

# SANS Sample Environment – Suite Review

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# Sample Environment Organizational Changes

37 Staff, 22 joined Sample Environment in last 5 years

## 6 Groups

Labs and Soft Matter

Low Temperature and Magnets at HFIR & SNS

High Pressure

Automation

High Temperature

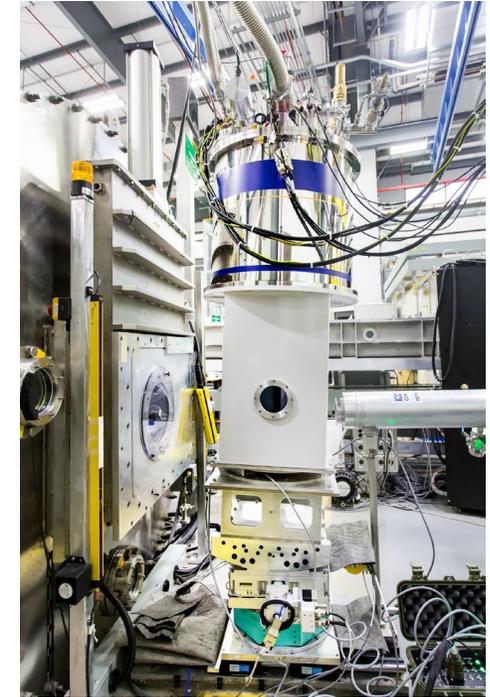
# General Equipment

- Peltier's
  - QNW 3x2, 1x8, 1x1
- Tumblers
- Humidity
  - RH generators
- Furnaces
  - Atmosphere furnace
  - ILL Furnace
  - Linkham Stage (1000C)



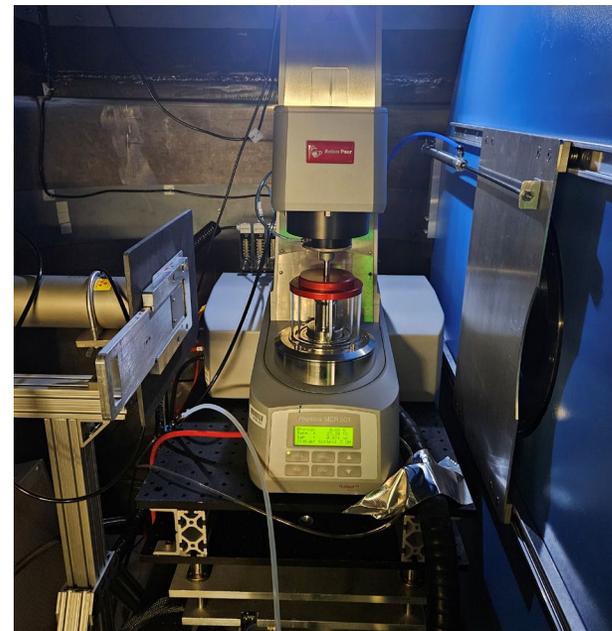
# Low Temperature

- Mag H
  - 5T horizontal field
  - 5K min Temp
- Mag G
  - 11T field
  - 0.05K mi Temp with dilution refrigerator
- Cold Multichanger
  - Cryostat
  - Cascading Peltier (-40C)

