

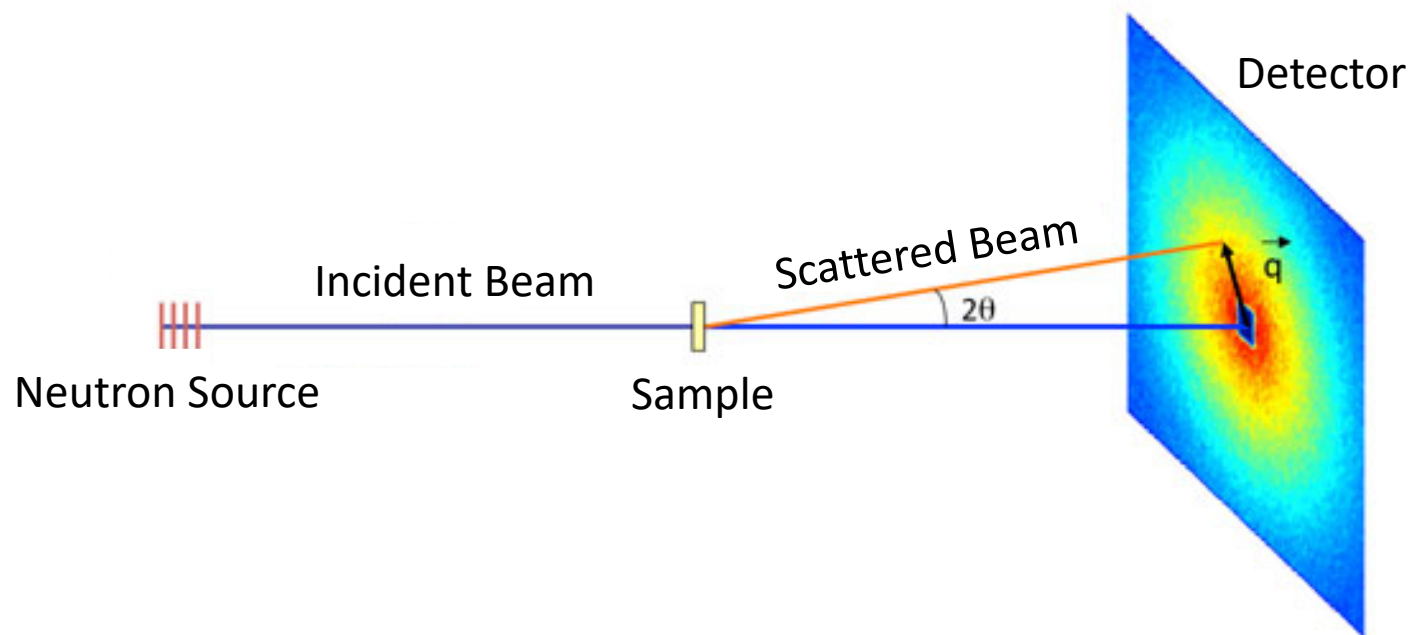
Automation of a Slit-Rheometer for SANS

Derek Nie, Thomas S. Wootton High School, Class of 2019

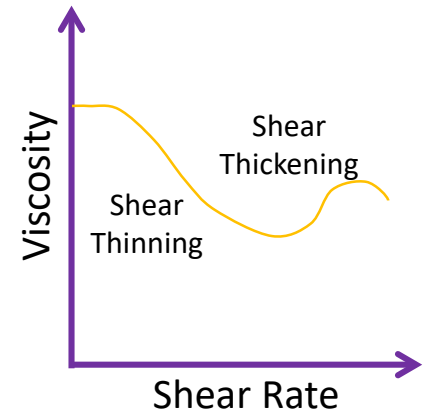
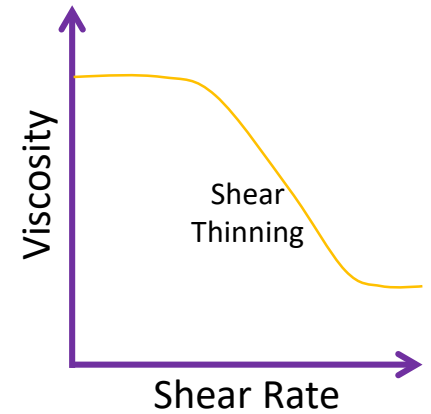
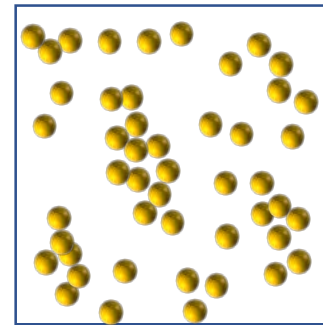
