



# ANALYTICAL RESOURCES CORE

## COLORADO STATE UNIVERSITY

### ARC MONTHLY BULLETIN

#### JULY 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!

#### WHAT BRINGS YOU TO THE ARC?

We'd love to hear from you what brings you to the ARC. How do we best serve your specific needs and what can we do better?

[Post your comments on our board.](#)

This board is anonymous. All input is appreciated!



#### ARC TRIVIA

What is the most heavily used instrument in the ARC?

## DID YOU KNOW?

The ARC has a life sciences stockroom (LSS) where CSU researchers can purchase biological and molecular research products from over 15 vendors. Items include enzymes, molecular biology reagents, media, DNA/RNA isolation/clean-up kits, and many everyday consumables, such as gloves, tips, and tubes. Purchasing from the LSS provides similar or better pricing than ordering direct or via Kualii, especially for dry ice shipped items because you pay no shipping or hazard charges. Hundreds of products are at your fingertips. We can also special order items we don't stock from our 15 vendors. See our brochure and get more info at the website listed below.

**Contact:** Chrissy Battaglia at [arc\\_stockroom@colostate.edu](mailto:arc_stockroom@colostate.edu)  
Find our online catalog at [research.colostate.edu/bio/freezer-program](https://research.colostate.edu/bio/freezer-program)

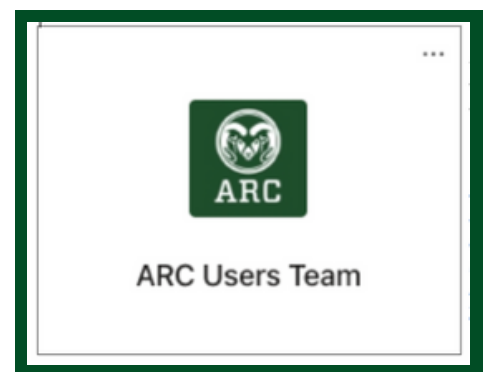
**Location:** Microbiology C115



## EQUIPMENT UPDATES

Instrument status information can be found on our visual Dashboard in Teams. If you have not joined our User Team yet and would wish to receive live updates on equipment status, you can request access [here](#)

For more information, please reach out to the ARC instrument managers, and they can add you to the relevant instrument chat groups.



## MPMS3 open again for independent self-use

Given the lowered restrictions around helium use, we have opened up self-use access to the MPMS3 since Friday, June 23rd. New protocols are in place and have been communicated to users by Dr. Indrani Bhowmick to minimize the chances of helium waste. We hope this will help accelerate your research and collaborations.



## Our road to upgrading the ARC

Lots of team effort this past year has gone to internal and federal grant proposals to upgrade critical equipment in the ARC through collaborations and wonderful support from CSU faculty. We are committed to continue this effort to remain a state of the art Core facility where CSU investigators can continue to obtain the highest quality data that will help advance their research programs.



Submitted an NIH-SIG S10 proposal together with Chemistry professor Andy McNally and collaborators for a new high throughput Bruker AvanceNEO 400MHz NMR with 60 slot sample changer and Heliosmart Recovery to add much needed capacity to the oversubscribed NMR spectrometers in the ARC. Anticipate more news early 2024.



NSF-MRI proposal for a new X-ray photoelectron spectrometer (XPS) received 'very good' to 'excellent' reviews but unfortunately did not get funded. Together with Drs. Herrera-Alonso and Prieto, we plan to resubmit an even stronger proposal in the next round and will call on users for additional input.



NSF-MRI proposal for a new 600 MHz NMR with advanced liquids and solids state capabilities received great reviews especially around the broad scientific merit, but unfortunately did not get funded. Together with Prof. Levinger and Zadrozny, we are exploring a possible resubmission in the next round and may call on faculty for additional input.