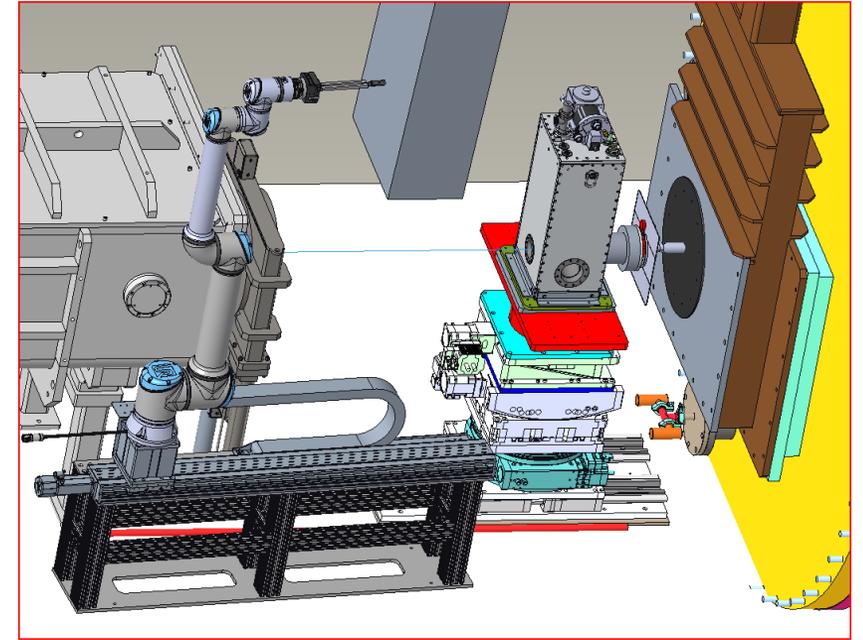
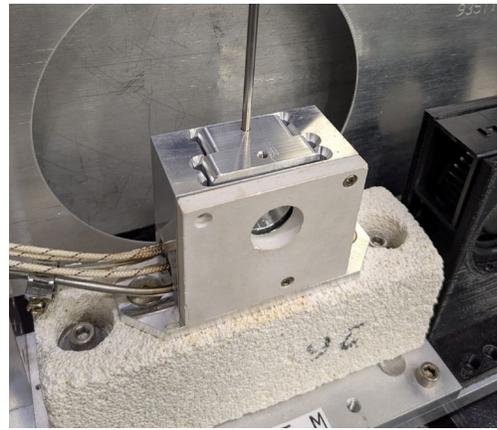


# Rheology

- SANS & USANS
  - 702e space
  - Improved controls
  - LAOS
- Multi-source Water Bath
  - Quenching



# Automation



## GP

- 42 samples
- Nonmagnetic gripper for handling highly radioactive samples in high field magnet
- Manipulating sample in beam (magnet)
- 300°C Sample stage and standby storage