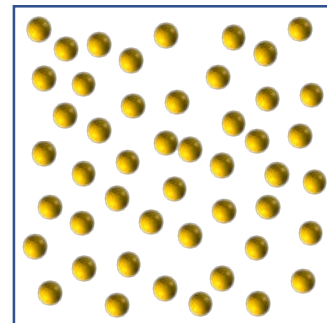
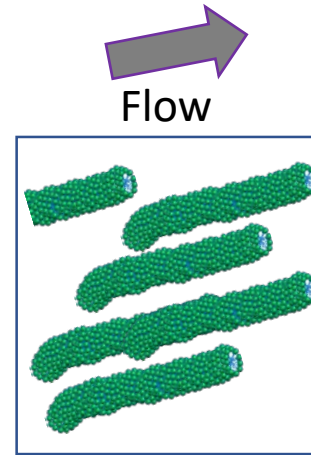
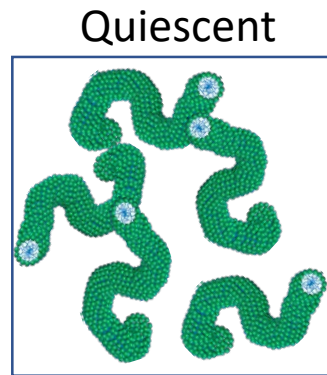
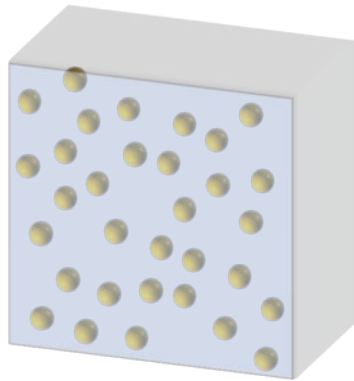
Mentors: Katie Weigandt, Jeffery Krzywon, Javen Weston



Small Angle Neutron Scattering (SANS)



