ePIC pfRICH Aerogel QA Progress Report

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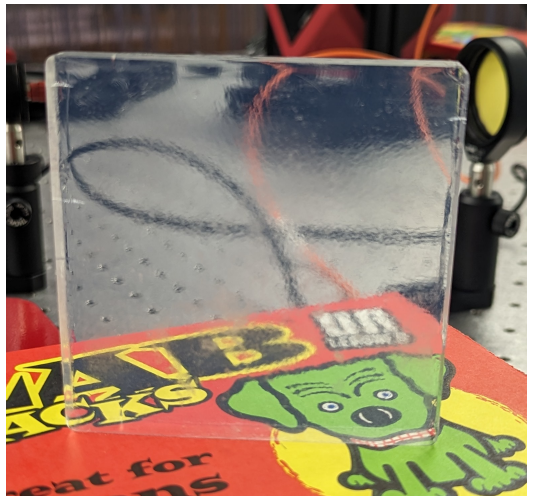
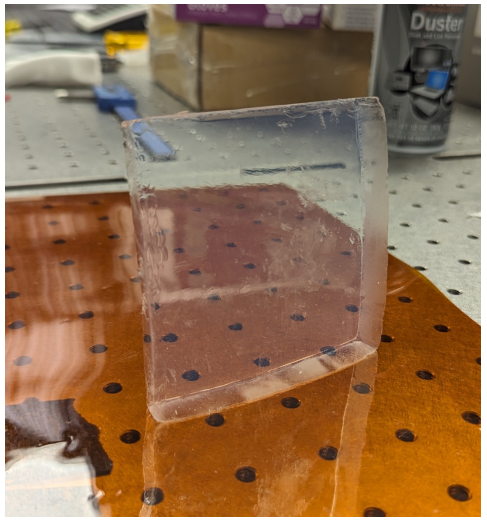
Aerogel Visual Assessment

- Received first two aerogel tiles
  - 0-A and 0-B (0 = batch, letter = ID)
  - Tiles are 9 cm x 9 cm x 1 cm
  - Tiles show clear curving, with 0-B deviating the most from a flat tile
  - Edges are not smooth
- Weights (P = 1025.1 hPa, T = 21.7 C, RH = 30.5%)
  - 0-A = 16.0418 g
  - 0-B = 16.0930 g

0-A

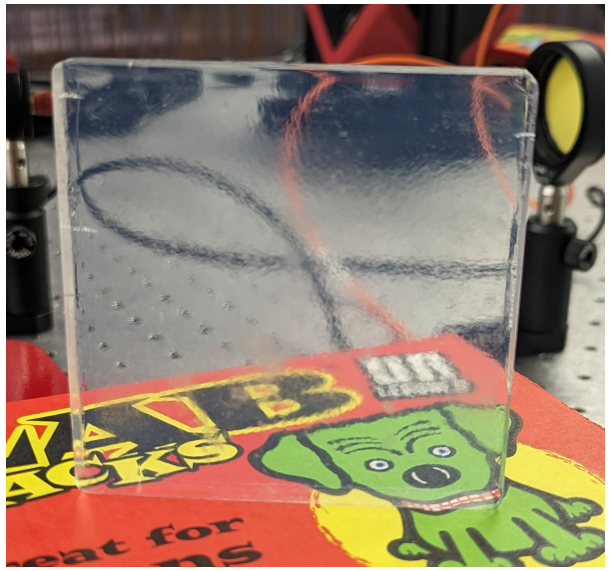


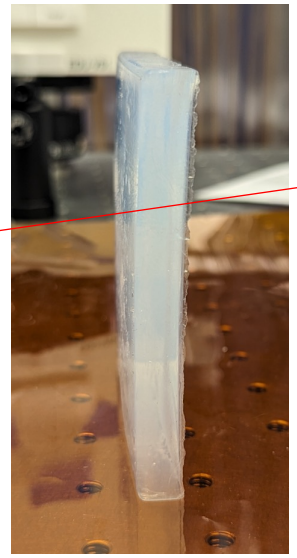
0-B



Aerogel Visual Assessment

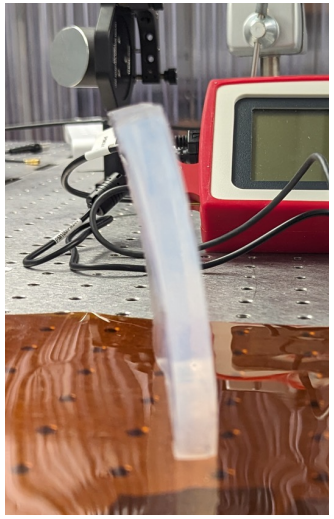
0-A

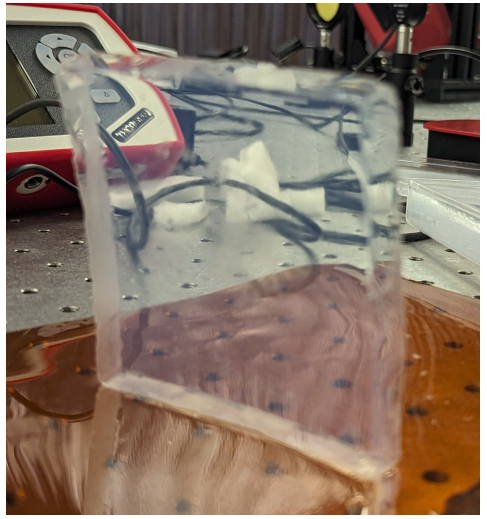




Some rough areas on aerogel

Is there a way to clean the aerogel?



