circuits (ECEn212) – undergraduate level

Semiconductor Devices (ECEn450)* – undergraduate level

COURSES TAUGHT (CONT.)

Semiconductor Devices Laboratory (ECEn452)* – undergraduate level

Capstone Advisor (ECEn475-476) – undergraduate level

Solar Lighting, Free Space Optical Communications, Lightsuits (ECEn490)* – senior project

Micro-electro-mechanical Systems (ECEn550)* – graduate level

includes laboratory portion

Optoelectronic Devices (ECEn555)* – graduate level

includes laboratory portion

* Indicates new course development

PROFESSIONAL EXPERIENCE

Co-founder and Consultant (2016 – present)

Fluxus Corporation, Santa Clara, CA

- Specialist in chip fabrication, device integration and packaging

Scientific Board Member and Co-founder (2011 – 2013)

LiquiLume Technologies, San Jose, CA

- Oversaw attempts to transfer chip fabrication to commercial foundries
- Assisted with proposal writing and pitches to venture capital firms

Consultant (2004 – 2006)

Palmar Technologies, Provo, UT

- Designed thin-film based electrodes for compact mass spectrometer
- Oversaw electrode fabrication on silicon and ceramic substrates

Staff Applications Engineer (2001 - 2002)

Intel Corporation, Calabasas, CA

- Provide technical support to networking customers for Intel's products from the optical fiber layer to the framer including TIAs, LIAs, Laser Drivers, CDRs, Mux and Demuxes, and FECs
- Perform systems and component level testing for new products including noise characterization, jitter performance, S-parameter measurements, and sensitivity measurements and predictions
- Set product specifications for next generation devices for SONET and Ethernet applications

Principle Engineer (1998 – 2001)

CIENA Corporation, Santa Barbara, CA

- Lead technical effort to bring InGaAs-Silicon avalanche photodiodes (APDs) to commercial viability at 10 Gbit/s and 2.5 Gbit/s, creating world's most sensitive optical receivers
- Hired, trained, and supervised a team of engineers and technicians to create and validate component processes, DC and RF testing procedures, package designs, and device reliability.
- Oversaw and scheduled component production utilizing \$2M annual budget

Vice President of Research and Development (1997 – 1998)

Terabit Technology Incorporated, Santa Barbara, CA

- Co-founded company based on graduate research
- Oversaw \$15M corporate acquisition of Terabit by CIENA Corporation
- Built semiconductor cleanroom and procured processing and testing equipment with \$2M capital equipment budget

Graduate Student Researcher (1994 – 1997)

University of California, Santa Barbara, Santa Barbara, CA

- Reported world record gain-bandwidth-product for optical detector
- Invented technique of InGaAs to silicon wafer fusion

Undergraduate Research Assistant (1992 – 1993)

Los Alamos National Laboratory, Los Alamos, NM

- Worked in hydrodynamics testing group modeling X-ray production from large radiographic machines

Teaching Assistant (1993 – 1994)

Applied Physics Department, California Institute of Technology, Pasadena, CA

- Graded, conducted recitations, and supervised labs for undergraduate optics class

Undergraduate Research Assistant (1991 – 1992)

Chemistry Department, California Institute of Technology, Pasadena, CA

- Assisted with time-of-flight mass spectrometry experiments

HONORS AND AWARDS

- IEEE Photonics Society Engineering Achievement Award (2019)
- BYU University Professor (2016 – present)
- Institute of Electrical and Electronics Engineers (IEEE) Fellow (2016)
- Optical Society of America Fellow (2015)
- BYU Sponsored Research Achievement Award (2014)
- Engineering and Technology Endowed Chair (2012 – 2015)
- BYU Electrical Engineering Department Outstanding Faculty Award, 2011
- BYU Electrical Engineering Department Outstanding Faculty Teaching Award, 2011
- BYU Karl G. Maeser Research and Creative Arts Award, 2010
- BYU College of Engineering, Excellence in Scholarship Award, 2005
- IEEE Senior Member, 2004
- Intel Division Award, 2002
- UCSB Chancellor's Fellowship, 1994-1995
- Caltech ARCS Scholar, 1992-1994
- Robert C. Byrd Scholarship from state of New Mexico
- High school valedictorian

PUBLICATIONS AND PATENTS

Books

1. Aaron R. Hawkins and Holger Schmidt (Eds.), "Handbook of Optofluidics," CRC Press, Taylor & Francis, ISBN 9781420093544, (2010).
2. Aaron R. Hawkins and Stephen M. Schultz, "Practically Magic – A Guide to Electrical and Computer Engineering," Kendall Hunt, ISBN 9780757581786, (2010).

Book Chapters

1. Aaron R. Hawkins, Matthew R. Holmes, Tao Shang, and Yue Zhao, "Microfabrication," in "Handbook of Optofluidics," Aaron R. Hawkins and Holger Schmidt, eds., CRC Press, Taylor & Francis, ISBN 9781420093544, (2010).
2. Holger Schmidt and Aaron R. Hawkins, "Single molecule analysis with planar optofluidics," in "Advanced Photonic Structure for Biological and Chemical Sensing," Xudong Fan, ed., Springer Verlag, (2009).
3. K. Alexis Black, Aaron R. Hawkins, Near M. Margalit, Dubravko I. Babic, Archie L. Holmes, Jr., Ying-Lan Chang, Patrick Abraham, John E. Bowers, and Evelyn L. Hu, "Fusion Bonding: Hetero-interfacial Materials Analysis and Device Application," in "Heterogeneous Integration: Systems on a Chip" A. Husain, M. Fallahi, eds., SPIE, Bellingham, Washington, (1998).

Archival Journal Publications

1. Samuel Avila, H. Dennis Tolley, Brian Iverson, Aaron Hawkins, Shawn Johnson, Milton Lee, "Comparison of Dynamic Thermal Gradient to Temperature Programmed Conditions in Gas Chromatography Using a Stochastic Transport Model," in review *Analytical Chemistry*.
2. Joel Greig Wright, Md Nafiz Amin, Holger Schmidt, Aaron R. Hawkins, "Performance Comparison of Flow-Through Optofluidic Biosensor Designs," in review *Biosensors*.
3. V. Ganjalizadeh, G.G. Meena, T.A. Wall, M.A. Stott, A.R. Hawkins, and H. Schmidt, "Fast custom wavelet analysis technique for single molecule detection and identification", in review *Nature Communications*.
4. Mohammad Julker Neyen Sampad, Han Zhang, Thomas D. Yuzvinsky, M.A. Stott, Aaron R. Hawkins, and Holger Schmidt, "Label-free, trapping-assisted detection of SARS-CoV-2 RNAs with an optofluidic nanopore sensor," in review *Nature Communications*.
5. Samuel Avila, H. Dennis Tolley, Brian D. Iverson, Aaron R. Hawkins, Nathan L. Porter, Shawn L. Johnson, Edgar D. Lee and Milton L. Lee, "Comparison of Static Thermal Gradient to Isothermal Conditions in Gas Chromatography Using a Stochastic Transport Model," in press *Analytical Chemistry*.
6. Jace Rozsa, Yixin Song, Austin Kerr, Naomi Debaene, Daniel Austin, Shiuh-hua Wood Chiang, and Aaron Hawkins, "Optimizing the Noise Performance of Multi-Electrode Image Charge Detectors Constructed on Printed Circuit Boards," in press *IEEE Transactions on Instrumentation and Measurement*.
7. Mahmudur Rahman, Mohammad Julker Neyen Sampad, Aaron Hawkins and Holger Schmidt, "Recent advances in integrated nanopore sensors," in press *Lab on Chip*.
8. Alexandra M. Stambaugh, Joshua W. Parks, Matthew A. Stott, Aaron R. Hawkins, and Holger Schmidt, "Optofluidic multiplex detection of single SARS-CoV-2 and Influenza A antigens using a novel bright fluorescent probe assay," *Proceedings of the National Academy of Science* **118**, e2103480118, (2021).
9. Joel G. Wright Jr., Md Nafiz Amin, Gopikrishnan G. Meena, Holger Schmidt, and Aaron R. Hawkins "Optofluidic Flow-Through Biosensor Sensitivity – Model and Experiment," *Journal of Lightwave Technology* **39**, 3330-3340, (2021).

10. G.G. Meena, A.M. Stambaugh, V. Ganjalizadeh, M.A. Stott, M.D. Stone, A.R. Hawkins and H. Schmidt, "Ultrasensitive detection of SARS-COV-2 RNA and Antigen Using Single-Molecule Optofluidic" *APL Photonics* **6**, 066101, (2021).
11. Md Nafiz Amin, Vahid Ganjalizadeh, Matt Hamblin, Aaron R. Hawkins, and Holger Schmidt, "Free-Space Excitation of Optofluidic Devices for Pattern-Based Single Particle Detection," in press *IEEE Photonics Technology Letters* 10.1109/LPT.2021.3069673.
12. G.G. Meena, J. Wright, A.R. Hawkins, H. Schmidt, "Greatly enhanced single particle fluorescence detection using high refractive index liquid-core waveguides," *IEEE Journal of Selected Topics in Quantum Electronics*. **27**, 6900407, (2021).
13. H. Dennis Tolley, Samuel Avila, Brian Iverson, Austin Foster, Aaron Hawkins, Samuel Tolley, Milton Lee, "Simulating Capillary Gas Chromatographic Separations Including Thermal Gradient Conditions," *Analytical Chemistry* **93**, 2291-2298, (2021).
14. G.G. Meena, T.A.Wall, M.A.Stott, O. Brown, R. Robison, A.R. Hawkins and H. Schmidt, "7X multiplexed, optofluidic detection of nucleic acids for antibiotic-resistance bacterial screening," *Optics Express* **28**, 33019-33027, (2020).
15. Joel Wright, Holger Schmidt, and Aaron Hawkins, "Effects of Post-Etching Microstructures on the Optical Transmittance of Silica Ridge Waveguides," *Journal of Lightwave Technology* **38**, 6137-6421, (2020).
16. G.G. Meena, R.L. Hanson, R.L. Wood, O.T. Brown, M.A. Stott, R.A. Robison, W.G. Pitt, A.T. Woolley, A.R. Hawkins, and H. Schmidt, "3X multiplexed detection of antibiotic resistant plasmids with single molecule sensitivity," *Lab on Chip* **20**, 3763-3771, (2020).
17. A. Stambaugh, M. A. Stott, G. G. Meena, M. Tamhankar, R. Carrion Jr., J. L. Patterson, A. R. Hawkins, and H. Schmidt, "Optofluidic Amplification-free Multiplex Detection of Viral Hemorrhagic Fevers," *IEEE Journal of Selected Topics in Quantum Electronics* **27**, 7200206, (2020).
18. Zach Walker, Tanner Wells, Kalliyan Lay, Mohammad Julker Neyen Sampad, Holger Schmidt, and Aaron R. Hawkins, "Solid-State Membranes Formed on Natural Menisci," *Nanotechnology* **31**, 445303, (2020).
19. Yixin Song, Jace Rozsa, Joan Magalhaes, Shea Smith, Benjamin Karlinsey, Whitney Kinnison, Daniel Austin, Aaron R. Hawkins, and Shih-hua Wood Chiang, "A Solid-State Charge Detector With Gain Calibration Using Photocurrent," *IEEE Transactions on Instrumentation and Measurement* **69**, 9398-9407, (2020).
20. Erik S. Hamilton, Vahid Ganjalizadeh, Joel Wright, Holger Schmidt, and Aaron R. Hawkins, "3D Hydrodynamic Focusing in Microscale Optofluidic Channels Formed with a Single Sacrificial Layer," *Micromachines* **11**, 349 (2020).
21. Erik S. Hamilton and Aaron R. Hawkins, "Direct macro-to-micro interface method for microfluidics," *Journal of Micromechanics and Microengineering* **30**, 057001 (2020).
22. Jace Rozsa, Yixin Song, Devon Webb, Naomi Debaene, Austin Kerr, Elaura L. Gustafson, Tabitha Caldwell, Halle V. Murray, Daniel E. Austin, Shih-hua Wood Chiang, and Aaron R. Hawkins, "Simulation and Measurement of Image Charge Detection with Printed-Circuit-Board Detector and Differential Amplifier" *Review of Scientific Instruments* **91**, 053302 (2020).

