KEATON MERTZ

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EDUCATION & SKILLS

University of Wisconsin-Madison, Madison, WI — 2020 – 2025
PhD Program: Analytical Chemistry

Carleton College, Northfield, MN — 2015 – 2018
BA: Chemistry (ACS Certified Major)

Selected Relevant Coursework: VSLI Semiconductor Manufacturing, Materials Chemistry Research, Electrochemistry, Instrumental Chemical Analysis, Electricity and Magnetism, Electronics (Physics), Data Structures, Software Design, Computer Organization and Architecture, and Multivariable Calculus.

Programming: Python, C++, Java, Lua, Assembly, LabView, Arduino C, MolFlow+, Solidworks, HTML/CSS/JS, CAD/CAM

EXPERIENCE

Instrumentation Tech II at Wisconsin Centers for Nanoscale Technology – Dr. Julie Morasch (2025 – Present)
- Installing, maintaining, and repairing advanced instruments in the cleanroom fab and nanoscale imaging facility
- Developing recipes and SOPs for semiconductor fabrication workflows for a dual beam FIB/SEM, spin coater, and laser direct write lithography

Analytical Chemistry Graduate Research at University of Wisconsin-Madison – Dr. Joshua Coon (2020 – 2025)
- Improving negative mode gas-phase ion-ion reactions in collaboration with Thermo Fisher
- Custom hardware and software implementation of ion parking and IRMPD on a Tribrid MS improving separation and quantification of TMT
- Troubleshooting and repairing advanced laboratory equipment
- Independently developed instrumentation for deposition of a mass spectrometer ion beam on to a cryogenically cooled surface for cryo-EM structural biology studies. This includes analog and digital electronics, hardware, and software for a UHV manifold, quartz crystal microbalance, acousto-optic modulator, class IV laser, cryogenic temperature control.
- Preparation of TEM grids by plasma cleaning, dry etching, PVD
- Mass spectrometry method development for proteomic analysis

XHV Vacuum Design Consultant at Steam Instruments Inc. – Dr. Thomas Kelly, President & CEO (Winter 2025)
- Modeled XHV vacuum chamber designs in CERN's MolFlow+
- Conducted a literature review of XHV technology to inform vacuum chamber design criteria

Lead Intern Scientist at Thermo Fisher – Dr. Jean Jacques Dunyach, Sr Director R&D (Summer 2021)
- Chromatography and Mass Spectrometry Division of the Analytical Instruments Group
- Performed software and hardware modifications to create a linear ion trap MS internal ionization source
- Created embedded unit tests to assess the temporal efficiency of a new product line

Chemical Sensor Research Technician at MBARI – Dr. Kenneth Johnson, PI (2018 –2020)
- Designed, programmed, and tested an autonomous in-situ dissolved inorganic carbon sensor
- Collaborated on biogeochemical projects such as pH and alkalinity sensor

Materials Chemistry Research at Carleton – Dr. Steven Drew, PI (Spring 2016 – Spring 2018 & Summer 2016-17)
- Researched and synthesized semiconductors for photovoltaic cells, especially perovskite crystalline structures
- Worked with research peers to construct instruments for testing the photovoltaic cells
- Met with Professor Drew frequently to discuss results and findings
- Analyzed published papers and produced semi-novel approaches for our experiments

Carleton Summer Science Institute Research Assistant – Dr. Steven Drew, PI (Summer 2016 and Summer 2017)
- Developed demos and labs for high school students on photovoltaics
- Taught introductory lessons on quantum dots and proper lab technique
- Helped student lab groups produce a poster to explain their results

Supplemental Instructor for Organic Chemistry I – Dr. Joseph Chihade and Dr. David Alberg, Profs (Fall 2016 – Spring 2018)

- Scheduled and ran supplemental sessions with original practice worksheets
- Assisted professor in answering questions during in-class group worksheets
- Worked with professors and students to identify difficult concepts and clarify them

PERSONAL EXPERIENCE – ALLOTROPIC PROJECTS, LLC

Microelectronic Semiconductor Fabrication

- Working towards the fabrication of primitive semiconductors and micromaterials
- Repairing a 1980's Jeol 6400 scanning electron microscope with a microprobe analysis suite
- Utilizing the SEM's circuit schematics to design in E-beam lithography capabilities
- Design and testing physical vapor deposition methods such as DC magnetron sputtering and thermal evaporation deposition

Web Development

- Familiar with TCP/IP stack, MQTT, embedded IoT development, and writing code consistent with RFC documentation
- Manage a google cloud linux VM instance as a server
- Spun-up a SQL database, central git repository server, apache, and a custom secure websocket protocol in JS and C++ with OpenSSL
- Website is updated upon git commit and code is compiled and executed to update the navigation bar. A development branch is maintained and hosted as well
- The website has contained various interactions with APIs such as google maps API and ebay API

Conception to Small Scale Production

- Created a digital-ion trap demonstration product for statically charged macroscopic particles
- Integrated advanced features: stroboscope, sine or square wave trapping, resonance excitation, RF/DC isolation
- Parts selection, schematic design, PCB layout, and microcontroller firmware
- 3D design of the product and 3D SIMION simulation of the trap

Tinkering

- Additive manufacturing, subtractive manufacturing on CNC mill and lathe, analog electronics, microcontrollers from bare-metal assembly to C++ on Arm Cortex-M3