Flow and Complex Fluids

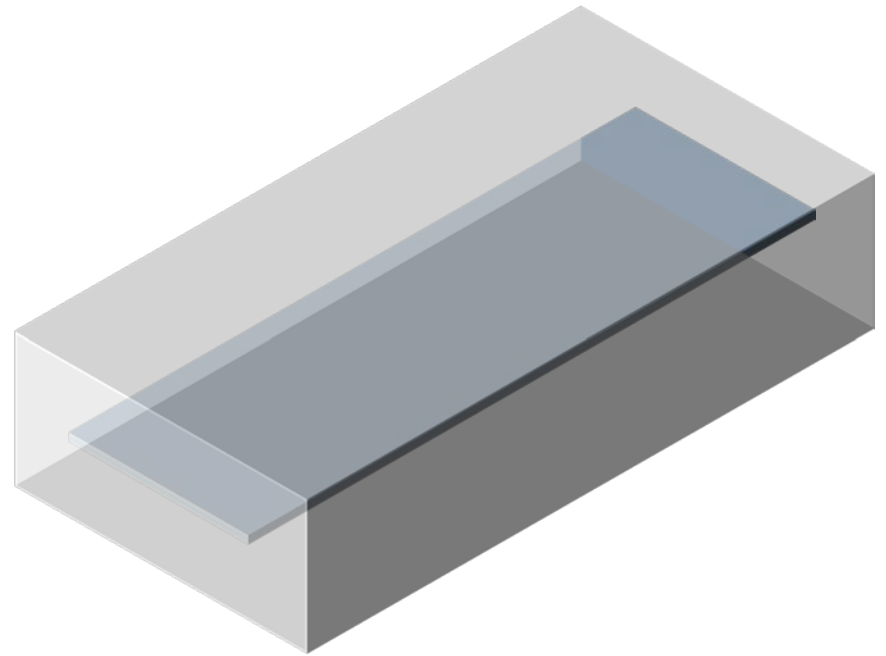




Rotating Cylinder Rheometer