23. John M. Stout, Thomas Baumgarten, Grant Stagg, and Aaron R. Hawkins, "Nanofluidic Peristaltic Pumps Made from Silica Thin Films," *Journal of Micromechanics and Microengineering* **30**, 015004, (2020).
24. Erik S. Hamilton, Vahid Ganjalizadeh, Joel G. Wright, William G. Pitt, Holger Schmidt, and Aaron R. Hawkins, "3D Hydrodynamic Focusing in Microscale Channels Formed with Two Photoresist Layers," *Microfluidics and Nanofluidics* **23**, 122 (2019).
25. Mahmudur R. Rahman, Mark Harrington, Matthew A. Stott, Yucheng Li, Mohammad J. N. Sampad, Aaron R. Hawkins, and Holger Schmidt, "Optical trapping assisted detection rate enhancement of single molecules on a nanopore optofluidic chip," *Optica* **6**, 1130-1131 (2019).
26. Mahmudur Rahman, Matthew A. Stott, Mark Harrington, Yucheng Li, Laura Lancaster, Thomas D. Yuzvinsky, Harry F. Noller, Aaron R. Hawkins and Holger Schmidt, "On demand delivery and analysis of single molecules on a programmable nanopore-optofluidic device," *Nature Communications* **10**, 3712 (2019).
27. Yajun Zheng, Trevor K. Decker, Xiao Wang, Stephen A. Lammert, Aaron R. Hawkins, and Daniel E. Austin, "Extended mass range detection with a microscale planar linear ion trap mass spectrometer," *International Journal of Mass Spectrometry* **440**, 1-3, (2019).
28. Matthew Hamblin, Thane Downing, Sophia Anderson, Holger Schmidt, Aaron Hawkins, "A broadband anti-reflective light blocking layer using nano-particle suspension in photoresist with high resolution patterning," *Journal of Micro/Nanolithography, MEMS, and MOEMS* **18**, 015501 (2019).
29. Trevor K. Decker, Yajun Zheng, Aaron J. Ruben, Xiao Wang, Stephen A. Lammert, Daniel E. Austin, Aaron R. Hawkins, "A Microscale Planar Linear Ion Trap Mass Spectrometer," *Journal of the American Society of Mass Spectrometry* **30**, 482-488 (2019).
30. Abhijit Ghosh, Austin Foster, Carlos Vilorio, Jacob Johnson, Luke Tolley, Brian Iverson, Aaron Hawkins, H. Dennis Tolley, and Milton Lee, "Stainless-Steel Column for Robust High Temperature Microchip Gas Chromatography," *Analytical Chemistry* **91**, 792-796 (2019).
31. Jennifer A. Black, Erik Hamilton, R.A. Reyes Hueros, Joshua W. Parks, Aaron R. Hawkins, and Holger Schmidt, "Enhanced Detection of Single Viruses On-Chip via Hydrodynamic Focusing", *IEEE Journal of Selected Topics in Quantum Electronics* **25**, 7201206 (2019).
32. Gopikrishnan G. Meena, Aadhar Jain, Joshua W. Parks, Alexandra Stambaugh, Jean Patterson, Aaron R. Hawkins and Holger Schmidt, "Integration of sample preparation and analysis into an optofluidic chip for multi-target disease detection," *Lab on a Chip* **18**, 3678 (2018).
33. Mahmudur Rahman, Matthew A Stott, Mark Harrington, Aaron R Hawkins, Holger Schmidt, "Single particle analysis with 2D electro-optical trapping on an integrated optofluidic device," *Optica* **5**, 1311-1314, (2018).
34. Trevor K. Decker, Yajun Zheng, Joshua S. McClellan, Aaron Ruben, Stephen A. Lammert, Daniel E. Austin, Aaron R. Hawkins, "Double Resonance Ejection Using Novel Radiofrequency Phase Tracking Circuitry in a Miniaturized Planar Linear Ion Trap Mass Spectrometer," *Rapid Communications in Mass Spectrometry* **32**, 2024-2030, (2018)
35. Matthew A. Stott, Vahid Ganjalizadeh, Gopikrishnan Meena, Johnny McMurray, Maclain Olsen, Marcos Orfila, Holger Schmidt, Aaron R. Hawkins, "Buried Rib SiO₂ Multimode Interference Waveguides for Optofluidic Multiplexing," *Photonics Technology Letters* **30**, 1487-1490, (2018).

36. Abhijit Ghosh, Carlos Vilorio, Aaron R. Hawkins, and Milton L. Lee, "Fundamentals and Developments in Microchip Gas Chromatography Column Technology," *Talanta* **188**, 463-492, (2018).
37. Alexandra Stambaugh, Joshua W. Parks, Matthew A. Stott, Gopikrishnan G. Meena, Aaron R. Hawkins, and Holger Schmidt, "Dual Detection of Zika Virus Nucleic Acid and Protein Using a Multi-Mode Interference Waveguide Platform," *Biomedical Optics Express* **9**, 3725-3730 (2018).
38. Yuan Tian, Trevor K. Decker, Joshua S. McClellan, Qinghao Wu, Abraham De La Cruz, Aaron R. Hawkins, and Daniel E. Austin, "Experimental Observation of the Effects of Translational and Rotational Electrode Misalignment on a Planar Linear Ion Trap Mass Spectrometer," *Journal of the American Society of Mass Spectrometry* **29**, 1376–1385, (2018).
39. Matthew A. Stott, Vahid Ganjalizadeh, Maclain Olsen, Marcos Orfila, Johnny McMurray, Holger Schmidt, Aaron R. Hawkins, "Optimized ARROW-Based MMI Waveguides for High Fidelity Excitation Patterns for Optofluidic Multiplexing," *Journal of Quantum Electronics* **54**, 6200107, (2018).
40. Matthew Hamblin, Thane Downing, Erik Hamilton, Sophia Anderson, Doyoung Kim, and Aaron Hawkins, "Anti-reflective light blocking layers using a liquid top matte coating," *Journal of Micro/Nanolithography, MEMS, and MOEMS* **17**, 025501, (2018)
41. Trevor K. Decker, Yuan Tian, Joshua S. McClellan, Linsey Bennett, Stephen A. Lammert, Daniel E. Austin, and Aaron R. Hawkins, "Optimal Fabrication Methods for Miniature Coplanar Ion Traps," *Rapid Communications in Mass Spectrometry* **32**, 289-294, (2018).
42. Yuan Tian, Trevor K. Decker, Joshua McClellan, Ailin Li, Abraham de la Cruz, Derek Andrews, Stephen A. Lammert, Aaron R. Hawkins, Daniel E. Austin, "Improved miniaturized linear ion trap mass spectrometer using lithographically patterned plates and tapered ejection slit," *Journal of the American Society of Mass Spectrometry* **29**, 213-222, (2018).
43. Thomas Wall, Johnny McMurray, Gopikrishnan Meena, Vahid Ganjalizadeh, Holger Schmidt, and Aaron Hawkins, "Optofluidic Lab-on-a-Chip Fluorescence Sensor using Integrated Buried ARROW (bARROW) Waveguides," *Micromachines* **8**, 252, (2017).
44. Damla Ozelcik, Aadhar Jain, Alexandra Stambaugh, Matthew A. Stott, Joshua Parks, Aaron Hawkins, Holger Schmidt, "Scalable Spatial-Spectral Multiplexing of Single-Virus Detection Using Multimode Interference Waveguides," *Scientific Reports* **7**, 12199 (2017).
45. Abhijit Ghosh, Jacob E. Johnson, Jonathan G. Nuss, Brittany A. Stark, Aaron R. Hawkins, Luke T. Tolley, Brian D. Iverson, H. Dennis Tolley and Milton L. Lee, "Extending the Upper Temperature Range of Microchip Gas Chromatography Using a Heater/Clamp Assembly," *Journal of Chromatography A* **1517**, 134-141 (2017).
46. Thomas Wall, Steven Hammon, Marcos Orfila, Erik Hamilton, Gabriel Zacheu, Holger Schmidt, and Aaron R. Hawkins, "Mitigating water absorption in waveguides made from unannealed PECVD SiO₂," *Photonics Technology Letters* **29**, 806-809, (2017).
47. Matthieu Giraud-Carrier, Trevor Decker, Joshua McClellan, Linsey Bennett, Jennifer Black, Holger Schmidt, and Aaron R. Hawkins, "Temperature and Wall Coating Dependence of Alkali Vapor Transport Speed in Micron-Scale Capillaries," *Journal of Vacuum Science and Technology A* **35**, 031602, (2017).

