



ANALYTICAL RESOURCES CORE

COLORADO STATE UNIVERSITY

ARC MONTHLY BULLETIN

APRIL 2023

Welcome to the ARC Bulletin, a monthly newsletter to keep you informed about the latest happenings in the ARC. Here you will find information about our team, job opportunities, equipment and facilities, upcoming seminars, and other exciting news!

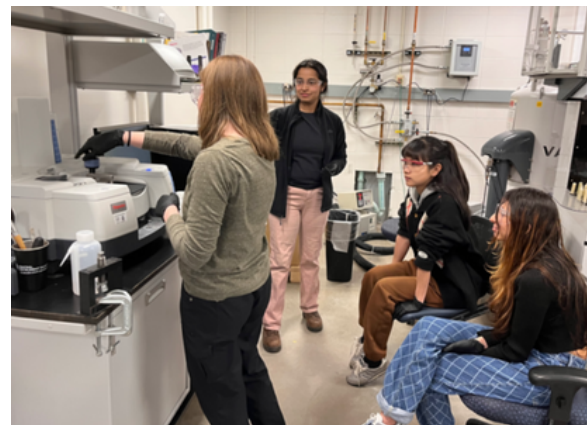
DID YOU KNOW?

The ARC supports CSU undergraduate and graduate classes through guest lectures, instrument demos, or lab tours to introduce students to relevant instrument theory and research applications. This academic year, ARC has provided support in **MSE502A/502C**, **BIOL533**, **ESS 660**, **CHEM532**, **CHEM321**, and **CHEM440**.

"One of the best parts about graduate school is getting to learn from so many experts with different backgrounds and skill sets. Having ARC staff members give presentations and instrument demos in my CHEM532 class added layers of valuable perspective. Most of us were already familiar with an instrument or two, but many of us were unaware of all the analytical tools we have available to us at CSU. After learning about and interacting with instruments in the ARC, we are better equipped to handle our own research and design more informed experiments. Thanks, ARC staff!"

-Stephanie Cardinalli, CHEM532 student

Feel free to reach out to us for more information about how we can help you with your classes.



MEET THE INSTRUMENT AND EXPERT

MEET OUR “ULTRAFLEX” MALDI-TOF/TOF MASS SPECTROMETER

The “Ultraflex” (NSF-MRI funded) is a state-of-the-art high resolution mass spectrometer well suited for the analysis of macromolecules like synthetic polymers, nanoparticles, proteins, peptides, and other biologically derived polymers, as well as small molecules. What makes this instrument unique from other MS techniques in the lab is the MALDI (matrix assisted laser desorption ionization) ionization technique that uses a 355 nm modified Nd:YAG laser paired with a small molecule UV absorber (the matrix) to volatilize and ionize large, insoluble, and/or labile molecules non-destructively.



As a “soft” ionization mechanism, MALDI enables us to observe intact, singly charged molecules even at exceptionally high molecular weights (up to 500 kDa!). Our users enjoy the MALDI because it allows them to rapidly and accurately measure samples that are often difficult or impossible to analyze by more traditional mass spectrometry methods. The “Ultraflex” is capable of resolution exceeding 40,000, mass accuracy better than 5 ppm, and sensitivity in the femtomolar range.

The MS/MS feature allows users to do advanced fragmentation for structure elucidation of samples up to 5 kDa. Our suite of synthetic polymer characterization software allows our polymer chemists to easily analyze their MALDI-TOF spectra to predict end groups and obtain information on average molecular weight, degree of polymerization, dispersity and more.

MEET MALDI EXPERT ALYSSA WINTER MAY

Dr. Alyssa May has managed the MALDI-TOF systems at the ARC for over two years. With a background in synthetic polymer chemistry and soft materials analysis, she also has in-depth experience with many of the other ARC instruments, including other MS systems, NMR, materials, X-ray, and spectroscopy equipment, both as ARC staff and a user during her graduate studies here at CSU as a member of the Travis Bailey group. She also manages the SAMD Materials Testing and Processing core facility located in the Anatomy-Zoology building, which contains a wide variety of materials processing and mechanical testing equipment.