PUBLICATIONS

Mertz, K. L., Jordahl, Hemme, C. A., Probasco, M. D., Forbes, D. S., Ducos, P. L., Salome, A. Z., Westphall, M. S., Quarmby, S. T., Grant, T., & Coon, J. J. (2025). Laser-Induced Rehydration of Cryo-Landed Proteins Restores Native Structure. *Molecular & Cellular Proteomics*, 100987. https://doi.org/10.1016/J.MCPRO.2025.100987

Mertz, K. M.; Serrano, L. S.; Coon, J. J.; Sinitcyn, P. (2025). Dynamic Quadrupole Selection to Associate Precursor Masses with MS/MS Fragments in Data-Independent Acquisition. *Journal of the American Society for Mass Spectrometry, In Review*

Coon, J., Westphall, M., Miller, I., Smith, L., Mertz, K. (2023). *U.S. Patent Application No. 18/074,060.*

Peters-Clarke, T. M., Liang, Y., Mertz, K. L., Lee, K. W., Westphall, M. S., Hinkle, J. D., McAlister, G. C., Syka, J. E. P., Kelly, R. T., Coon, J. J. (2024). Boosting the Sensitivity of Quantitative Single-Cell Proteomics with Infrared-Tandem Mass Tags. *Journal of Proteome Research.* https://doi.org/10.1021/acs.jproteome.4c00076

Westphall, M. S., Lee, K. W., Hemme, C., Salome, A. Z., Mertz, K., Grant, T.; Coon, J. J. (2023). Cryogenic Soft Landing Improves Structural Preservation of Protein Complexes. *Analytical Chemistry*, *95* (40), 15094–15101. https://doi.org/10.1021/acs.analchem.3c03228

Lee, K. W., Peters-Clarke, T. M., Mertz, K. L., McAlister, G. C., Syka, J. E. P., Westphall, M. S., & Coon, J. J. (2022). Infrared Photoactivation Boosts Reporter Ion Yield in Isobaric Tagging. *Analytical Chemistry*, *94*(7), 3328–3334. https://doi.org/10.1021/acs.analchem.1c05398

Takeshita, Y., Mertz, K. L., Norgaard, A., Gray, S., Verburg, M. H., & Bockmon, E. E. (2022). Accurate spectrophotometric pH measurements made directly in the sample bottle using an aggregated dye perturbation approach. *Limnology and Oceanography: Methods*, *20*(5), 281–287. https://doi.org/10.1002/lom3.10486

Mucciarone, D. A., DeJong, H. B., Dunbar, R. B., Takeshita, Y., Albright, R., & Mertz, K. (2021). Autonomous submersible multiport water sampler. *HardwareX*, *9*, e00197. https://doi.org/10.1016/j.ohx.2021.e00197

Takeshita, Y., Jones, B. D., Johnson, K. S., Chavez, F. P., Rudnick, D. L., Blum, M., Conner, K., Jensen, S., Long, J. S., Maughan, T., Mertz, K. L., Sherman, J. T., & Warren, J. K. (2021). Accurate pH and O2 Measurements from Spray Underwater Gliders, *Journal of Atmospheric and Oceanic Technology*, 38(2), 181-195. https://doi.org/10.1175/JTECH-D-20-0095.1

Bresnahan, P.J., Takeshita, Y., Wirth, T., Martz, T.R., Cyronak, T., Albright, R., Wolfe, K., Warren, J.K. and Mertz, K. (2021), Autonomous in situ calibration of ion-sensitive field effect transistor pH sensors. *Limnol Oceanogr Methods*, 19: 132-144. https://doi.org/10.1002/lom3.10410

AWARDS

National Institutes of Health (NIH) Biotechnology Training Program (BTP) Traineeship
Roger J. Carlson Graduate Award for Outstanding Graduate Achievements in Chemistry at UW-Madison (2024)
Charles Carlin Prize in Chemistry at Carleton College (2018)
James Adams Memorial Award for Positivity at Carleton College (2018)
Deora Bodley Alumni Association Award for Service at La Jolla Country Day School (2015)

ACTIVITIES & LEADERSHIP

Founder and President of the Circuits and Schematics Club, Northfield, MN
- Working on making a 3D persistence of vision display from scratch

Program Director of Faribault Middle School Science Club, Faribault, MN
- Prepare and provide lessons and labs for Faribault Middle School's after-school program

Unified Special Olympics Volunteer, Northfield, MN
- Provide support for my individually partnered athlete, who is wonderful

Teacher's Assistant at Greenvale Bilingual School for Spanish, Northfield, MN
- Converse (in Spanish) and bring stories to life by reading aloud using various tones, voices, and gestures

Interests: hobbyist electron microscopy, surfing, rock climbing/bouldering, tinkering, and the recorder

REFERENCES

Dr. John Syka, Senior Research Scientist at Thermo Fisher Scientific
Dr. Syka was my supervisor during my internship with Thermo, and he has served as a scientific mentor in graduate school.

john.syka@thermofisher.com +1 434-960-0614

Dr. Michael Westphall, Distinguished Scientist III Instrument Innovator, University of Wisconsin-Madison
Dr. Westphall served as staff scientist, mentor, and coworker of mine in Dr. Joshua Coon's lab for four years.

michael.westphall@wisc.edu +1 608-239-3682

Professor Joshua Coon, Professor of Biomolecular Chemistry and Chemistry, University of Wisconsin-Madison
Prof. Coon is the advisor of my PhD research on mass spec instrumentation development, data analysis software design, fundamental ion chemistry studies, and biological applications of the technology.

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