

Zechariah B. Kitzhaber

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Department of Chemistry and Biochemistry

University of South Carolina

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EDUCATION

Ph.D. 2024 Analytical Chemistry (expected May 2024), University of South Carolina

B.A. 2019 Chemistry, Saint Mary's University of Minnesota, *Magna cum laude*

WORK EXPERIENCE

2018 – 2019 Quality Control Lab Technician, Watkins Co., Winona, MN

- Performed routine analysis of raw materials and finished products
 - Operated and maintained lab equipment including distillation apparatus, FTIR-ATR, pH meters, density meter, viscometer, water activity meter, refractometer, and polarimeter
 - Complied with standards for food products and over-the-counter remedies
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RESEARCH EXPERIENCE

2019 – present University of South Carolina, Department of Chemistry and Biochemistry Graduate Assistant under Dr. Michael L. Myrick

- Molecular spectroscopy including Fluorescence Excitation and Emission, Raman, UV-Vis-NIR, and FT-IR
- Design, construction, and alignment of filter and scanning spectrometers
- Data exploration, analysis and plotting with MATLAB, Igor Pro, Maple, and Python
- Design and prototyping using CAD 3D modelling and 3D printing
- Design and assembly of electronic circuits for hardware control and high-speed data transmission
- Software programming on Windows and Linux (C++, Python, Matlab)
- Using Microcontrollers and Single Board computers (Arduino, Raspberry Pi, Red Pitaya) to control instruments, acquire and process data, and automate laboratory tasks
- Mentoring undergraduate and junior graduate students

2018 – 2019 Saint Mary's University of Minnesota, Undergraduate Research under Dr. Nathan Lien

- Using GC-MS and QuEChERS method to identify pesticides in coffee
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TEACHING EXPERIENCE

2019-2023 CHEM541L/542L, Physical Chemistry Laboratory I/II

- Polymorphism of acetaminophen by Differential Scanning Calorimetry
- Polymer curing by DSC thermal analysis
- Molecular Spectroscopy: vibrational, rotation-vibrational, and overtone
- Using molecular spectroscopy to demonstrate quantum mechanical concepts
- Instrument maintenance of DSC, UV-Vis-NIR, FT-IR
- Computational chemistry for modelling excited states and molecular mechanics (Spartan and ORCA)

Invited Lectures

2022 EMCH 368, Mechatronics, “Using Microcontrollers in Scientific Instruments”

AWARDS

2024 Graduate Student Achievement Award
 2023 Joseph W. Bouknight Teaching Award
 2019 Peyton C. Teague Fellowship

PUBLICATIONS

English, C. M.; **Kitzhaber, Z. B.**; Sanim, K. R.; Vitzilaios, N.; Hodgson, M. E.; Richardson, T. L.; Myrick, M. L. Filter Fluorometer Calibration without the Fluorometer. *Applied Spectroscopy* **2023**. DOI:10.1177/00037028231181593.

Sanim, K. R.; English, C. M.; **Kitzhaber, Z. B.**; Kalaitzakis, M.; Vitzilaios, N.; Myrick, M. L.; Hodgson, M. E.; Richardson, T. L. Autonomous UAS-Based Water Fluorescence Mapping and Targeted Sampling. *Journal of Intelligent & Robotic Systems* **2023**, 108 (2). DOI:10.1007/s10846-023-01880-9.

Myrick, M. L.; English, C. M.; **Kitzhaber, Z. B.** A Brief Look at Optical Diffuse Reflection (DR) Spectroscopy. *Spectroscopy* **2023**.

Kitzhaber, Z. B.; English, C. M.; Sanim, K. R.; Kalaitzakis, M.; Kosaraju, B.; Hodgson, M. E.; Vitzilaios, N.; Richardson, T. L.; Myrick, M. L. Fluorometer Control and Readout Using an Arduino Nano 33 BLE Sense Board. *Applied Spectroscopy* **2022**, 77 (2), 220–224. DOI:10.1177/00037028221128800.

English, C. M. [‡]; **Kitzhaber, Z. B.** [‡]; Sanim, K. R.; Kalaitzakis, M.; Kosaraju, B.; Pinckney, J. L.; Hodgson, M. E.; Vitzilaios, N. I.; Richardson, T. L.; Myrick, M. L. Chlorophyll Fluorometer for Intelligent Water Sampling by a Small Uncrewed Aircraft System (SUAS). *Applied Spectroscopy* **2022**, 77 (1), 94–105. DOI:10.1177/00037028221126748.