## EQ

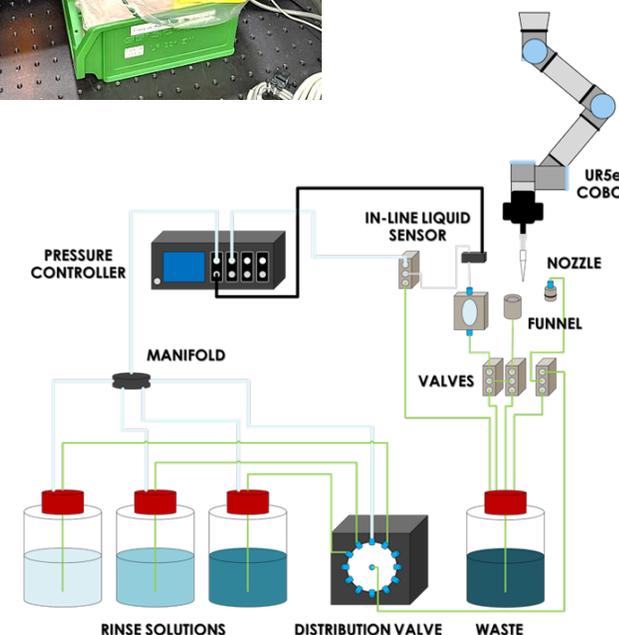
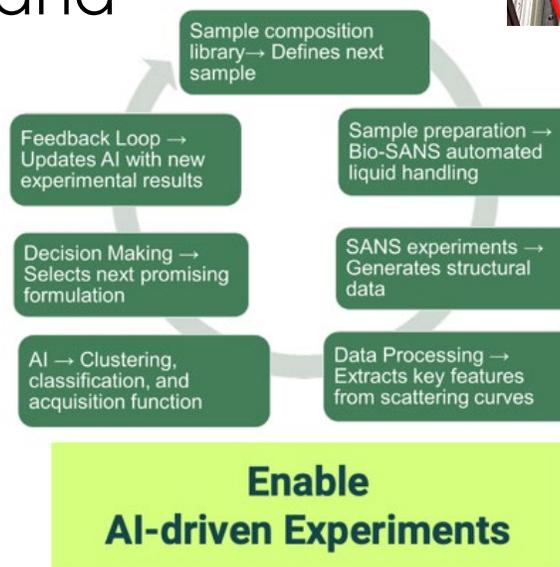
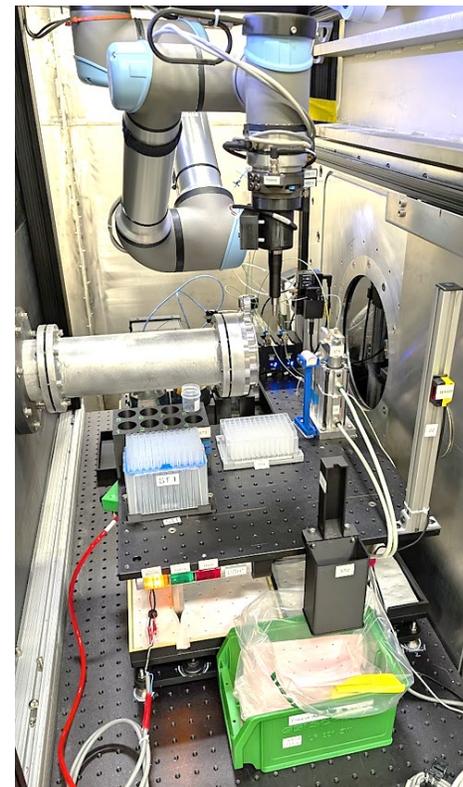
- 42 position sample pallet
- Compatible with Banjo or Titanium Cells
- Peltier sample holder -5°C to ~100°C
- Resistance heater RT to 300°C



# Automation

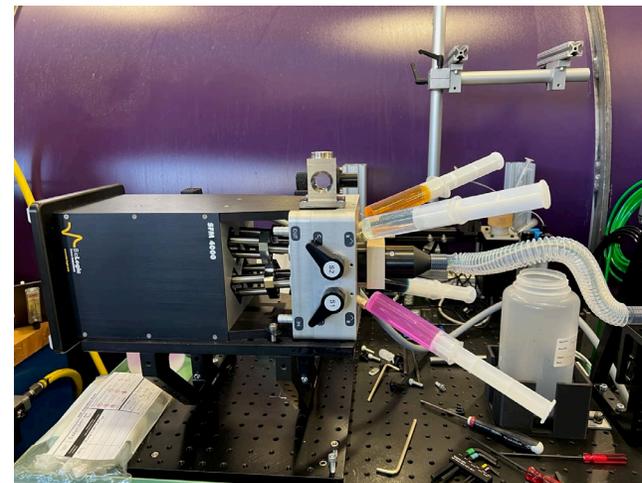
## Bio

- 96 cell sample changer
- Developing with multiple stages
- Robotic liquid handling air-displacement pipette
- PEEK-based sample delivery and actuator arm
- Inline sensing for sample transfer and cleaning
- Modular sample deck
  - pipette tips,
  - stock solutions
- AI development
  - NIST, UCONN



# Flow Cells

- Size Exclusion Chromatography
  - Auto Sampler
  - Akta Pure HPLC/Inline Columns
  - Inline UV characterization
- Stop-Flow
  - Bio-logic 4 syringe system
  - Cylindrical cell
  - NIST