48. John M. Stout, Taylor M. Welker, and Aaron R. Hawkins, "Electrostatically Actuated Membranes Made from Silica Thin Films," *Applied Physics Letters* **110**, 053105, (2017).
49. Damla Ozcelik, Hong Cai, Kaelyn D. Leake, Aaron R. Hawkins, and Holger Schmidt, "Optofluidic bioanalysis: Fundamentals and applications," *Nanophotonics* **6**, 647–661, (2017).
50. Qinghao Wu, Yuan Tian, Ailin Li, Derek Andrews, Aaron R. Hawkins, Daniel E. Austin, "A miniaturized linear wire ion trap with electron ionization and single photon ionization sources," *Journal of The American Society for Mass Spectrometry* **28**, 859-865, (2017).
51. Ke Du, Hong Cai, M. Park, T.A. Wall, M.A. Stott, K.J. Alfson, A. Griffiths, R. Carrion, J.L. Patterson, A.R. Hawkins, H. Schmidt, and R.A. Mathies, "Multiplexed Efficient On-Chip Sample Preparation and Sensitive Amplification-Free Detection of Ebola Virus", *Biosensors and Bioelectronics* **91**, 489–496, (2017).
52. Hong Cai, Matthew A. Stott, Damla Ozcelik, Joshua W. Parks, Aaron R. Hawkins and H. Schmidt, "On-chip Wavelength Multiplexed Detection of Cancer DNA Biomarkers in Blood," *Biomicrofluidics* **10**, 064116 (2016).
53. Hong Cai, Aaron R. Hawkins, and Holger Schmidt, "Amplification-free direct detection of Ebola virus on hybrid optofluidic platform," *Clinical Laboratory International* **40**, 20-22, (2016).
54. Matthew A. Stott, Jennifer A. Black, Erik Hamilton, Holger Schmidt, and Aaron R. Hawkins, "Optimization of Y-splitting antiresonant reflecting optical waveguides-based rib waveguides", *Opt. Eng.* **55**, 100505 (2016).
55. M. Jaris, Y. Yahagi, B. K. Mahato, S. Dhuey, S. Cabrini, V. Nikitin, J. Stout, A. R. Hawkins, and H. Schmidt, "Intrinsic spin dynamics in optically excited nanoscale magnetic tunnel junction arrays restored by dielectric coating," *Applied Physics Letters* **109**, 202403, (2016).
56. Holger Schmidt and Aaron R. Hawkins, "Single-virus analysis through chip-based optical detection," *Bioanalysis* **8**, 867-870, (2016).
57. Matthieu Giraud-Carrier, Cameron Hill, Trevor Decker, Jennifer A. Black, Holger Schmidt, and Aaron Hawkins, "Perforated hollow-core optical waveguides for on-chip atomic spectroscopy and gas sensing," *Applied Physics Letters* **108**, 131105, (2016).
58. Thomas A. Wall, Roger P. Chu, Joshua W. Parks, Damla Ozcelik, Holger Schmidt, and Aaron R. Hawkins, "Improved environmental stability for plasma enhanced chemical vapor deposition SiO₂ waveguides using buried channel designs," *Optical Engineering* **55**, 040501, (2016).
59. Damla Ozcelik, Matthew A. Stott, Joshua W. Parks, Jennifer A. Black, Thomas A. Wall, Aaron R. Hawkins and Holger Schmidt, "Signal-to-noise enhancement in optical detection of single viruses with multi-spot excitation," *IEEE Journal of Special Topics in Quantum Electronics* **22**, 4402406, (2016).
60. Shuo Liu, Aaron R. Hawkins, and Holger Schmidt, "Optofluidic devices with integrated solid-state nanopores (Review)," *Microchimica Acta* **183**, 1275-1287, (2016).
61. Matthieu Giraud-Carrier, Cameron Hill, Trevor Decker, Aaron R. Hawkins, Jennifer A. Black, Soren Almquist, Holger Schmidt, "Non-diffusive Rubidium Vapor Transport in Confined Glass Channels," *Journal of Vacuum Science and Technology A* **34**, 031602, (2016).

62. Joshua W. Parks, Thomas A. Wall, Hong Cai, Aaron R. Hawkins, and Holger Schmidt, "Enhancement of ARROW Photonic Device Performance via Thermal Annealing of PECVD-based SiO₂ Waveguides", *IEEE J. Sel. Topics Qu. Elec.* **22**, 249-254, (2016).
63. Damla Ozcelik, Joshua W. Parks, Thomas A. Wall, Matthew A. Stott, Hong Cai, Joseph W. Parks, Aaron R. Hawkins, and Holger Schmidt, "Optofluidic wavelength division multiplexing for single-virus detection," *Proceedings of the National Academy of Sciences* **112**, 12933-12937, (2015).
64. Hong Cai, Joshua W. Parks, Thomas A. Wall, Matthew A. Stott, A. Stambaugh, K. Alfson, A. Griffiths, Richard A. Mathies, Ricardo Carrion Jr., Jean L. Patterson, Aaron R. Hawkins and Holger Schmidt, "Integrated optofluidic analysis for amplification-free detection of Ebola infection," *Scientific Reports* **5**, 14494 (2015).
65. Carlos Vilorio, Brittany Stark, Aaron R. Hawkins, Kendal Frogget and Brian Jensen, "Stress relaxation insensitive designs for metal compliant mechanism threshold accelerometers," *Sensing and Biosensing Research* **6**, 33-38, (2015).
66. Kaelyn D. Leake, Michael A.B. Olson, Damla Ozcelik, Aaron R. Hawkins, and Holger Schmidt, "Spectrally reconfigurable integrated multi-spot particle trap," *Optics Letters* **40**, 5435-5438, (2015).
67. Shuo Liu, Thomas A. Wall, Damla Ozcelik, Joshua W. Parks, Aaron R. Hawkins and Holger Schmidt, "Electro-Optical Detection of Single λ -DNA," *Chemical Communications* **51**, 2084-2087, (2015).
68. Anzi Wang, Sampo Hynynen, Aaron R. Hawkins, Samuel E. Tolley, H. Dennis Tolley, Milton L. Lee, "Axial thermal gradients in microchip gas chromatography," *Journal of Chromatography A* **1374**, 216-223, (2014).
69. Joshua W. Parks, Michael A. Olson, Jungkyu Kim, Ricardo Carrion Jr., Jean L. Patterson, Richard A. Mathies, Aaron R. Hawkins, and Holger Schmidt, "Integration of programmable microfluidics and on-chip fluorescence detection for biosensing applications," *Biomicrofluidics* **8**, 054111, (2014).
70. Shuo Liu, Yue Zhao, Joshua W. Parks, David D. Deamer, Aaron R. Hawkins, and Holger Schmidt, "Correlated Electrical and Optical Analysis of Single Nanoparticles and Biomolecules on a Nanopore-Gated Optofluidic Chip," *Nano Letters* **14**, 4816-4820, (2014).
71. Spencer Chadderton, LeGrand Shumway, Andrew Powell, Ailin Li, Daniel E. Austin, Aaron R. Hawkins, Richard H. Selfridge, Stephen M. Schultz, "Ion trap electric field characterization using slab coupled optical fiber sensors.," *Journal of the American Society for Mass Spectrometry* **25**, 1622-1627, (2014).
72. Ailin Li, Brett J. Hansen, Andrew T. Powell, Aaron R. Hawkins, Daniel E. Austin, "Miniaturization of a Planar-Electrode Linear Ion Trap Mass Spectrometer," *Rapid Communications in Mass Spectrometry* **28**, 1338-1344, (2014).
73. Sara Ehlert, Nathan Ives, and Aaron R. Hawkins, "Cross-flow microfilters with large-diameter sacrificially-etched cross sections," *Microfluidics and Nanofluidics* **16**, 465 - 471, (2014).
74. Kaelyn D. Leake, Brian S. Phillips, Thomas D. Yuzvinsky, Aaron Hawkins, and Holger Schmidt, "Optical particle sorting on an optofluidic chip," *Optics Express* **21**, 32605-32610, (2013).
75. Suresh Kumar, Jie Xuan, Milton L. Lee, Dennis Tolley, Aaron R. Hawkins and Adam T. Woolley, "Thin-Film Microfabricated Nanofluidic Arrays for Size-Selective Protein Fractionation," *Lab on a Chip* **13**, 4591-4598 (2013).

76. Joshua W. Parks, Hong Cai, Lynnell Zempoaltecatl, Thomas D. Yuzvinsky, Kaelyn Leake, Aaron R. Hawkins, and Holger Schmidt, "Hybrid optofluidic integration," *Lab on a Chip* **13**, 4118-4123, (2013).
77. Kaelyn D. Leake, Aaron R. Hawkins, and Holger Schmidt, "All-optical particle trap using orthogonally intersecting beams," *Photonics Research* **1**, 47-51 (2013).
78. Bryan S. Blankenagel, Shiul Khadka, Aaron R. Hawkins, Karl F. Warnick, and Brian A. Mazzeo, "Radio-frequency microfluidic interferometer in printed circuit board process," *Microwave and Optical Technology Letters* **55**, 1616–1618, (2013)
79. Brett J. Hansen, Richard J. Niemi, Aaron R. Hawkins, Stephen A. Lammert, and Daniel E. Austin, "A Lithographically Patterned Discrete Planar Electrode Linear Ion Trap Mass Spectrometer," *IEEE/ASME Journal of Microelectromechanical Systems* **22**, 876 – 883 (2013).
80. John F. Hulbert, Matthieu Giraud-Carrier, Tom Wall, Aaron R. Hawkins, Scott Bergeson, Jennifer Black, and Holger Schmidt, "Versatile Rb vapor cells with long lifetimes," *Journal of Vacuum Science and Technology A* **31**, 033001 (2013).
81. Yue Zhao, Brian Phillips, Damla Ozcelik, Joshua Parks, Philip Measor, David Gulbransen, Holger Schmidt, and Aaron R. Hawkins, "Tailoring the spectral response of liquid waveguide diagnostic platforms," *Journal of Biophotonics* **5**, 703–711, (2012).
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Conference Papers and Presentations