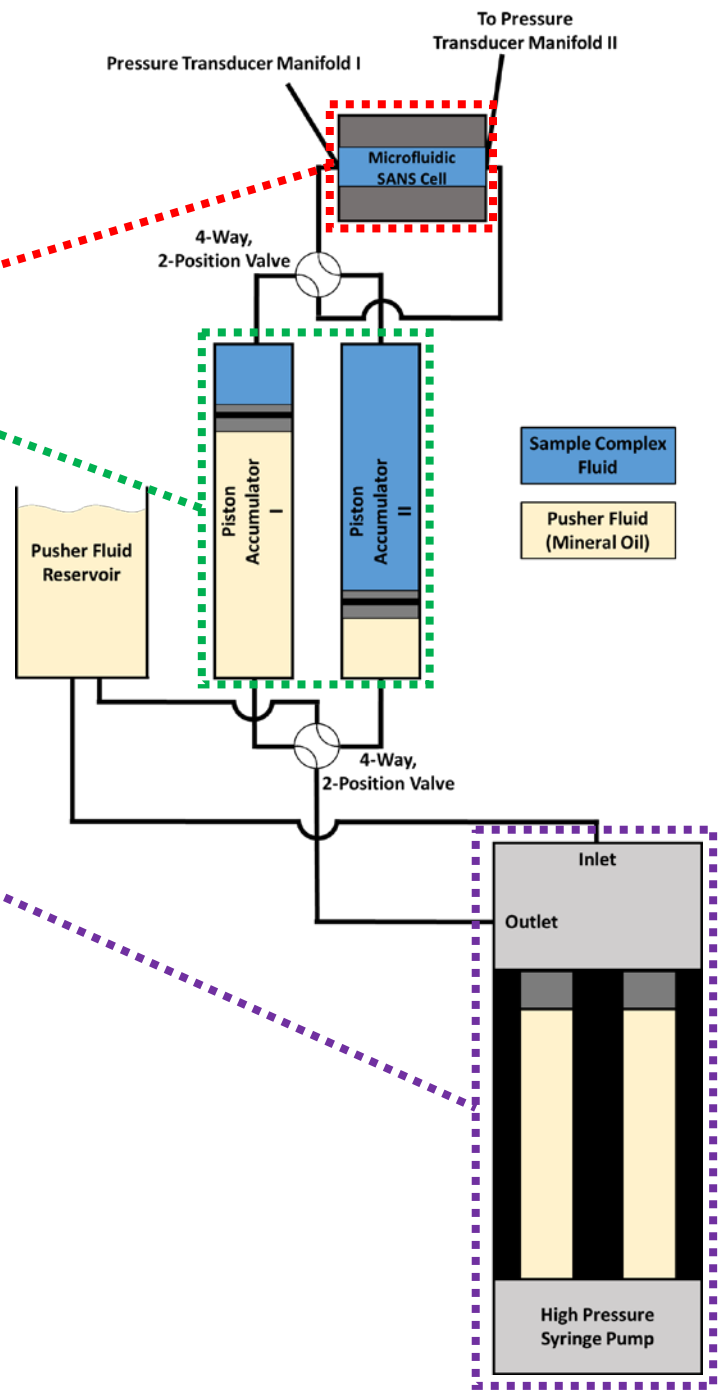
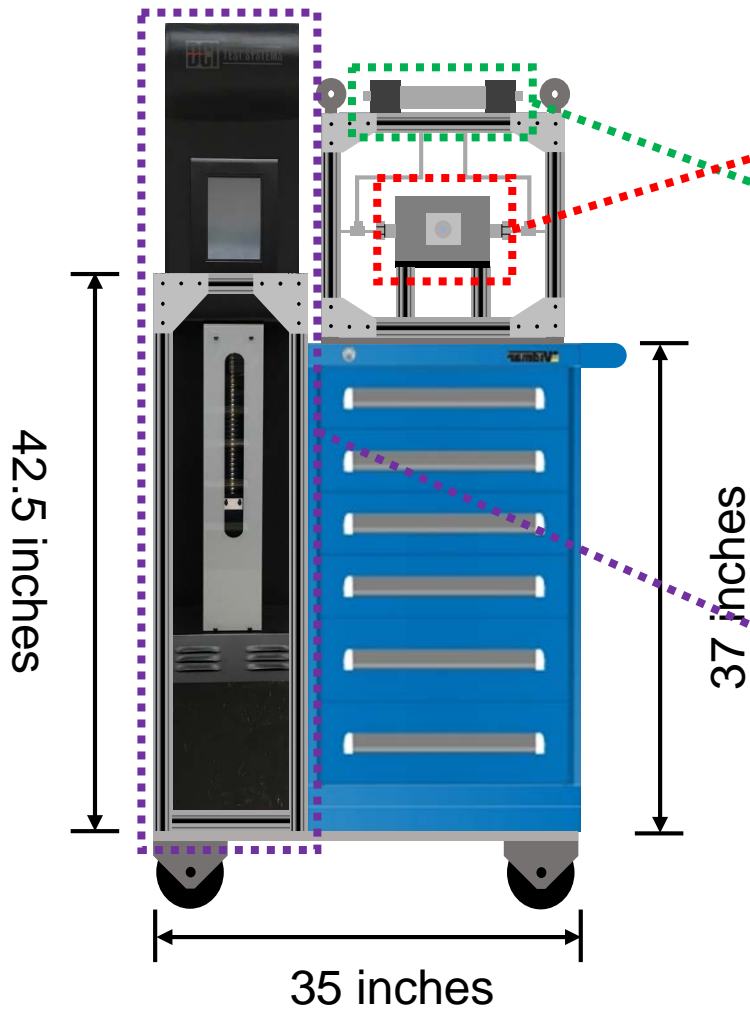