# Tensile Stage/Mechanical Load Frame



## PsyloTech

### Tensile Stage

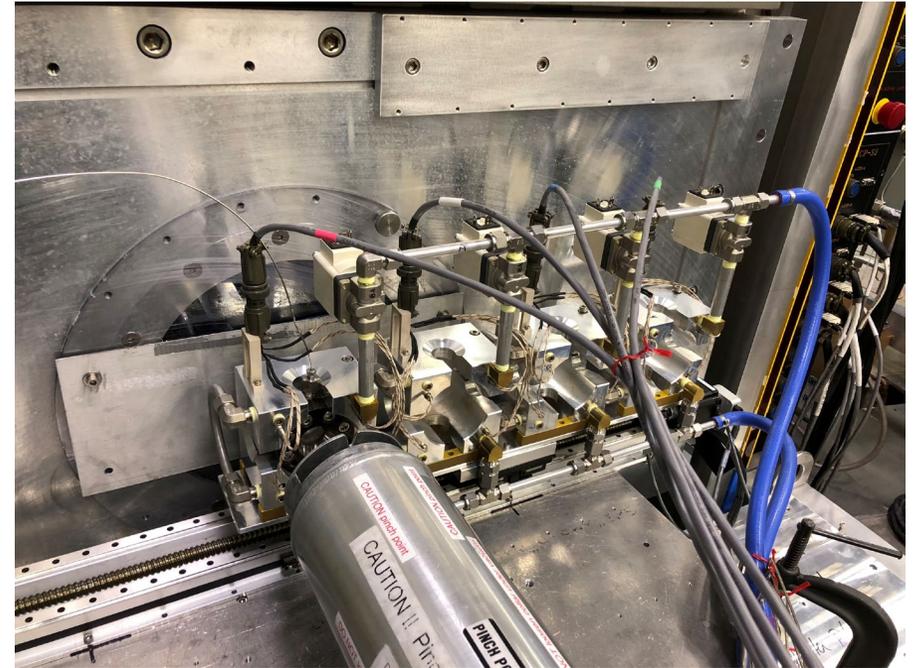
- EQ-SANS
- Designed for soft materials
- Temperature controlled

### Load Frame

- MARS and GP-SANS
- Designed for hard materials
- 20kN capacity
- Investigating induction heating option.