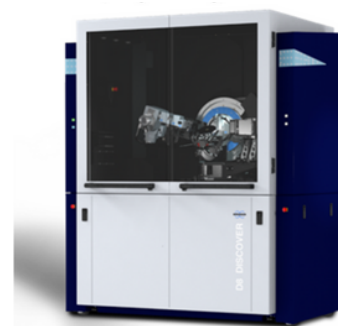




We are making good progress on bringing a new scanning electron microscope (SEM) to the ARC and CSU. This would be a state-of-the-art SEM with high resolution in-lens imaging detectors, variable pressure capability, and state-of-the-art analytical detectors catered to the evolving needs of a diverse user community especially those in materials science and engineering, geosciences, biological sciences, but also agricultural and ecosystem sciences and veterinary medicine.



A proposal will be submitted to the next round of NSF-MRI for a new state-of-the-art Bruker AXS D8/Discover diffractometer for both powder and thin film analysis to replace our 25-y old thin film XRD and offer more advanced technology to investigate the structural and chemical properties of a wide range of materials.



A proposal will be submitted to the next OVPR quarterly strategic investment call to upgrade our 43-y old carbon coater. Carbon coating is critical when preparing non-conducting samples (polymers, ceramics, geological samples, biological tissues) for electron microscopy imaging, to avoid charge build-up which can both corrupt image quality and damage the sample.



A proposal will be submitted to NSF-MRI track 3 to expand our helium recovery and reliquification capacity by adding another Quantum Design helium liquefier as well as a Bruker Heliosmart Recovery system to collect helium gas boil-off from NMR magnets in the Chemistry Research Building, which are currently not hooked up to our recovery system in the main Chemistry building. Another step towards becoming less dependent on this scarce resource.



# SUNSETTING PLANS

With upgrading also comes a time for sunsetting. The ARC will be sunsetting some older chromatography equipment and mass spectrometers we no longer have a need for as they have been recently replaced by more advanced and newer models or underutilized due to better alternatives. The following are items that are still in good condition and we hope to find a buyer for. Please reach out to [Claudia.Boot@colostate.edu](mailto:Claudia.Boot@colostate.edu) if you have an interest in any of the following items:

- **Waters Acquity H-class UPLC with Xevo TQD triple quad mass spectrometer.** Mass Lynx/Target Lynx software. Used for small molecule targeted quantitative assays. Purchased new in 2018.

*Underutilized and moving services over to more sensitive Xevo TQS triple quad.*



- **Waters Acquity UPLC-PDA.** Used for LC chromatography with photodiode array detection. Waters Empower software. Donated used in 2018.

*Underutilized and moving services over to a second LC-PDA system in the ARC.*



- **Bruker MALDI Microflex LRF TOF mass spectrometer.** FlexAnalysis and Compass MBT (for biotyper) software. Used for microbial biotyping. Purchased new in 2015.

*Recently replaced by higher resolution Bruker Ultraflextreme MALDI TOF/TOF.*

- **Agilent 5973N GCMS.** Chemstation software and LN2 oven cooling accessory. Comes with Wiley MS spectral database. Used for small molecule volatile analysis. Purchased new in 2001. Windows XP.

*Underutilized and moving services over to newer Thermo GCMS systems in the ARC.*