Microfluidic Slit Rheometer



https://www.valleyvet.com/ct_detail.html?pgguid=e50f088f-f794-4a52-970b-d0676b9d3037

<https://stock.adobe.com/search?k=spray>



FLOW MODE

Current Values

Current Pressure **-0** psi

Current Flow Rate **0** ml/min

Total Vol Pumped **65.34** ml

MOVE TO
BOTTOM

START
CONTROL

Flow Settings

Flow Rate **250.0** ml/min

Volume to Pump **215** ml

Ready to start flow control.

PRE-
PRESS

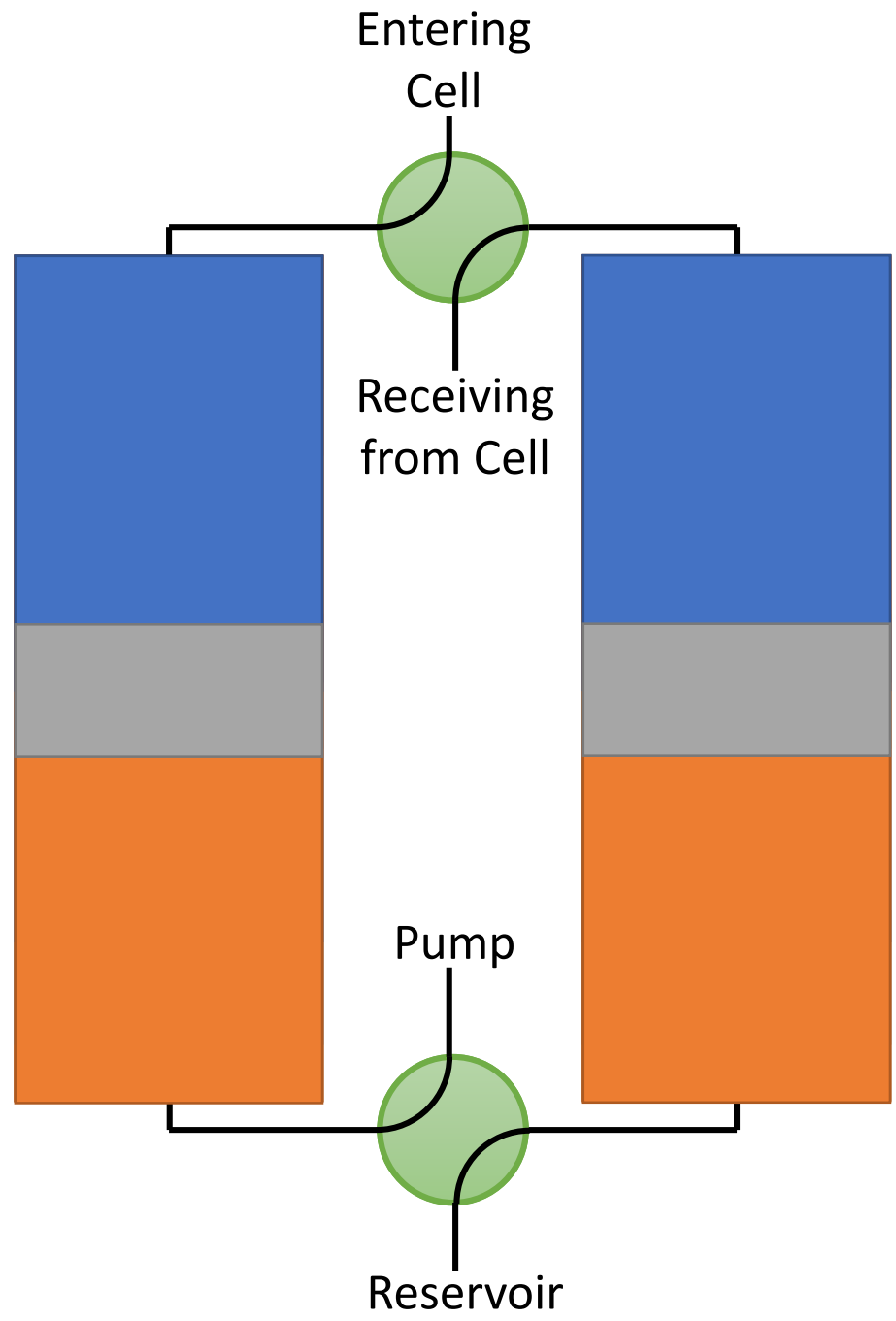
SET
LIMITS

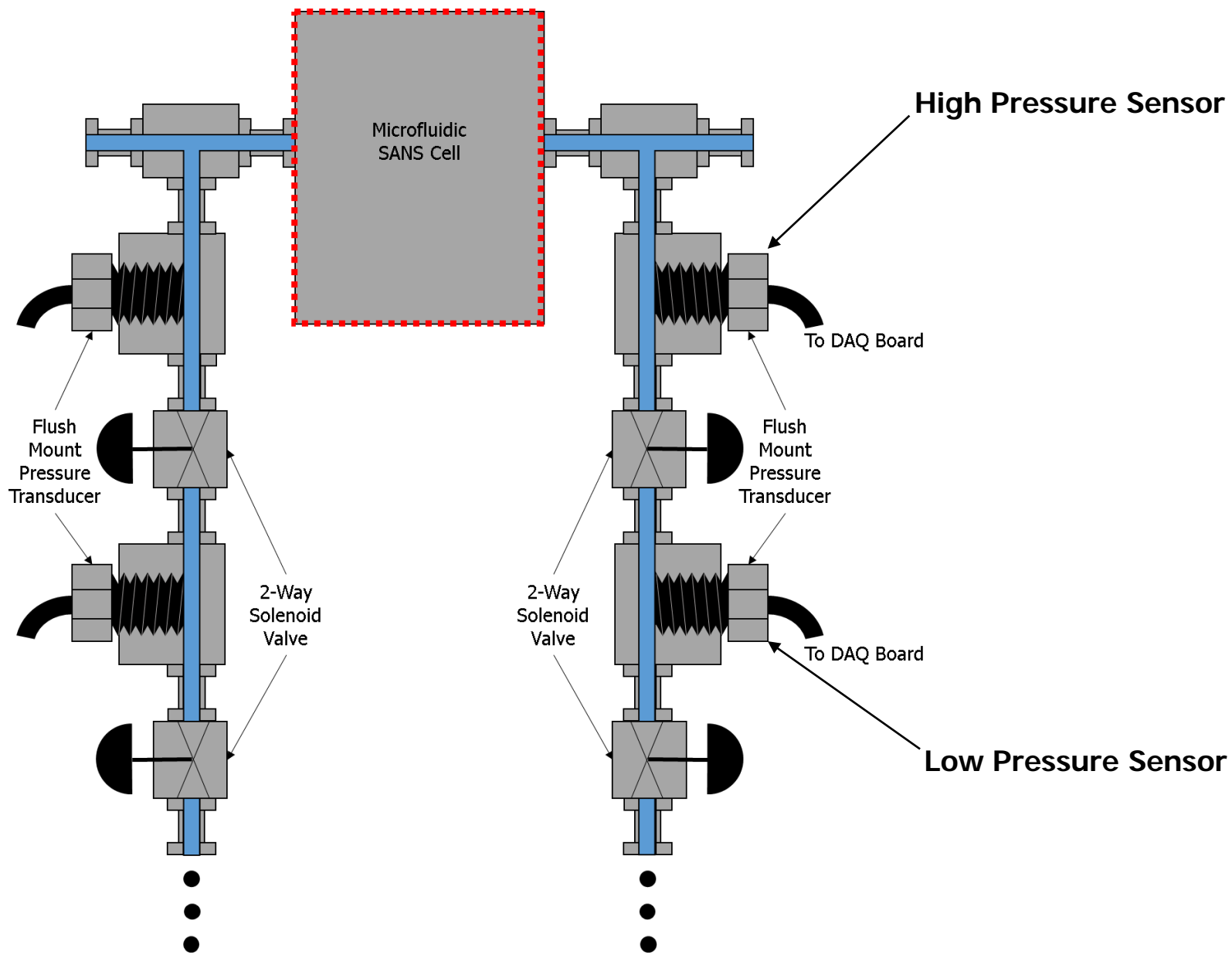
ZERO P
XDCRS

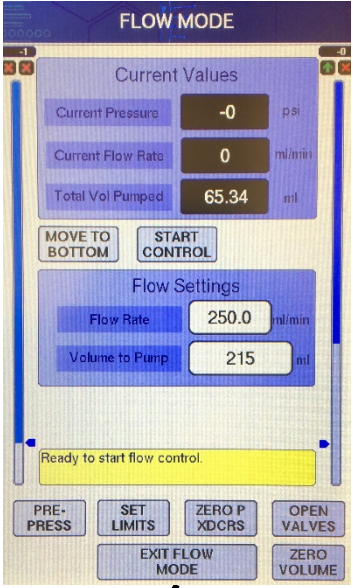
OPEN
VALVES

EXIT FLOW
MODE

ZERO
VOLUME







pymodbus

PyDAQmx

gclib



Slit-Rheometer



File Edit Parameters Help

Slit-Rheometer

Start Pump

Stop Pump

Zero Volume Dispensed

Input a Flow Rate (mL/min)

Input a Working Volume (mL)

0.0

Set Flow Rate

0.0

Set Working Volume

Current Flow Rate (mL/min)

Current Target Volume (mL)

Current Volume Dispensed (mL)

Retrieve

Retrieve

Input a Valve Number

0

Rotate Valve



Conclusion

- ✓ Communication with pump, valves, and pressure sensors
- ✓ Utilizing volume dispensed data to turn valves
- Utilizing pressure values to turn valves
- GitHub: <https://git.ncnr.nist.gov/jkrzywon/microrheosans>



Acknowledgements

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