1. Joel Wright, Gopikrishnan Gopalakrishnan Meena, Holger Schmidt, Aaron Hawkins, "Design and Testing of High-Index Liquid-Core Waveguides for Single Particle Sensing," CLEO/QELS, Virtual Conference, May 9-14, (2021).
2. Mohammad Julker Neyen Sampad, Md Nafiz Amin, Gopikrishnan Gopalakrishnan Meena, Aaron Hawkins, Holger Schmidt, "Real-Time Bio Particle Flow Analysis Platform Based on FPGA Integrated Optofluidic ARROW Devices," CLEO/QELS, Virtual Conference, May 9-14, (2021).
3. M.N. Amin, V. Ganjalizadeh, M. Hamblin, A.R. Hawkins, and H. Schmidt, "Multiplexed single particle sensing in optofluidic sensors using free space excitation," IEEE Photonics Conference, Virtual Conference, September 27 – October 1, (2020).
4. Grant Stagg, Rachel Harris, Hollis Belnap, and Aaron R. Hawkins, "Nanoscale Electrostatic Membrane Actuation for Nanofluidic Pumping," Intermountain Engineering, Technology and Computing (IETC), Orem, UT, October 2-3, (2020).
5. Jace Rozsa, Yixin Song, Devon Webb, Naomi Debaene, Austin Kerr, Elaura L. Gustafson, Tabitha Caldwell, Halle V. Murray, Daniel E. Austin, Shiuh-hua Wood Chiang, and Aaron R. Hawkins, "A Verified Simulation Method for Image Charge Detection with Non-cylindrical Electrodes," Intermountain Engineering, Technology and Computing (IETC), Orem, UT, October 2-3, (2020).
6. James Green, Carlos Vilorio, Kalliyay Lay, Christine Lastra, and Aaron R. Hawkins, "Silicon Micro Gas Chromatography with Silkscreen Heater and Polyimide Capillary Insertion," Intermountain Engineering, Technology and Computing (IETC), Orem, UT, October 2-3, (2020).
7. Yixin Song, Jace Rozsa, Joan Magalhaes, Shea Smith, Benjamin Karlinsey, Whitney Kinnison, Elaura Gustafson, Daniel E. Austin, Aaron R. Hawkins, and Shiuh-hua Wood Chiang, "Design of Common-Mode Feedback for High-Gain Charge Amplifier," Intermountain Engineering, Technology and Computing (IETC), Orem, UT, October 2-3, (2020).
8. Devon Webb, Yixin Song, Jace Rozsa, Elaura Gustafson, Daniel E. Austin, Aaron R. Hawkins, and Shiuh-hua Wood Chiang, "Low-Noise, Low-Power Pulse Shaper for Particle Detection," 63rd IEEE International Midwest Symposium on Circuits and Systems, Virtual Conference, August 9-12, (2020).
9. W.G. Pitt, R.L. Wood, R. L. Hanson, A. T. Woolley, G. G. Meena, H. Schmidt, and A. R. Hawkins, "Rapid and Specific Genotyping for Blood Infection Identification," AIChE Annual Meeting, Orlando, FL, November 10-15, (2019).
10. K. B. Bywaters, H. Schmidt, D. Deamer, A.R. Hawkins, Z. Panchal, R. C. Quinn, W. Vercootere, and C. P. McKay, "Development of Solid-State Nanopore Life Detection Technology," 236th Electrochemical Society Meeting, Atlanta, GA, October 13-17, (2019).

11. Erik S. Hamilton, Vahid Ganjalizadeh, Holger Schmidt, and Aaron R. Hawkins, "Three-Dimensional Hydrodynamic Focusing Designs for Integrated Optofluidics Detection Enhancement," IEEE Photonics Conference, San Antonio, TX, September 29 – October 3, (2019).
12. G.G. Meena, O. Brown, R. Hanson, R. Wood, W.G. Pitt, A.T. Wooley, R. Robison, A.R. Hawkins and H. Schmidt, "Multiplexed detection of single antibiotic drug-resistant plasmids using multimode interference waveguide based optofluidic chip," IEEE Photonics Conference, San Antonio, TX, September 29 – October 3, (2019).
13. M.N. Amin, M. Hamblin, G.G. Meena, A.R. Hawkins, and H. Schmidt, "Free space excitation in optofluidic devices for single particle detection," IEEE Photonics Conference, San Antonio, TX, September 29 – October 3, (2019).
14. Elaura Gustafson, Halle Murray, Yixin Song, Jace Rozsa, Shih-hua Wood Chiang, Aaron Hawkins, and Daniel Austin, "Charge detection mass spectrometry of microparticles using printed circuit board electrode arrays," American Society for Mass Spectrometry (ASMS) Annual Conference, Atlanta, GA, June 2-6, (2019).
15. Yixin Song, Justin Chu, Joan Magalhaes, Jacob Nowjack, Jace Rozsa, Eric Swindlehurst, Sanjiv Pant, Kent Layton, Xiao Wang, Nathan Porter, Edgar Lee, Steve Lammert, Milton Lee, Aaron Hawkins, and Shih-hua Wood Chiang, "High-pressure solid-state ion detector with 10 uV/e- gain and 180-e- noise," American Society for Mass Spectrometry (ASMS) Annual Conference, Atlanta, GA, June 2-6, (2019).
16. Aadhar Jain, Gopikrishnan G. Meena, Alexandra Stambaugh, Jean Patterson, Aaron Hawkins, Holger Schmidt, "Optofluidic Platform with Integrated Optical Waveguides and Sample Preparation for Digitized Detection of Nucleic Acid Targets," CLEO/QELS, San Jose, CA, May 5-10, (2019).
17. Vahid Ganjalizadeh, Gopikrishnan G. Meena, Matthew Stott, Holger Schmidt, Aaron Hawkins, "Single Particle Detection Enhancement with Wavelet based Signal Processing Technique," CLEO/QELS, San Jose, CA, May 5-10, (2019)
18. Austin R. Foster, Samuel Avila, H. Dennis Tolley, Abhijit Ghosh, Carlos R. Vilorio, Jacob C. Johnson, Aaron R. Hawkins, Brian D. Iverson, Milton L. Lee, "Influence of Temporally and Spatially Varying Temperature Profile in Thermal Gradient Gas Chromatography," Pittcon, Philadelphia, PA, March 17-21, (2019).
19. Matthew Hamblin, Thane Downing, Sophia Anderson, Holger Schmidt, and Aaron Hawkins, "A Patternable, Anti-Reflective Light Blocking Layer Using a Nano-Particle Suspension in Photoresist," IEEE Photonics Conference, Reston, VA, October 1-4, (2018).
20. A. Jain, G.G. Meena, J.W. Parks, A. Stambaugh, J.L. Patterson, A.R. Hawkins, and H. Schmidt, "All-In-One Optofluidic Platform for Differential Diagnostics of Multiple Biomarkers with Single Molecule Sensitivity," IEEE Photonics Conference, Reston, VA, October 1-4, (2018).
21. G.G. Meena, M.A. Stott, O. Brown, R. Robison, A.R. Hawkins, and H. Schmidt, "Multimode Interference Waveguide-Based 7X Multiplexed Detection of Nucleic Acids for Antibiotic-Resistant Bacterial Screening," IEEE Photonics Conference, Reston, VA, October 1-4, (2018).
22. A. Ghosh, A.R. Foster, C.R. Vilorio, J.C. Johnson, X. Xie, L.M. Patil, L.T. Tolley, P.B. Farnsworth, H.D. Tolley, A.R. Hawkins, B.D. Iverson, M.L. Lee, "Portable Gas and Liquid Chromatographic

- Techniques,” 19th Brazilian Meeting on Analytical Chemistry, Caldas Novas, Brazil, September 16-19, (2018).
23. Holger Schmidt and Aaron Hawkins, “Recent progress in waveguide-based on-chip particle trapping and manipulation,” SPIE Nanoscience + Engineering, San Diego, CA, August 19 – 23, (2018).
 24. Stephen Schultz and Aaron Hawkins, “Intensive Mentoring and Micro-Electronics Research for Students in Engineering (IMMERSE),” ASEE Annual Conference & Exposition, Salt Lake City, UT, June 24-27, (2018).
 25. Yuan Tian, Joshua S. McClellan, Trevor K. Decker, Qinghao Wu, Abraham L. De la Cruz Hernandez, Aaron R. Hawkins, Daniel E. Austin, “Experimental Observation of the Effects of Translational and Rotational Electrode Misalignment on a Planar Linear Ion Trap Mass Spectrometer,” ASMS Conference on Mass Spectrometry and Allied Topics, San Diego, CA, June 3 – 7, (2018).
 26. Erik Hamilton, Joel Wright, Matthew Stott, Jennifer Black, Holger Schmidt, and Aaron Hawkins, “3D Hydrodynamic Focusing for Optofluidics Using a Stacked Channel Design,” CLEO/QELS, San Jose, CA, May 14-17, (2018).
 27. M.L. Lee, A. Ghosh, A.R. Foster, C.R. Vilorio, J.C. Johnson, X. Xie, L.M. Patil, L.T. Tolley, H.D. Tolley, A.R. Hawkins, “Novel Column Technologies for Portable Capillary Chromatography,” 42nd Intern. Symp. on Capillary Chromatography, Riva del Garda, Italy, May 14-18, (2018).
 28. Matthew Stott, Erik Hamilton, Vahid Ganjalizadeh, Maclain Olsen, Marcos Orfila, Johnny McMurray, Holger Schmidt, and Aaron Hawkins, “High Fidelity MMI Excitation Patterns for Optofluidic Multiplexing,” CLEO/QELS, San Jose, CA, May 14-17, (2018).
 29. Abhijit Ghosh, Austin R. Foster, Aaron R. Hawkins, Brian D. Iverson, Milton L. Lee, H. Dennis Tolley, Luke Tolley, Carlos R. Vilorio, “Effect of Thermal Control in Microchip Thermal Gradient Gas Chromatography,” Pittcon, Orlando, FL, February 26 – March 1, (2018).
 30. Matthew A. Stott, Vahid Ganjalizadeh, Holger Schmidt, and Aaron R. Hawkins, “High Fidelity MMI-Based Multi-Spot Excitation for Optofluidic Multiplexing,” IEEE Photonics Conference, Orlando, FL, October 1-5, (2017).
 31. M. Rahman, M. Harrington, M.A. Stott, T.D. Yuzvinsky, Y. Li, A.R. Hawkins, and H. Schmidt, “Optical trapping assisted enhancement of on-chip single molecule detection rate with a solid-state nanopore,” IEEE Photonics Conference, Orlando, FL, October 1-5, (2017).
 32. Joshua W. Parks, Alexandra Stambaugh, Matthew A. Stott, Aaron R. Hawkins, and Holger Schmidt, “Dual Detection of Zika Virus Nucleic Acid and Protein Using Multi-Mode Interference Waveguide Platform,” IEEE Photonics Conference, Orlando, FL, October 1-5, (2017).
 33. M. Rahman, M. Harrington, M.A. Stott, A.R. Hawkins, and H. Schmidt, “Trapping-assisted analysis of single particles using integrated nanopores,” Optical Trapping and Optical Micromanipulation XIV, SPIE Nanoscience + Engineering Conference, San Diego, CA, August 6-10, (2017).
 34. Steven Hammon, Thomas Wall, Erik Hamilton, Marcos Orfila, Gabriel Zacheu, Holger Schmidt, and Aaron R. Hawkins, “Preserving Optical Confinement in Unannealed PECVD SiO₂ Waveguides”, CLEO/QELS, San Jose, CA, May 14-19, (2017).