**JULY**  
**26**

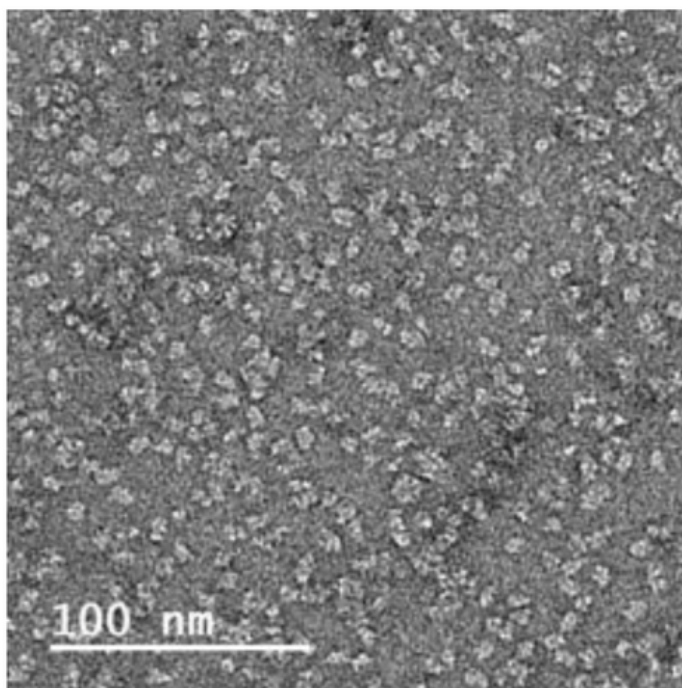
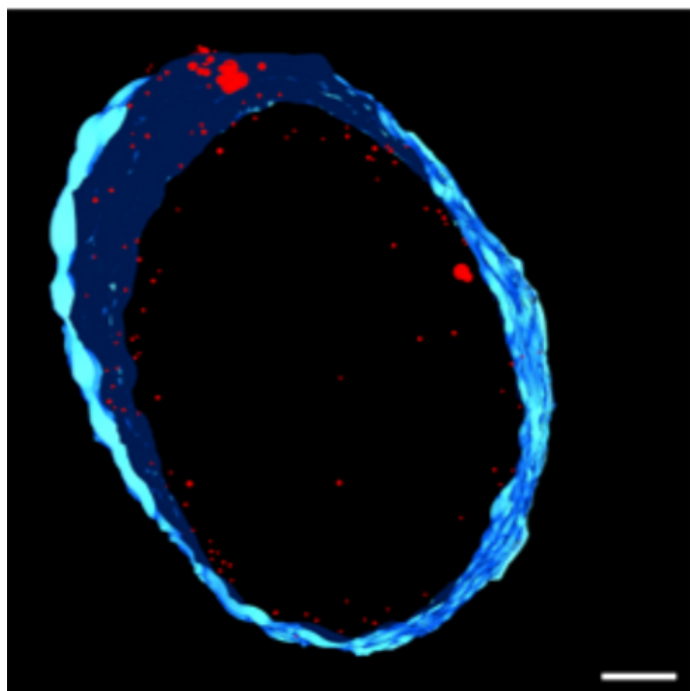
## **Biological Electron Microscopy in the ARC.**

Bradley Guilliams, PhD Candidate Ackerson Lab & ARC-ISS GRA.

Come hear about new capabilities within the ARC for preparing and imaging biological samples. Topics will include principles of biological electron microscopy, staining, single particle analysis, ultramicrotomy, and electron tomography.

**Register at:**

**<https://www.research.colostate.edu/arc/arc-seminar-series/>**



**JULY**  
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## **LSS Stockroom vendor showcase - 11am-1pm. Microbiology C116.**

Vendors include Light labs, Gold Biotechnology, USA Scientific, Zymo, and NEB.

Refreshments will be served and representatives will be available with swag and technical information.

## GOODBYE, BRIAN!



We are sad to announce that Brian Newell will be leaving ARC for a new position at Idaho National Laboratory. His last day at the ARC is July 14. He has been an integral component of the ARC (and CIF) family since 2011, serving X-ray diffraction and scattering and a suite of materials analysis applications. He is known at CSU and in the region for his expertise in small molecule X-ray crystallography. Brian has been an incredible resource and collaborator to hundreds of students and faculty and a wonderful colleague to all of us in ARC.

His departure will be felt by many. Brian, from all of us in the ARC: It's been an absolute pleasure working with you, and we wish you all the best in this next exciting chapter!

## WELCOME, DORA!

Hi everyone, my name is Doratheia, but you're welcome to call me Dora (like The Explorer). I am a Biochemist, BSc from the University of South Carolina. During my undergrad, I was involved in natural products research studying anti-inflammatory properties of various molecules produced in the gut microbiome. I worked primarily with HPLC and mass spectrometry, so I was thrilled to find this position! My senior thesis utilized a custom Python program for mass data analysis with the goal of understanding diversity in student perspectives across different fields of study. In my free time, I enjoy kayaking, basketball, and crochet! I am very excited to join ARC to expand my knowledge of proteomics, bioinformatics tools, and the wonders of mass spectrometry!