Hodgson, M.E.; Vitzilaios, N.I.; Myrick, M.L.; Richardson, T.L.; Duggan, M.; Sanim, K.R.I.; Kalaitzakis, M.; Kosaraju, B.; English, C.; **Kitzhaber, Z.** Mission Planning for Low Altitude Aerial Drones during Water Sampling. *Drones* **2022**, 6, 209. <https://doi.org/10.3390/drones6080209>

Sanim, K.R.I.; Kalaitzakis, M.; Kosaraju, B.; **Kitzhaber, Z.**; English, C.; Vitzilaios, N.I.; Myrick, M.L.; Hodgson, M.E.; Richardson, T.L. Development of an Aerial Drone System for Water Analysis and Sampling, **2022**

International Conference on Unmanned Aircraft Systems (ICUAS), Dubrovnik, Croatia, 2022, pp. 1601-1607, doi: 10.1109/ICUAS54217.2022.9836122

English, C. M. ‡; **Kitzhaber, Z. B.** ‡; Williams, J.; Humphries, A.; Myrick, M. L. Challenges of Spectrofluorometry, Part 1: Collect Data Right the First Time. *Spectroscopy* **2021**, 44–46. DOI:10.56530/spectroscopy.hc3878h4.

English, C. M. ‡; **Kitzhaber, Z. B.** ‡; Williams, J.; Myrick, M. L. Challenges of Spectrofluorometry, Part 2: Instrument-Specific Concerns. *Spectroscopy* **2021**, 41–45. DOI:10.56530/spectroscopy.nq2890h3.

English, C. M. ‡; **Kitzhaber, Z. B.** ‡; Williams, J.; Myrick, M. L. Challenges of Spectrofluorometry Part 3: Sample-Specific Concerns. *Spectroscopy* **2021**. DOI:10.56530/spectroscopy.xh2276b4.

In Preparation

Kitzhaber, Z. B.; Greytak, A. B.; Myrick, M. L. Experiments for the Physical Chemistry Laboratory: Measuring the Kinetics and Thermodynamics of an Epoxy Curing Reaction using Differential Scanning Calorimetry. *Journal of Chemical Education*.

English, C. M. ‡; **Kitzhaber, Z. B.** ‡; Sanim, K. R.; Kalaitzakis, M.; Kosaraju, B.; Pinckney, J. L.; Hodgson, M. E.; Vitzilaios, N. I.; Richardson, T. L.; Myrick, M. L. Remote Sensor for Phytoplankton Pigment Fluorescence from a Small Uncrewed Aircraft System (SUAS). *Applied Spectroscopy*.

Kitzhaber, Z. B.; Myrick, M. L. A Fluidic Control System for Repeat Analysis of Individual Cells in Flow

‡ - indicates equal contribution to manuscript

PRESENTATIONS

Poster Presentations

Kitzhaber, Z. B.; English, C.M.; Myrick, M. L. A Fluidic Control System for Repeat Analysis of Individual Cells in Flow. Pittsburgh Conference & Expo, San Diego, CA, February 26, 2024.

Kitzhaber, Z. B.; English, C.M.; Myrick, M. L. A Fluidic Control System for Repeat Analysis of Individual Cells in Flow. USC Dept of Chemistry & Biochemistry Senior Graduate Student Poster Competition, Columbia, SC, February 9, 2024.

Kitzhaber, Z.; Lien, N. Determination of Pesticides and Raw, Roasted, and Brewed Coffee by GC-MS using QuEChERS. ACS National Conference, Orlando, FL, 2019.

AFFILIATIONS AND OUTREACH

2023 – present USC Institute for Clean Water under Dr. Michael L. Myrick

2021-2023 Stem Club volunteer at local middle school

2018 – present Member of the American Chemical Society

REFERENCES

Dr. Michael L. Myrick

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Dept. of Chemistry and Biochemistry
Research Advisor & TA Supervisor
myrick@mailbox.sc.edu

Dr. Andrew B. Greytak

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Dr. Tim Shaw

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Dr. Nikolaos (Nikos) I. Vitzilaos

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