35. Damla Ozcelik, Matthew A. Stott, Joshua W. Parks, Aadhar Jain, Aaron R. Hawkins, and Holger Schmidt, "Multimodal Multiplexing of Single-Virus Detection Using Multi-Mode Interference Waveguides", CLEO/QELS, San Jose, CA, May 14-19, (2017).
36. M. Rahman, M. Harrington, M.A. Stott, A.R. Hawkins, and H. Schmidt, "Single Particle Fluorescence Analysis on Demand on Electro-Optofluidic Chip with Gated Particle Delivery," CLEO/QELS, San Jose, CA, May 14-19, (2017).
37. Abhijit Ghosh, Aaron R. Hawkins, Brian D. Iverson, H. Dennis Tolley, Jacob E. Johnson, Jonathan G. Nuss, Luke T. Tolley, and Milton L. Lee, "Temperature Control for Microchip Thermal Gradient Gas Chromatography," Pittcon, Chicago, IL, May 5 (2017).
38. Daniel Austin, Aaron R. Hawkins, Ailin Li, Derek Andrews, Joshua McClellan, Qinghao Wu, Richard Zare, Trevor Decker, Yuan Tian, "Miniaturized Wire Ion Trap," Pittcon, Chicago, IL, May 6 (2017).
39. K. B. Bywaters, H. Schmidt, W. Vercoutere, D. Deamer, A.R. Hawkins, R. C. Quinn, A. S. Burton, and C. P. McKay, "Development of Solid-State Nanopore Technology for Life Detection," Astrobiology Science Conference, Mesa, AZ, April 24-28 (2017).
40. Trevor Decker, Holger Schmidt, and Aaron R. Hawkins, "Perforated hollow-core optical waveguides for chip-scale spectroscopy and quantum interference," SPIE Photonics West, San Francisco, CA, Jan 28 – Feb 2 (2017).
41. Holger Schmidt and Aaron R. Hawkins, "Tunable optofluidic interference devices for bioanalysis", IEEE Photonics Conference, 29th Annual Conference of the IEEE Photonics Society, Waikoloa, HI, October 2-6 (2016).
42. G. Meena, Damla Ozcelik, Matthew Stott, Thomas Wall, Richard Robison, Aaron R. Hawkins and Holger Schmidt, "MMI waveguide based multispectral detection of nucleic acids for analysis of drug-resistant bacteria", 29th Annual Conference of the IEEE Photonics Society, Waikoloa, HI, October 2-6 (2016).
43. M. Rahman, M.A. Stott, A.R. Hawkins and H. Schmidt, "Design and Characterization of Integrated 2D ABEL Trap", IEEE Photonics Conference, 29th Annual Conference of the IEEE Photonics Society, Waikoloa, HI, October 2-6 (2016).
44. Milton L. Lee, Abhijit Ghosh, Luke T. Tolley, Aaron R. Hawkins, Brian D. Iverson, H. Dennis Tolley, "Microchip Thermal Gradient Gas Chromatography," 40th Intern. Symp. on Capillary Chromatography, Riva del Garda, Italy, May 29-June 3, (2016).
45. Damla Ozcelik, Joshua Parks, Hong Cai, Thomas Wall, Matthew Stott, Aaron Hawkins, and Holger Schmidt, "Optofluidic wavelength division multiplexing for single biomolecule sensing" OSA Advanced Photonics Congress, Vancouver, Canada, July 18-20 (2016).
46. Matthieu Giraud-Carrier, Trevor K. Decker, Aaron Hawkins, Jennifer A. Black, and Holger Schmidt, "Perforated Hollow-Core Waveguide Devices for Atomic Spectroscopy with Alkali Vapor," CLEO/QELS, San Jose, CA, June 5 - 10, (2016).
47. Hong Cai, Matthew A. Stott, Damla Ozcelik, Aaron Hawkins, Holger Schmidt, "On-chip Wavelength Multiplexing Detection of Cancer DNA Biomarkers in Blood Serum," CLEO/QELS, San Jose, CA, June 5 - 10, (2016).

48. Damla Ozcelik, Matthew A. Stott, Hong Cai, Aaron Hawkins, Holger Schmidt, "Spatially Multiplexed Bioparticle Detection Using Multi-mode Interference.," CLEO/QELS, San Jose, CA, June 5 - 10, (2016).
49. John M. Stout, Aaron R. Hawkins, Suresh Kumar, and Adam T. Woolley, "Particle Trapping in Electrostatically Actuated Nanofluidic Barriers," IEEE 58th International Midwest Symposium on Circuits and Systems, Ft. Collins, CO, August 2-5, (2015).
50. Matthieu Giraud-Carrier, Cameron Hill, Trevor Decker, Aaron R. Hawkins, Jennifer A. Black, Holger Schmidt, "Rubidium Diffusion in Microscale Spectroscopy and Slow Light Platforms," IEEE 58th International Midwest Symposium on Circuits and Systems, Ft. Collins, CO, August 2-5, (2015).
51. Matthew A. Stott, Thomas A. Wall, Erik Hamilton, Roger Chu, Aaron R. Hawkins, Damla Ozcelik, Joshua W. Parks, Gopikrishnan G. Meena, Holger Schmidt, "Silicate Overcoat Layers for the Improvement of PECVD Optofluidic Waveguides," IEEE 58th International Midwest Symposium on Circuits and Systems, Ft. Collins, CO, August 2-5, (2015).
52. Thomas Wall, Joshua Parks, Holger Schmidt, and Aaron R. Hawkins, "Materials and Microfabrication Processes for ARROW-based Optofluidic Biosensors," IEEE 58th International Midwest Symposium on Circuits and Systems, Ft. Collins, CO, August 2-5, (2015).
53. Dirk Schulze-Makuch, Dale Andersen, Mike Daly, Alfonso F. Davila, David Deamer, James Dohm, Alberto G. Fairen, Wolfgang Fink, Roberto Furfaro, Aaron R. Hawkins, James N. Head, Joop M. Houtkooper, Louis N. Irwin, Michael Knoblauch, Darlene S.S. Lim, Abel Mendez, Holger Schmidt, S. Kelly Sears, Henry J. Sun, Hojatollah Vali, "The Biological Oxidant and Life Detection (BOLD) mission: A proposal for a low-cost mission to Mars," 11th Low-Cost Planetary Missions Conference, Berlin, Germany, June 9-11, (2015).
54. Kaelyn D. Leake, Michael Olson, Damla Ozcelik, Aaron Hawkins, Holger Schmidt, "Spectrally Reconfigurable Multi-Spot Trap on Optofluidic ARROW Chip," CLEO/QELS, San Jose, CA, May 11-15, (2015).
55. Matthew Stott, Thomas Wall, Damla Ozcelik, Josh Parks, Gopikrishnan G. Meena, Erik Hamilton, Roger Chu, Holger Schmidt, Aaron Hawkins, "Silicate Spin-on-Glass as an Overcoat Layer for SiO₂ Ridge Waveguides," CLEO/QELS, San Jose, CA, May 11-15, (2015).
56. Josh Parks, Hong Cai, Thomas Wall, Matthew Stott, Roger Chu, Erik Hamilton, Aaron Hawkins, Holger Schmidt, "Improvement of Silicon Dioxide Ridge Waveguides Using Low Temperature Thermal Annealing," CLEO/QELS, San Jose, CA, May 11-15, (2015).
57. Daniel Austin, Ailin Li, Aaron Hawkins, Justin Sorensen, Yuan Tian, "Miniaturized Ion Traps," Pittcon Conference and Expo, New Orleans, LA, March 8-12, (2015).
58. Hong Cai, Joshua W. Parks, Thomas Wall, Ricardo Carrion, Jean Patterson, Richard A. Mathies, Aaron R. Hawkins, and Holger Schmidt, "Integrated optofluidics chips for efficient on-chip infectious disease detection," Photonics West, San Francisco, CA, February 7-12, (2015).
59. Aaron R. Hawkins, Thomas A. Wall, Joshua W. Parks, and Holger Schmidt, "Optofluidic Waveguiding for Biomedical Sensing," Materials Research Meeting Fall Meeting and Exhibit, Boston, MA, Nov 30 - Dec 5, (2014).