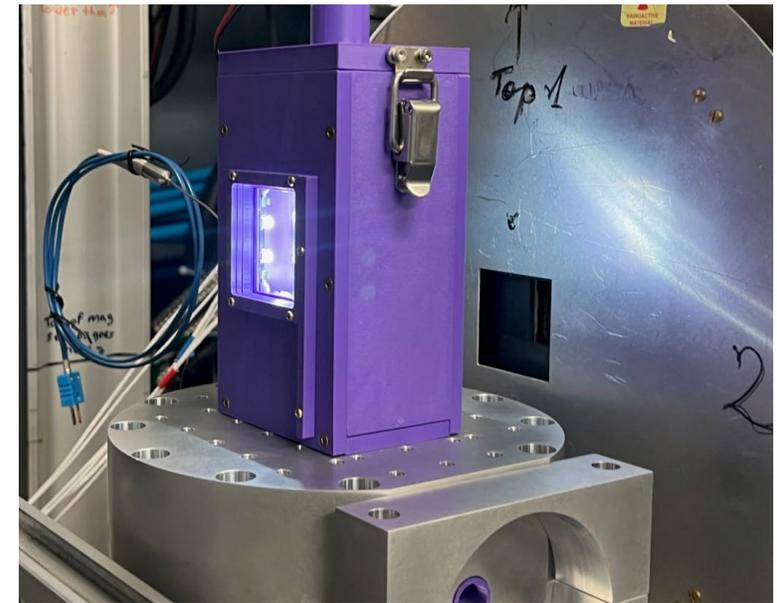
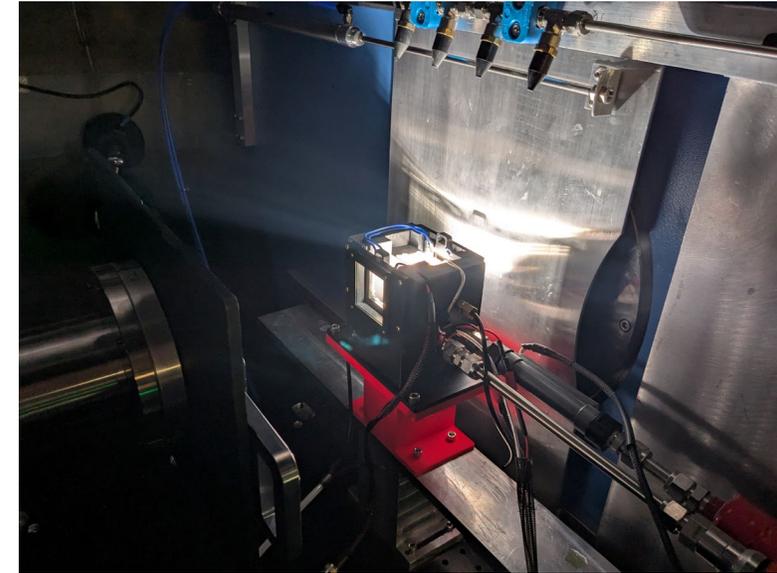
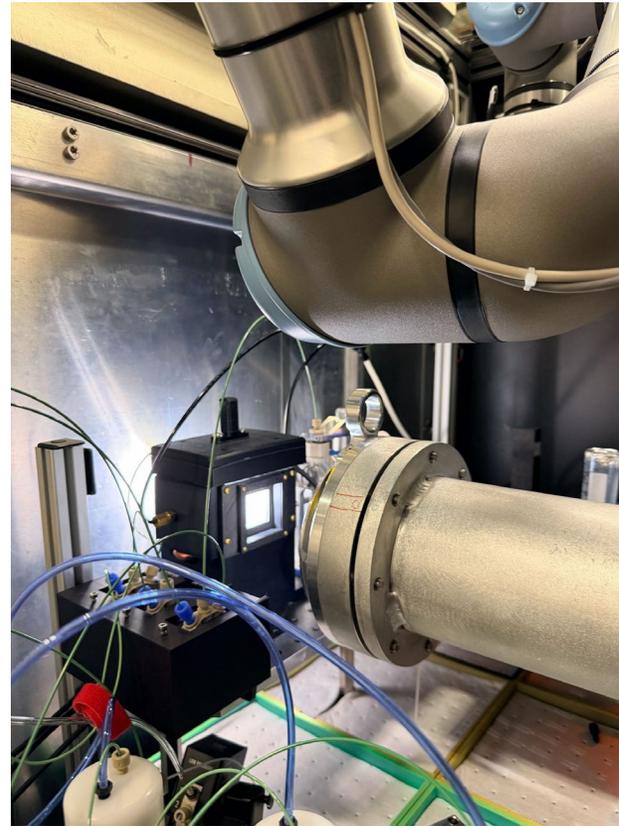
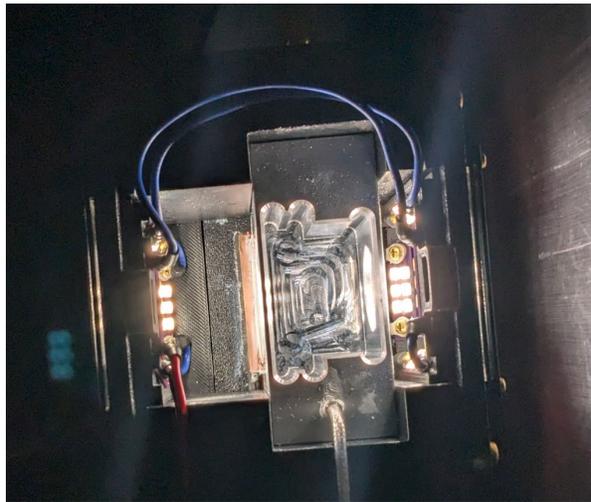
# Pressure and Gas