Her favorite part about working at the ARC is the opportunity to get to know and teach users about the equipment and help them to get the best data possible. When she’s not shooting UV lasers at molecules, you might find her cooking, playing ultimate frisbee, hiking, doing graphic design, playing video games, or, most likely, snuggling with her very fluffy cat.

EXPECT RATE CHANGES JULY 1

The ARC continues to experience price increases for major expenses such as cryogenics, inert gases, consumables and services. Salary raises required by the university in many cases impact our operations costs as many of our salaries are not paid from university contributed base funds. Our vendors have announced as high as 10% increases in service contracts which contribute to 30% of our operating costs. In addition, the ARC is still faced with a significant deficit induced by the disuse of many of our instruments during the COVID Pandemic. Being a non-profit Center, we have very little means to build up revenue in excess of our normal cost-recovery. External use helps but serving external companies is not our primary mission as an academic shared research resource and training facility. Please be prepared to see some rate increases with the start of the new FY, but know we are trying to implement other measures to reduce our costs strategically to keep rates affordable to our users. Please reach out to me with any questions or concerns. ~Karolien

ASK US ANYTHING!

If you have any questions or suggestions you would like to bring to us, please post them here:



(responses are anonymous)

ON THE CALENDAR

UPCOMING USER FOCUS GROUP MEETINGS

April 19 – Mass Spec Self-Use Focus Group with Claudia Boot

May 4 – Electron Microscopy Self-Use Focus Group with Roy Geiss and Rebecca Miller

UPCOMING SEMINARS

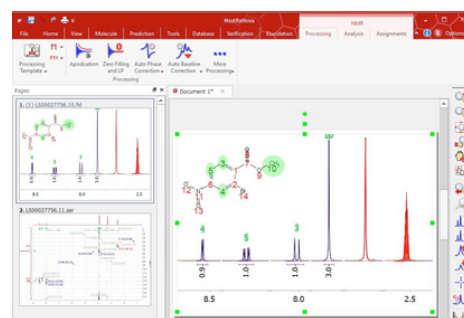
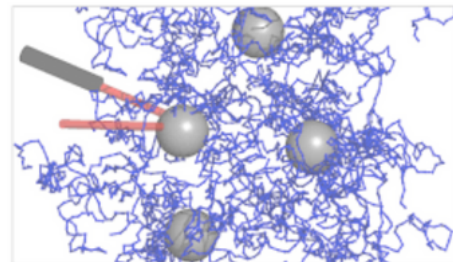
April 19 – Dr. Ana Morfesis (Malvern Panalytical). Zeta potential and micro-rheology measurements using light scattering techniques.

Register here

www.research.colostate.edu/arc/arc-seminar-series

UPCOMING LECTURES:

April 10: CHEM532 – An Introduction to Nuclear Magnetic Resonance (Dr. Michele Mailhot) – Yates 406



ELECTRON MICROSCOPY IMAGING CONTEST

We received over 30 amazing SEM and TEM images, some demonstrating quite the creative side of our electron microscopy users!! We are in the process of evaluating and will announce the winner and winning image in our May bulletin. The winner will receive a professionally framed print of their image to show off at home or in their office!



OTHER UPDATES AND REMINDERS

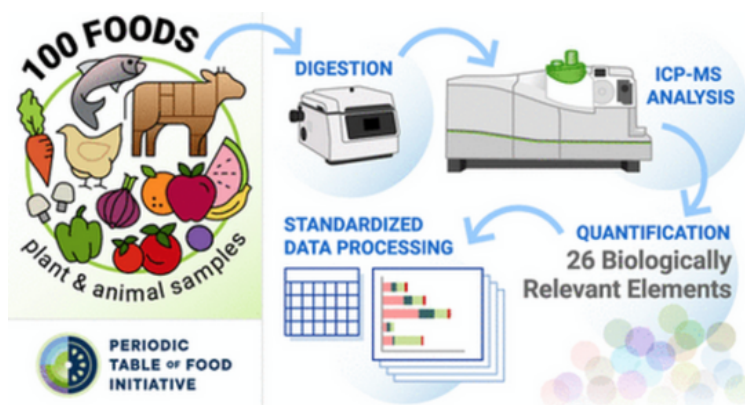
- Please continue to cite or acknowledge us by our Research Resource ID (**RRID: SCR_021758**) in publications that include any data generated in or by our facility.
- Remember to reference the NSF-MRI grant number in any of your publications using our Bruker UltrafleXtreme MALDI-TOF/TOF (**NSF Grant No. 2117934**) or Thermo Orbitrap Eclipse (**NSF Grant No. 2117943**).