60. Shuo Liu, Yue Zhao, Thomas A. Wall, Joshua W. Parks, Aaron R. Hawkins, and Holger Schmidt, "Electro-Optical Detection of Single Nanoparticles on a Nanopore-Optofluidic Chip," Materials Research Meeting Fall Meeting and Exhibit, Boston, MA, Nov 30 – Dec 5, (2014).
61. Suresh Kumar, John M. Stout, Aaron R. Hawkins, and Adam T. Woolley, "Ionic Strength Effects on Protein Trapping in Thin-film Nanochannels," 18th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS), San Antonio, TX, October 26-30, (2014).
62. Ailin Li, Brett J. Hansen, Yuan Tian, Andrew T. Powell, Aaron R. Hawkins, Daniel E. Austin, D.E. "Sub-mm linear ion trap mass spectrometer made using ceramic plates" 248th ACS National Meeting and Exposition, San Francisco, CA, August 10-14, (2014).
63. Aaron R. Hawkins and Holger Schmidt, "Optofluidic Integration for Biomolecular Analysis," Tsukuba Nanotechnology Symposium TNS 14, Tokyo, Japan, July 25-26, (2014).
64. Ailin Li, Brett J. Hansen, Andrew T. Powell, Yuan Tian, Aaron R. Hawkins, Daniel E. Austin, "Miniaturized Planar Electrode Linear Ion Trap (LIT) Mass Analyzer," 62nd Conference of the American Society for Mass Spectrometry, Baltimore, MD, June 15-19, (2014).
65. Hong Cai, Joshua W. Parks, Ricardo Carrion, Lynnell Zempoaltecatl, Jean P. Patterson, Aaron Hawkins, Holger Schmidt, "On-chip detection of clinical Ebola virus RNA using specific DNA binding technique," CLEO/QELS, San Jose, CA, June 8-13, (2014).
66. Shuo Liu, Yue Zhao, Joshua W. Parks, Aaron Hawkins, Holger Schmidt, "On-chip Opto-electrical Discrimination of Single Biological Nanoparticles," CLEO/QELS, San Jose, CA, June 8-13, (2014).
67. Joshua W. Parks, Lynnell Zempoaltecatl, Richard A. Mathies, Aaron Hawkins, Holger Schmidt, "Automated Single Molecule Nucleic Acid Detection with a Waveguide Chip," CLEO/QELS, San Jose, CA, June 8-13, (2014).
68. Aaron R. Hawkins and Holger Schmidt, "Atom photonics on a chip", META'14, the 5th International Conference on Metamaterials, Photonic Crystals and Plasmonics, Singapore, May 20-23, (2014).
69. LeGrand J. Shumway, Spencer Chadderdon, Andrew Powell, Aaron R. Hawkins, Richard Selfridge, Stephen Schultz, Ailin Li, Daniel E. Austin, "Ion trap electrical field measurements using slab coupled optical sensors," SPIE conference on Smart Sensor Phenomena, Technology, Networks, and Systems Integration VII, San Diego, CA, March 9-13 (2014).
70. Anzi Wang, Aaron R. Hawkins, H. Dennis Tolley, Milton L. Lee, "Enhancing Separation Performance of Microfabricated Gas Chromatography Using Temperature Gradients," Pittcon Conference and Expo, Chicago, IL, March 2-6, (2014).
71. Suresh Kumar, Jie Xuan, H. Dennis Tolley, Milton L. Lee, Aaron R. Hawkins, Adam T. Woolley, "Thin-Film Microfabricated Nanofluidic Arrays for Size-Selective Protein Fractionation," Pittcon Conference and Expo, Chicago, IL, March 2-6, (2014).
72. Jennifer A. Black, M. Girard Carrier, Aaron R. Hawkins, and Holger Schmidt, "Recent progress in waveguide-based atom photonics," Photonics West, San Jose, CA, February 1-6, (2014).
73. Milton L. Lee, Anzi Wang, Jesse A. Contreras, Samuel E. Tolley, Matthew C. Asplund, Aaron R. Hawkins, H. Dennis Tolley, "Thermal Gradient Gas Chromatography – A New Paradigm for

- Hyphenation,” 13th Internat. Symp. on Hyphenated Techniques in Chromatography and Separation Technology, Bruges, Belgium, January 28-31, (2014).
74. Adam T. Woolley, Suresh Kumar, Jie Xuan, Milton L. Lee, H. Dennis Tolley, and Aaron R. Hawkins, “Size-based protein fractionation in nanofluidic channel arrays,” MicroTAS 2013, Freiburg, Germany, October 27-31, (2013).
 75. Holger Schmidt, Joshua Parks, and Aaron Hawkins, “Hybrid optofluidic integration,” SPIE Optics + Photonics, San Diego, California, August 25-29, (2013).
 76. Aaron R. Hawkins, Lynnell U. Zempoaltecatl, and Holger Schmidt, “Design and fabrication of silicon-based optofluidic waveguide platforms,” SPIE Optics + Photonics, San Diego, California, August 25-29, (2013).
 77. Joshua Parks, Jungkyu Kim, Lynnell U. Zempoaltecatl, Damla Ozcelik, Hong Cai, Rich Mathies, Aaron Hawkins, Holger Schmidt, “Hybrid Optofluidic Device for Fluidic Particle Manipulation and Detection,” CLEO/QELS, San Jose, CA, June 9-14, (2013).
 78. Matthieu Giraud-Carrier, John F. Hulbert, Thomas Wall, Aaron Hawkins, Holger Schmidt, Jennifer A. Black, “High Longevity Rubidium Packaging Method Suitable for Integrated Optics,” CLEO/QELS, San Jose, CA, June 9-14, (2013).
 79. Damla Ozcelik, Joshua W. Parks, Lynnell U. Zempoaltecatl, Kealyn Leake, Jennifer A. Black, Yaeji Lim, Holger Schmidt, Aaron Hawkins, “High Sensitivity Fluorescence Detection with Multi-spot Excitation Using Y-splitters,” CLEO/QELS, San Jose, CA, June 9-14, (2013).
 80. Shuo Liu; Yue Zhao; Aaron Hawkins; Holger Schmidt, “Correlated Optical and Electrical Detection of Single Nanoparticles on a Nanopore-Optofluidic Chip,” CLEO/QELS, San Jose, CA, June 9-14, (2013).
 81. Philip Measor, Lynnell U. Zempoaltecatl, Josh Parks, Samia Naccache, Steve Miller, Charles Chiu, Aaron Hawkins, Holger Schmidt, “Clinical Detection of Viral Infection on an Optofluidic Chip,” CLEO/QELS, San Jose, CA, June 9-14, (2013).
 82. Adam T. Woolley, Suresh Kumar, Jie Xuan, Aaron Hawkins, Milton L. Lee, “Size-selective protein fractionation in arrays of nanofluidic channels,” 37th International Symposium on Capillary Chromatography, Palm Springs, CA, May 12-16, (2013).
 83. Milton L. Lee, Jie Xuan, Mark Hamblin, John Stout, Suresh Kumar, Dennis Tolley, Daniel Maynes, Adam T. Woolley, Aaron Hawkins, “Size-Selective Trapping of Bioparticles Using Planar Nanofluidic Devices,” Pittcon Conference and Expo, Philadelphia, PA, March 17-21, (2013).
 84. Daniel E. Austin, Zhipeng Zhang, Brett J. Hansen, Ying Peng, Aaron R. Hawkins, “Microfabricated ion trap massspectrometers for planetary missions: the planar Paul trap and the coaxial ion trap,” International Workshop on Instrumentation for Planetary Missions, Greenbelt, MD, October 10-12 (2012).
 85. Philip Measor, Yue Zhao, Aaron Hawkins, and Holger Schmidt, “An Ultrasensitive Optofluidic Nucleic Acid Biosensor,” CLEO/QELS, San Jose, CA, May 6, (2012).
 86. Damla Ozcelik, Brian Phillips, Philip Measor, Aaron Hawkins, and Holger Schmidt, “Independent Particle Detection and Tunable Spectral Filtering on Optofluidic Chip,” CLEO/QELS, San Jose, CA, May 6, (2012).

87. Holger Schmidt and Aaron Hawkins, "Hollow-core Photonics for Optofluidics and Atom Photonics," CLEO/QELS, San Jose, CA, May 6, (2012).
88. Adam T. Woolley, Suresh Kumar, Jie Xuan, Milton L. Lee, H. Dennis Tolley, Daniel R. Maynes, Aaron R. Hawkins, "Planar Thin-film Nanofluidic Devices for Sample Fractionation," Pittcon, Orlando, FL, March 11 – 15, (2012).
89. Aaron R. Hawkins and Holger Schmidt, "Optofluidic Waveguide Development for High Sensitivity Bioparticle Detection," Invited talk, SLAS 2012, San Diego, CA, February 4-8, (2012).
90. Kaelyn D. Leake, Shamik Mascharak, Philip Measor, Brian S. Phillips, Aaron R. Hawkins, and Holger Schmidt, "Manipulation, trapping, and SERS detection of nanoparticle-coated microspheres in optofluidic waveguides," Invited talk, Photonics West, San Jose, CA, January 21-26, (2012).
91. Bin Wu, John F. Hulbert, Katie Hurd, Aaron R. Hawkins, and Holger Schmidt, "Chip-scale platform for quantum interference based slow light in atoms," Invited talk, OSA Advanced Photonics Congress - Slow and Fast Light Meeting, Toronto, Canada, June 12-16, (2011).
92. Daniel Austin, Brett Hansen, Hannah Quist, and Aaron Hawkins, "Microfabricated Linear Ion Trap Mass Spectrometer," Pittcon, Atlanta, GA, March 13 – 18, (2011).
93. Kaelyn D. Leake, Brian S. Phillips, Aaron R. Hawkins, and Holger Schmidt, "Sized-Based Optical Particle Sorting Using an Orthogonal Beam in Optofluidic Waveguides," CLEO/QELS, Baltimore, MD, May 1-6, (2011).
94. Holger Schmidt and Aaron R. Hawkins, "All-optical particle trap using two orthogonally intersecting beams," CLEO/QELS, Baltimore, MD, May 1-6, (2011).
95. Yue Zhao, Micah Jenkins, Kaelyn D. Leake, Shuo Liu, Philip Measor, Holger Schmidt, and Aaron R. Hawkins, "Optofluidic Waveguides with Ta₂O₅ Cladding Layers and Low Photoluminescence," CLEO/QELS, Baltimore, MD, May 1-6, (2011).
96. Bin Wu, John F. Hulbert, Katie Hurd, Aaron R. Hawkins, and Holger Schmidt, "Slow light and EIT in atomic spectroscopy chips", Invited talk, Photonics West, San Jose, CA, January 22-27, (2011).
97. Philip Measor, Mikhail I. Rudenko, Aiqing Chen, Evan J. Lunt, Brian S. Philips, Aaron R. Hawkins, and Holger Schmidt, "Liquid-core waveguide based optofluidics", Invited talk, IEEE Winter Topicals, Keystone CO, Jan 10-12 (2011).
98. Philip Measor, Brian S. Phillips, Aaron R. Hawkins, and Holger Schmidt "Liquid-core waveguide filter for optofluidic biosensing", European Optical Society Annual Meeting 2010, Paris, France, October 26-29, (2010).
99. Philip Measor, Brian S. Philips, Evan J. Lunt, Aaron R. Hawkins and Holger Schmidt, "Single-particle spectroscopy and manipulation in optofluidic devices," Frontiers in Optics, Rochester, NY, October 24-28, (2010).
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213. Weishu Wu, Aaron R. Hawkins, and John E. Bowers, "Effect of Electric Field Profile on Gain-Bandwidth Product of InGaAs/Si Avalanche Photodetectors," *Conference on Lasers and Electro-Optics*, Baltimore, MD, May 18-23, (1997).
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215. Barry F. Levine, Aaron R. Hawkins, Sangee Hiu, B. J. Tseng, Cliff A. King, L. A. Gruezke, R. W. Johnson, D. R. Zolnowski, and John E. Bowers, "20 GHz high performance planar Si/InGaAs P-I-N photodetector," *Indium Phosphide and Related Materials*, Hyannis, MA, May 11-15, (1997).
216. Weishu Wu, Aaron R. Hawkins, and John E. Bowers, "High Gain-Bandwidth Product Si/InGaAs Avalanche Photodetectors," *Optical Fiber Conference*, Dallas, TX, February 16-21, (1997).
217. Aaron R. Hawkins, Weishu Wu, and John E. Bowers, "Improvement of Avalanche Photodetectors Through Integration of InGaAs and Si," (invited paper), *SPIE Proceedings*, **2999**, 68-75, (1997).
218. Weishu Wu, Aaron R. Hawkins, and John E. Bowers, "Design of Si/InGaAs Avalanche Photodetectors for 400 GHz Gain-Bandwidth Product," (invited paper), *SPIE Proceedings*, **3006**, 38-47, (1997).
219. Aaron R. Hawkins, Weishu Wu, Patrick Abraham, Klaus Streubel, and John E. Bowers, "High Gain-Bandwidth Product Silicon Hetero-Interface Photodetector," (Postdeadline Paper), *Lasers and Electro-Optics Society Annual Meeting*, Boston, MA, November 18-21 (1996).
220. Aaron R. Hawkins, Thomas E. Reynolds, Derek England, Dubravko I. Babic, Klaus Streubel, and John E. Bowers, "81 GHz Gain-Bandwidth Product Silicon Hetero-Interface Photodetector," *Device Research Conference*, Santa Barbara, CA, June 24-26, (1996).