- Extended Angle Pressure
  - 1 kBar, 200C
  - Reaction Cell
  - Use with Teledyne pumps
- SANS gas load/flow
  - Tri-Teledyne pump
  - NIST
- Dome Cell
  - 1 kBar



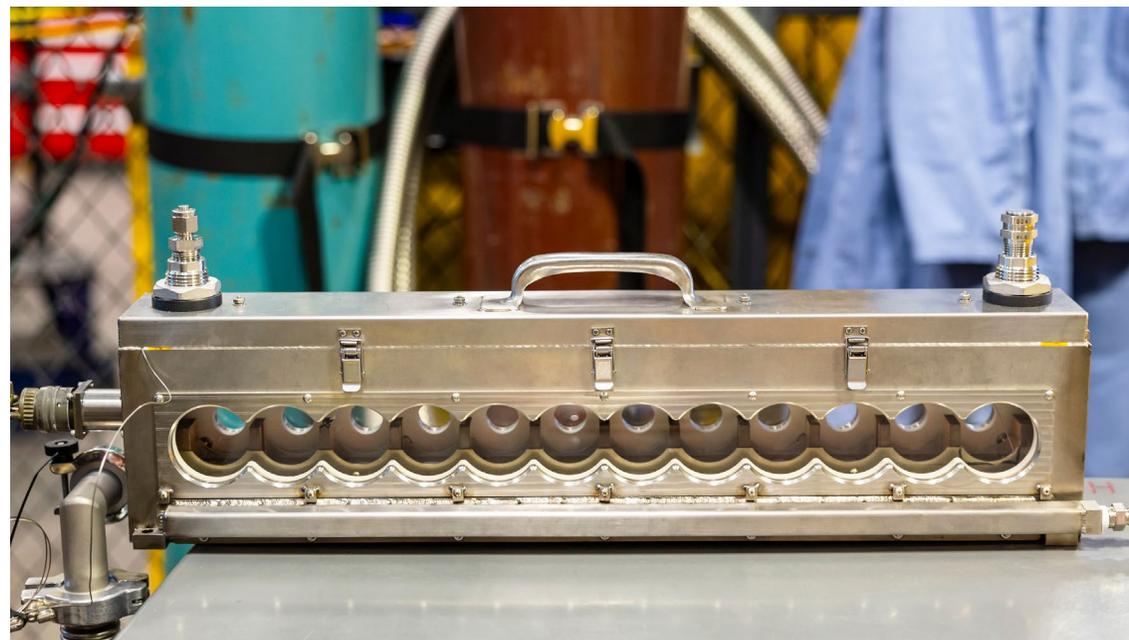
# Illumination Cells

- BioSANS, EQ-SANS, Neutron Spin Echo
  - UV and white light
  - Interchangeable lights
    - Multi wavelength
  - Adjustable power