ARC RESEARCH CONTRIBUTIONS

Check out the following recent publications authored or co-authored by ARC staff scientists:

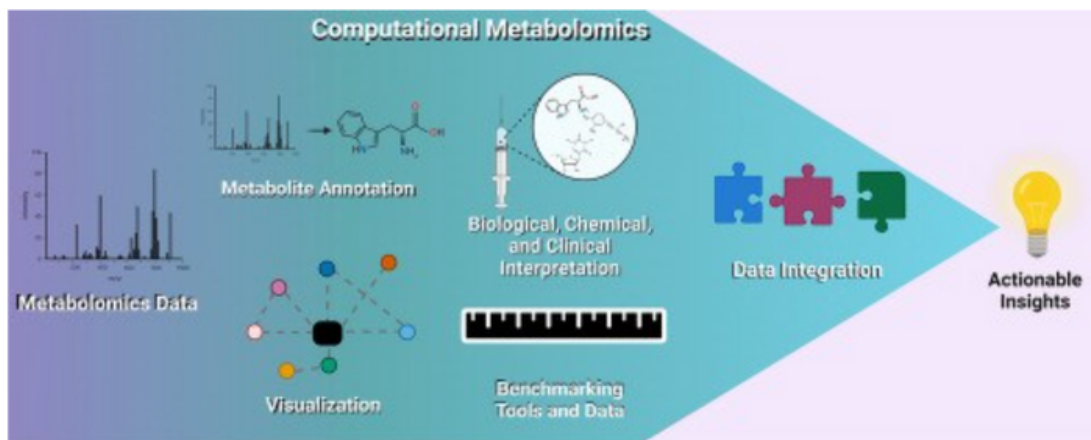
Multielement Profiling of Diverse Food Samples. ACS Food Sci. Technol. 2023, 3, 3, 459–464. Jackie Chaparro (co-author Corey Broeckling).

An study on multielement profiling of diverse food samples using inductively coupled plasma mass spectrometry (ICP-MS).



Recent advances in mass spectrometry-based computational metabolomics. Current Opinion in Chemical Biology. 2023, 74,102288. co-author Corey Broeckling.

A review article on the most recent advances in mass spectrometry-based computational metabolomics.



TEAM UPDATES



MEET BROOKE BERESFORD

Hi! My name is Brooke Beresford, and I'm a third-year undergraduate student here at CSU. I've worked as a marketing intern here at ARC for almost a year now. I have been working in tandem with Karolien Deneff to develop monthly newsletters, graphics, flyers, and other projects involving media communications. Although I am not a STEM student, I am passionate about the field and find the cutting-edge research and unique services we provide here at ARC fascinating and valuable. I love seeing how my work benefits the community and how I can continue to create designs that promote the services the ARC provides and inspire people to learn more. In addition to journalism and design, I am deeply passionate about environmentalism and how we can work to create a more sustainable future. I believe that what we do here at ARC is greatly beneficial not only for people at CSU but for creating a better future through learning for all.

WE ARE HIRING!



We are hoping to hire a Research Associate in the coming months to help with metabolomics and proteomics mass spectrometry sample preparation including the operation of the Labman Robot. If you have an interest in joining a highly supportive and collaborative team, looking to develop some valuable mass spectrometry skills and contribute to incredibly interesting and diverse metabolomics research, please consider applying!

<https://jobs.colostate.edu/postings/123372>



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VISION

We aim to foster a collaborative and inclusive learning and service environment where researchers can obtain valuable data and insights, driving scientific progress and new discoveries.

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