221. Aaron R. Hawkins and John E. Bowers, “Silicon-InGaAs APDs - the best of both worlds,” *WOSCEMMAD*, Santa Fe, NM, February 19-21, (1996).
222. Aaron R. Hawkins, Thomas Reynolds, Derek R. England, Dubravko I. Babic, Mark Mondry, and John E. Bowers, “Silicon Hetero-Interface Photodetector,” *Lasers and Electro-Optics Society Annual Meeting*, San Francisco, Oct. 30-Nov. 2, (1995).
223. Aaron R. Hawkins, Scott A. Watson, and Todd J. Kauppila, “Absolute Bremsstrahlung Energy Spectral and Dose Distributions – Theory and Experiment,” Los Alamos National Laboratory Report M-4:GR-93-09, Sept. 1, (1993).

Issued Patents

Title	Patent Number
Semiconductor hetero-interface photodetector	US6074892A
Apparatus for optical measurements on low-index non-solid materials based on arrow waveguides	US7149396B2
Semiconductor hetero-interface photodetector	US6130441A
Integrated sensor with electrical and optical single molecule sensitivity	US7248771B2
Integrated electrical and optical sensor for biomolecule analysis with single molecule sensitivity	US7444053B2
Semiconductor hetero-interface photodetector	US6147391A
Apparatus and method for aligning an optical fiber with an optical device	US6632028B1
Gas chromatography using a thermal gradient that is substantially monotonically non-increasing and has a positive second derivative	US9678046B2
Scanned Impedance Imaging System Method and Apparatus	US7205782B2
Method for amplification-free nucleic acid detection on optofluidic chips	US9551667B2
Impact ionization amplification apparatus method and system	US7485950B2
Two-chamber dual-pore device	US9696277B2

Pending Patents

- Hybrid, planar optofluidic integration
- Integrated Optical Vapor Cell Apparatus for Precision Spectroscopy
- Multiplex fluorescent particle detection using spatially distributed excitation

RECENT GRANT FUNDING

Project Name	Period	Funding Source	Role	Project PI	Total Grant	Funds Supervised
Nanopore-based multi-target analysis of Zika virus infection	2019-2023	NIH	Co-PI	Schmidt	\$2,000,000	\$500,000
A Circuit Board Charge Detector for Characterization of Martian Dust	2017-2020	NASA	Co-PI	Austin	\$639,000	\$180,000
Development of Nanopore Sequencing for Life Detection Technology	2017-2019	NASA	Co-PI	Schmidt	\$200,000	\$70,000
Packaging and Singulation Studies of Optofluidic Biosensor Chips	2017-2018	Fluxus Corp.	PI		\$60,000	\$60,000
Multiplexed, Non-Amplified, Nucleic Acid-Based Identification of Multidrug Resistant Pathogens Using an Integrated Optofluidic Platform	2015-2020	NIH	PI		\$5.5 M	\$1.2 M
IMMERSE/IML/Chip Camp	2016-2017	Micron Foundation	PI		\$145,000	\$145,000
Collaborative Research: Nanopore-gated on-chip trapping for single bioparticle sensing	2014 - 2017	NSF	PI		\$200,000	\$200,000
Miniaturized mass spectrometry using lithographically patterned electrodes	2014 - 2017	NSF	Co-PI	Austin (BYU)	\$400,000	\$150,000
Hand-Held Thermal Gradient GC-MS System	2015 - 2018	Perkin Elmer	Co-PI	Lee (BYU)	\$750,000	\$250,000
All Planar Fabrication of Chip-based Microfluidics with Electrospray Emitters	2015 - 2016	Perkin Elmer	PI		\$70,000	\$70,000
IMMERSE/IML/Chip Camp	2014-2015	Micron Foundation	PI		\$145,000	\$145,000
IML Support	2013-2015	IMFlash	PI		\$150,000	\$150,000
Hybrid integrated molecular analysis (HIMAS) for point-of-care diagnostics	2014 - 2017	NIH	Co-PI	Schmidt (UCSC)	\$1.2M	\$303,000
Solid State Ion Detection (SSID) Technology	2012-2014	DTRA/ARO	Co-PI	Ramsey (UNC)	\$2M	\$250,000
A Dual-Nanopore Instrument for Single DNA Measurements and Control	2012-2014	NIH	Co-PI	Dunbar (UCSC)	\$325,000	\$100,000

Project Name	Period	Funding Source	Role	Project PI	Total Grant	Funds Supervised
Hybrid integrated molecular analysis (HIMAS) for point-of-care diagnostics	2012-2014	NIH	Co-PI	Schmidt (UCSC)	\$325,000	\$100,000
Collaborative Research: Ultrasensitive Cancer Biomarker Detection on Biophotonic Chips	2012-2015	NSF	PI		\$210,000	\$210,000
Rapid, low-cost mRNA analysis system for cancer companion diagnostics	2012-2013	NIH	Co-PI	Measor (LiquiLume)	\$250,000	\$40,000
MRI: Acquisition of a direct write micro patterning system	2011-2012	NSF	Co-PI	Austin (BYU)	\$400,000	\$50,000
Portable Amplification-free Virus Nucleic Acid Detector	2011-2012	NSF	Co-PI	Measor (LiquiLume)	\$200,000	\$30,000
Collaborative Research: Slow and Stopped Light Photonics with Atomic Spectroscopy Chips	2011-2014	NSF	PI		\$180,000	\$180,000
Integrated optical particle trap for biomolecule analysis and manipulation	2009-2011	NIH	Co-PI	Schmidt (UCSC)	\$325,000	\$147,000
MRI: Acquisition of chlorine based reactive ion etcher	2007-2008	NSF	PI		\$300,000	\$300,000
Impact Ionization Based Multipliers for Optical Receivers	2007-2010	NSF	PI		\$270,000	\$270,000
The Open Storage Ring: a Mass-Mobility Spectrometer for in situ Characterization of Planetary Atmospheres and Evolved Gases	2007-2010	NASA	Co-PI	Austin (BYU)	\$558,000	\$150,000
Research Initiation: Optically Powered Transistor	2007-2008	BYU	PI		\$15,000	\$15,000
Single biomolecule sensors using integrated optical waveguides with liquid cores	2006-2009	NIH	Co-PI	Schmidt (UCSC)	\$1.3 M	\$500,000

Project Name	Period	Funding Source	Role	Project PI	Total Grant	Funds Supervised
Collaboration: SST: Integrated optical and electrical single molecule sensors	2006-2009	NSF	PI		\$400,000	\$133,000
Visible/Short Wave Infrared-Photon Counting Arrays (PCAR)	2006-2009	DARPA	Co-PI	Jack (Raytheon)	\$4 M	\$425,000
Research Initiation: Impedance Measurement of Micro-Fluidic Channels	2006-2007	BYU	PI		\$15,000	\$15,000
Collaboration: Integrated optical sensors using quantum interference in antiresonant waveguides	2005-2008	NSF	PI		\$225,000	\$112,500
Single-photon nonlinear optics in integrated hollow-core waveguides	2005-2009	DARPA	Co-PI	Schmidt (UCSC)	\$900,000	\$400,000
Integrated Hollow-Core Optical Waveguides	2005 - 2007	D. Huber Found.	PI		\$75,000	\$75,000
Low Noise Ionization Amplifier	2005	Raytheon	PI		\$25,000	\$25,000
Integrated Optical Waveguide Sensors for Biomedical Research	2004-2006	NIH	Co-PI	Schmidt (UCSC)	\$375,000	\$175,000
Research Initiation: Scanning Impedance Imager	2004-2006	BYU	PI		\$25,000	\$25,000
Chemical and Biological Agent Detector	2003-2005	DOD	Co-PI	Lee (BYU)	\$250,000	\$100,000
Handheld Chemical and Biological Agent Detector	2003-2007	DTRA	Senior Person	Lee (BYU)	\$6M	\$125,000
IMMERSE – Intensive Mentoring and Research in Micro-Electronics for Students in Engineering	2003 - 2013	BYU	PI		\$200,000	\$200,000
IMMERSE and IML Maintenance	2007-2013	Micron Foundation	PI		\$430,000	\$430,000
				Totals:	\$31.04 M	\$8.01 M

STUDENT MENTORING

Graduate Students Advised

Completed Degrees – Primary Advisor

- John P. Barber – Ph.D. (2006)
- Hong-Wei Lee – Ph.D. (2006)
- Donald B. Conkey – M.S. (2007)
- Hanho Cho – M.S. (2008)
- Joshua L. Beutler – Ph.D. (2010)
- Tao Shang – Ph.D. (2010)
- Evan J. Lunt – Ph.D. (2010)
- Mark N. Hamblin – Ph.D. (2010)
- Katie Hurd – M.S. (2010)
- Michael S. Johnson – Ph.D. (2011)
- Matthew R. Holmes – Ph.D. (2011)
- Brian S. Phillips – Ph.D. (2011)
- Yue Zhao – Ph.D. (2012)
- Brett J. Hansen – Ph.D. (2013)
- John F. Hulbert – Ph.D. (2013)
- Lynnell Zempoaltecatl – M.S. (2013)
- Michael Olson – M.S. (2014)
- Sadek Sabbah – M.S. (2014)
- Cameron Hill – M.S. (2015)
- Matthieu Girard-Carrier – Ph.D. (2016)
- Derek Andrews – M.S. (2016)
- Sanjiv Pant – M.S. (2016)
- Steven Hammon – M.S. (2017)
- Thomas Wall – Ph.D. (2017)
- Matthew Stott – Ph.D. (2018)
- John M. Stout – Ph.D. (2018)
- Trevor Decker – Ph.D. (2018)
- Jace Rozsa – M.S. (2020)
- Erik Hamilton – Ph.D. (2020)
- Carlos Vilorio – M.S. (2020)