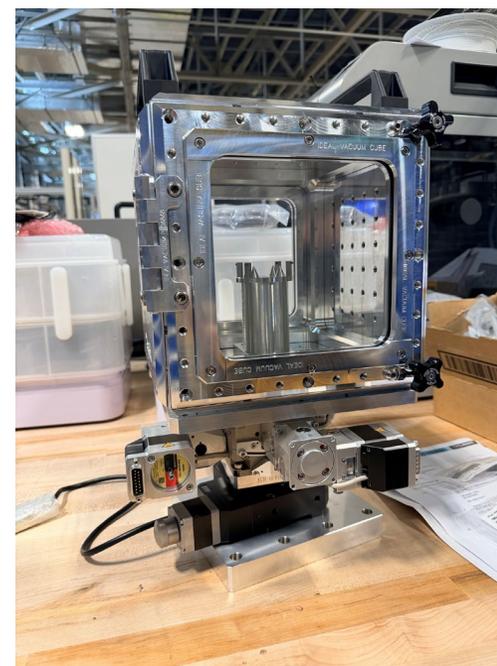
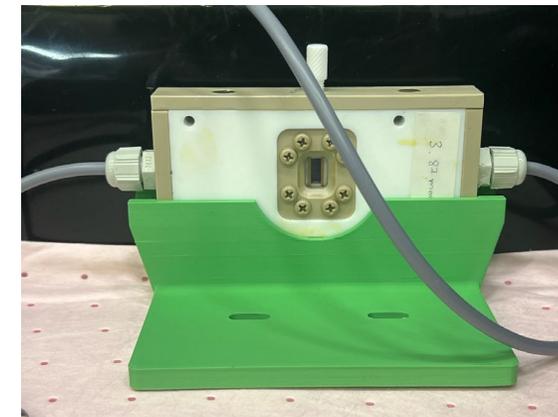
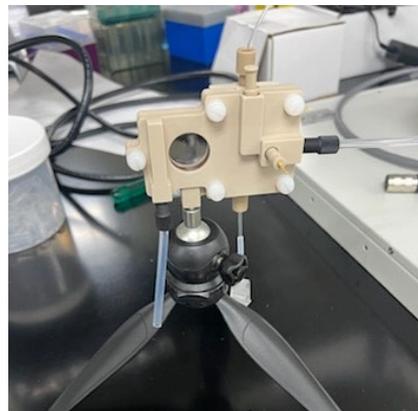
# Linear Sample Changer Furnace Development

- EQ-SANS
- 12 sample positions
- Max temperature 330C
- Active air cooling
- Accommodates multiple types of cells



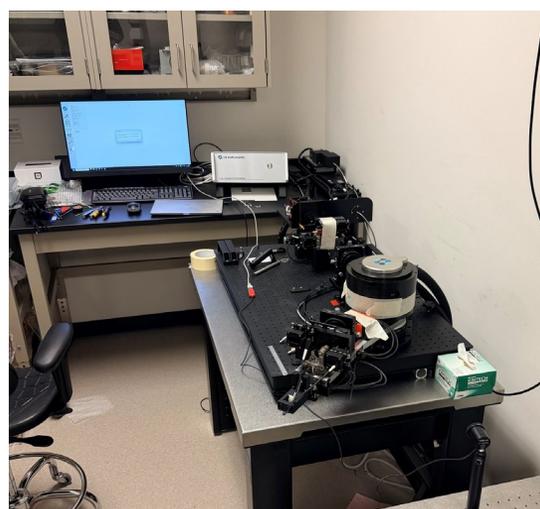
# Developments

- SANS Electrochemistry Cells
  - Flow with peristaltic pump
  - 3 chamber system w/electrodes
  - Ionic conduction
- SANS Broadband Dielectric Spectroscopy
  - Charge carrier dynamics
- Grazing Incidence
  - Gas and humidity control
  - Surface structures
- Dynamic Light Scattering



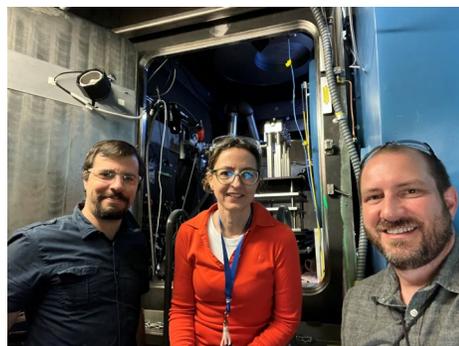
# Lab Spaces

- SLS/DLS
- Banjo Cell Cleaner
  - Automated clean/dry
  - 84 cells
- BioSAXS
- Rheo-SAXS
- Confocal Microscope



# NIST-ORNL Integrated Sample Environments

- Rheology (LAOS)
- Stop flow
- Autosampler/Pipette/AI (AFL)
- Pressure and temperature
- Gas Load/Flow



Build basics and community, further science capabilities

# Thank You

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