# THANK YOU FOR USING OUR RRID!

Rom CL, Smaha RW, Knebel CA, Heinselman KN, Neilson JR, Bauers SR, Zakutayev A. Bulk and film synthesis pathways to ternary magnesium tungsten nitrides. arXiv preprint arXiv:2306.02233. 2023 Jun 4.

<https://arxiv.org/abs/2306.02233>

Kale AR, Bullett WE, Prieto AL. Controlling Phase Conversion of Cu-Sb-Se Nanoparticles through the Use of an Amide Base. Nano Letters. 2023 Jun 13.

[https://pubs.acs.org/doi/full/10.1021/acs.nanolett.3c00506?](https://pubs.acs.org/doi/full/10.1021/acs.nanolett.3c00506?casa_token=0vzHz_prEnUAAAAA%3A2ySlzY8Nip0PW01txSmHPgalVFwVAhF82OySp8sMndiDBJwSLON6PxvTGZzD3EPEay0gG9BZ-Ba_2g_)

[casa\\_token=0vzHz\\_prEnUAAAAA%3A2ySlzY8Nip0PW01txSmHPgalVFwVAhF82OySp8sMndiDBJwSLON6PxvTGZzD3EPEay0gG9BZ-Ba\\_2g\\_](https://pubs.acs.org/doi/full/10.1021/acs.nanolett.3c00506?casa_token=0vzHz_prEnUAAAAA%3A2ySlzY8Nip0PW01txSmHPgalVFwVAhF82OySp8sMndiDBJwSLON6PxvTGZzD3EPEay0gG9BZ-Ba_2g_)

Bhattacharjee A, Goodall E, Popat KC, Zou L, Li YV. Selective detection of Gram-negative bacteria and antibacterial properties of colorimetric polydiacetylene nanofibers. Journal of Materials Science. 2023 May 12:1-3.

<https://link.springer.com/article/10.1007/s10853-023-08550-z>

Zhai C, Lonergan SM, Huff-Lonergan EJ, Johnson LG, Brown K, Prenni JE, N Nair M. Lipid Peroxidation Products Influence Calpain-1 Functionality In Vitro by Covalent Binding. Journal of Agricultural and Food Chemistry. 2023 May 11.

[https://pubs.acs.org/doi/full/10.1021/acs.jafc.3c01225?](https://pubs.acs.org/doi/full/10.1021/acs.jafc.3c01225?casa_token=BQ9nS4T_XzgAAAAA%3A2ySlzY8Nip0PW01txSmHPgalVFwVAhF82OySp8sMndiDBJwSLON6PxvTGZzD3EPEay0gG9BZ-Ba_2g_)

[casa\\_token=BQ9nS4T\\_XzgAAAAA%3A2ySlzY8Nip0PW01txSmHPgalVFwVAhF82OySp8sMndiDBJwSLON6PxvTGZzD3EPEay0gG9BZ-Ba\\_2g\\_](https://pubs.acs.org/doi/full/10.1021/acs.jafc.3c01225?casa_token=BQ9nS4T_XzgAAAAA%3A2ySlzY8Nip0PW01txSmHPgalVFwVAhF82OySp8sMndiDBJwSLON6PxvTGZzD3EPEay0gG9BZ-Ba_2g_)

Bhattacharjee A, Goodall E, Pereira BL, Soares P, Popat KC. Zinc (Zn) Doping by Hydrothermal and Alkaline Heat-Treatment Methods on Titania Nanotube Arrays for Enhanced Antibacterial Activity. Nanomaterials. 2023 May 10;13(10):1606.

<https://www.mdpi.com/2079-4991/13/10/1606>

## Using the ARC?

Please cite or acknowledge us by our Research Resource ID

**RRID: SCR\_021758**

in publications that include any data generated in or by our facility