Completed Degrees – Committee Member

- 18 Ph.D., 8 M.S. Students

Current Students – Primary Advisor

- Joel Wright – Ph.D. (Expected 2020)
- Matthew Hamblin – Ph.D. (Expected 2020)
- Zach Walker – Ph.D. (Expected 2022)
- Tanner Wells – Ph.D. (Expected 2023)

Current Students – Committee Member

- 10 Ph.D., 5 M.S. Students

Undergraduate Research Students Advised

Completed B.S. Degrees

- Ran Wang (2003)
- Bridget Peeni (2004)
- Cara Bell (2004)
- Chris Marchant (2004)
- Steve Markham (2004)
- Ben Green (2005)
- Ben Zhang (2005)
- Boaz Khan (2005)
- Don Conkey (2005)
- Ghassan Sanber (2005)
- Jacey Morine (2005)
- Jeff Campbell (2005)
- John Edwards (2005)
- Josh Kvavle (2005)
- Joshua Beutler (2005)
- Justin Henrie (2005)
- Mark Lowther (2005)
- Matt Smith (2005)
- Spencer Kellis (2005)
- Zack George (2005)
- Craig Christianson (2006)
- Evan Lunt (2006)
- Hanho Cho (2006)
- Jeff Maas (2006)
- Mark Hamblin (2006)
- Megan Larsen (2006)
- Rebecca Brenning (2006)
- Brian Phillips (2007)
- Carleton Clauss (2007)
- Daniel Evans (2007)
- Elizabeth Despain (2007)
- Tim Gardner (2007)
- Brandon Bytheway (2008)
- Brett Hansen (2008)
- Brian Buss (2008)
- Paul Tseung (2008)
- Alan Nelson (2009)
- Bridget Hall (2009)
- Chris Carron (2009)
- Cory Jones (2009)
- Douglas Hulbert (2009)
- Ryan Lee (2009)
- Benjamin Bush (2010)
- Brandon Carroll (2010)

- Laurie-Anne Parks (2010)
- Lynnell Zempoaltecatl (2010)
- Mallory Phillips Funkhouser (2010)
- Roy C Shuldberg (2010)
- Alisha Gillis (Pulsipher) (2011)
- Eric Teng (2011)
- Jared Keeley (2011)
- Matthieu Girard Carrier (2011)
- Micah Jenkins (2011)
- John Michael Stout (2012)
- Meagan Bracken (Miller) (2012)
- Sampo Hynynen (2012)
- Andrew Harris (2013)
- Cameron Hill (2013)
- David Gulbransen (2013)
- Hannah Quist (2013)
- Nathan Ives (2013)
- Tom Wall (2013)
- Yaeji Lim (2013)
- Alan Weinert (2014)
- Andrew Powell (2014)
- Matthew Alan Stott (2014)
- Richard Jon Niemi (2014)
- Sara Ehlert (2014)
- David Lindell (2015)
- Erik Hamilton (2015)
- Jeffery Ravert (2015)
- Justin Sorenson (2015)
- Luna Zhang (2015)
- Matthew Hamblin (2015)
- Steven Hammon (2015)
- Jacob Edward Johnson (2016)
- Jessica Hadley (2016)
- Trevor Decker (2016)
- Brittany Stark (2017)
- Carlos R Vilorio (2017)
- Jonathan Nuss (2017)
- Roger Chu (2017)
- Taylor Welker (2017)
- Laura Branham (2018)
- Thane Downing (2018)
- Joshua McClellan (2018)
- Marcos Orfila (2018)
- Jace Rozsa (2018)
- Gabriel Zacheu (2018)
- Jacob C. Johnson (2019)

- Maclain Olsen (2019)
- Thomas Baumgarten (2019)
- Scott Dye (2019)
- Joan Magalhaes (2020)
- Johnny McMurray (2020)

B.S. Degree in Progress

- Parker Allred
- Sophia Anderson
- Ethan Belliston
- Hollis Belnap
- Noah Boehme
- Naomi Debaene
- McKay Formica
- Hailey Hardy
- Rachel Harris
- Benjamin Karlinsey
- Austin Kerr
- Christine Lastra
- Kalliyay Lay
- Michael Mudrow
- Gracie Richens
- Aaron Ruben
- Grant Stagg
- Seth Walker

Undergraduate Research Programs

IMMERSE Program

Together with Prof. Stephen Schultz of BYU's Electrical and Computer Engineering Department, I initiated the Intensive Mentoring and Micro-Electronic Research for Students in Engineering (IMMERSE) program in 2003. Its goal is to prepare students for entry into top tier graduate programs and provide them an opportunity to author or co-author a technical paper. The program has grown to include approximately 80 undergraduate students and 20 faculty advisors annually. Students in the program receive one-on-one training by faculty and senior students and are assigned to an independent project. Students are offered full time employment in the summer and part time employment during the school year. Funding is provided by an existing BYU mentoring program, the MICRON Foundation, ORCA and department funds, and through external research grants.

IMMERSE Highlights:

- >400 Students employed since 2003
- > 80% of students have authored or co-authored a technical paper
- > 75% of students have pursued graduate degrees
- <http://immerse.byu.edu>

ORCA Scholarships

BYU's Office of Research and Creative Activities (ORCA) provides \$1800 scholarships for undergraduate students to conduct independent research projects. Students write proposals and

conduct the projects with the assistance of a faculty advisor. To date, I have advised 22 of these ORCA scholarship projects.

PROFESSIONAL SERVICE

Editorships

- Editor-in-Chief for IEEE Journal of Quantum Electronics (2014 – 2017)
- Associate Editor for IEEE Journal of Quantum Electronics (2007 – 2014)

Technical Society Leadership

- IEEE Photonics Society Vice President for Publications (2018 – 2020)
- IEEE Photonics Society Publications Council (2017)

Conference Program Committees

- Conference on Lasers and Electro-Optics (CLEO) (2017 - 2019)
- University/Government/Industry Micro/Nanotechnology (UGIM) Symposium (2016)
- IEEE International Midwest Symposium on Circuits and Systems (MWSCAS) (2015)
- Advanced Fabrication Technologies for Micro/Nano-Optics & Photonics at *Photonics West* (2008 - 2012)
- Conference on Lasers and Electro-Optics (CLEO) (2010 - 2012)
- IEEE/LEOS Summer Topical Meeting on Optofluidics (2008)

Reviewer for Research Proposals

- Department of Energy
- Environmental Molecular Sciences Laboratory
- European Research Council
- Israel Science Foundation
- National Aeronautics and Space Administration
- National Institutes of Health
- National Science Foundation
- Swiss National Science Foundation

Reviewer for Professional Journals

- Advances in Optical Technology
- Applied Materials and Interfaces
- Applied Optics
- Applied Physics Letters
- Biomedical Optics Express
- Biomicrofluidics
- Diagnostics
- IEEE Internet of Things Journal
- IEEE Photonics Technology Letters
- IEEE Journal of Quantum Electronics
- IEEE Journal of Lightwave Technology
- International Journal of Mass Spectrometry
- Journal of Electronic Materials

- Journal of Materials Chemistry C
- Journal of Microfluidics and Nanofluidics
- Journal of Micromechanics and Microengineering
- Journal of Nanoscience and Nanotechnology
- Lab-on-a-Chip
- Light: Science and Applications
- Measurement Science and Technology
- Micromachines
- Microsystems and Nanoengineering
- Nanomaterials and Nanotechnology
- Nanotechnology
- Nature Communications
- Optical and Quantum Electronics
- Optical Materials
- Optical Materials Express
- Optics Communications
- Optics Express
- Royal Society Open Science
- RSC Advances
- Science
- Scientific Reports
- Smart Science
- Soft Matter
- Solid-State Electronics

Nominator and Evaluator for Prizes and Awards

- The Kyoto Prize
- The Mustafa Prize
- The Heinz Awards

Web Based Reference Tools

An effort was begun in 2003 to provide on-line instructions for the tools in BYU's cleanroom facility, the Integrated Microfabrication Laboratory. This work rapidly expanded to include basic reference information on semiconductors, microfabrication, and equipment operation, including tutorials and interactive calculators and graphs. This information is now contained at the following website: www.ee.byu.edu/cleanroom and contains over 250 separate pages of information. The site receives around 90,000 hits per month from external visitors who use it as an essential reference. A companion site was launched in 2005 dedicated to providing reference information on photonics topics: www.ee.byu.edu/photonics. This site contains over 100 separate pages and receives 50,000 hits per month from external visitors. Prof. Stephen Schultz and I oversee the continued expansion and improvement of these two sites. Most of the HTML coding is done by students participating in our IMMERSE program.

Professional Memberships

- IEEE - Institute of Electrical and Electronic Engineers
- APS – American Physical Society
- OSA – Optical Society of America

- ASEE – American Society of Engineering Education

UNIVERSITY SERVICE

Department Committees and Assignments

- Department Chair (2018 – present)
- Associate Department Chair (2012 – 2018)
- Chair Rank & Status Committee (2012 – present)
- Chair Faculty Hiring Committee (2012 – present)
- Chair External Relations Committee (2010 - 2012)
- Member External Relations Committee (2002 – 2010)

University Committees

- Utah Conference on Undergraduate Research selection committee (2006)

Laboratory Director

Since 2002 I have directed the Integrated Microfabrication Laboratory, a 2500 ft² class 10 cleanroom. This facility is open for use by all BYU faculty and students and provides a significant resource for researchers in the micro and nanotechnology fields. I have had oversight of fundraising, lab budgets, student training and admission, equipment removal and installation, lab procedures, and staff activities. Since my arrival, >30 new systems have been installed, dramatically improving the labs capabilities. The number of lab users has also significantly increased. Current registered users total >130, with approximately 60 of those coming from the Electrical and Computer Engineering Department. It is estimated that the laboratory currently supports research projects with total external funding levels of \$3 Million per year.

CV Last Updated January 2021