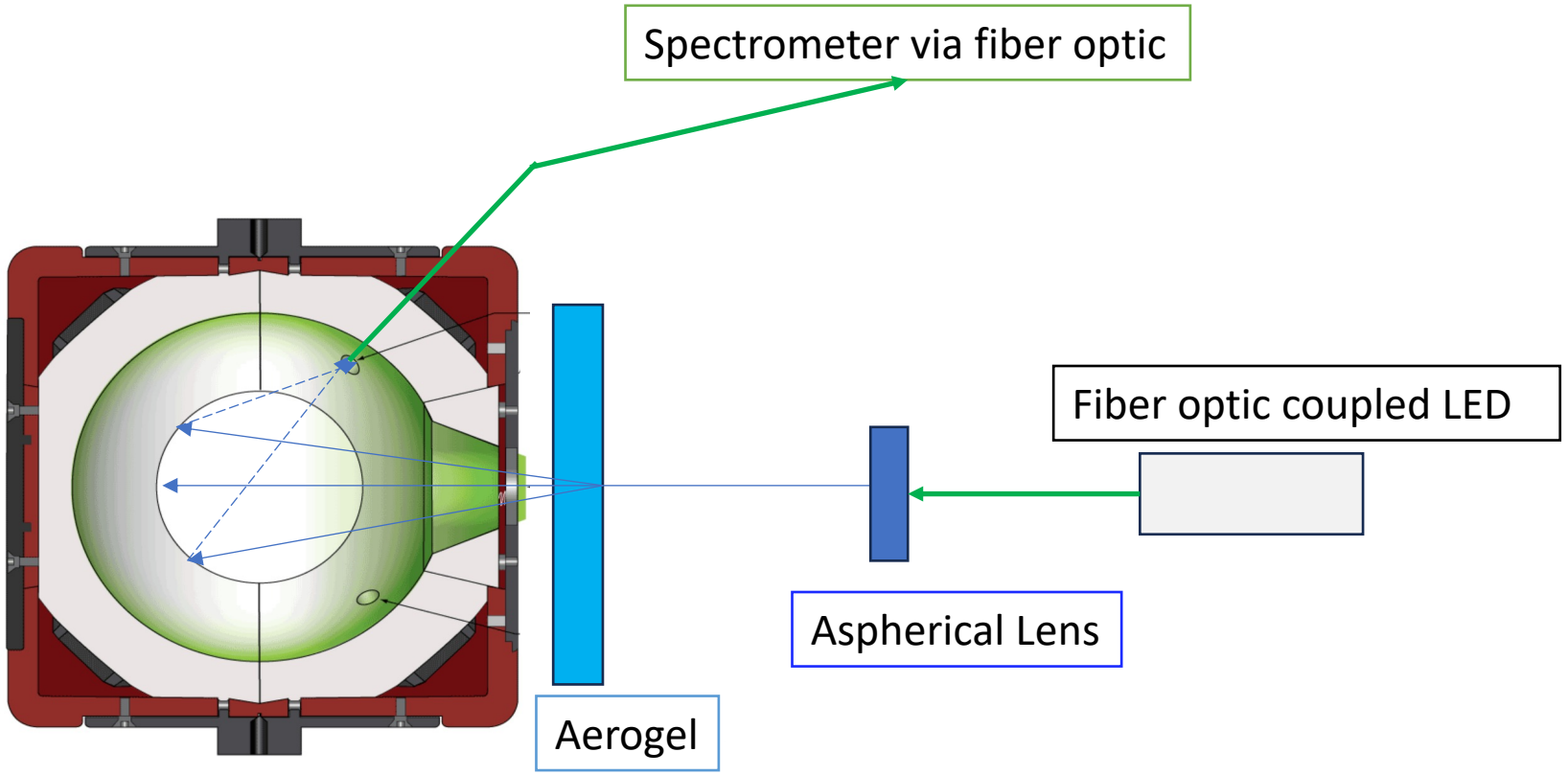


0-B

Transmission Measurement Configurations

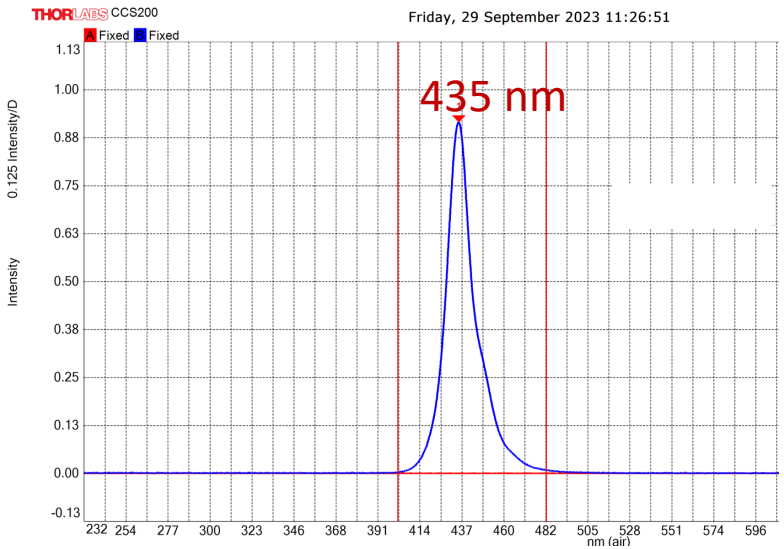
❑ Total Transmission

- Reference measurement: No aerogel present, but LED on
- Background measurement: No aerogel or LED light present



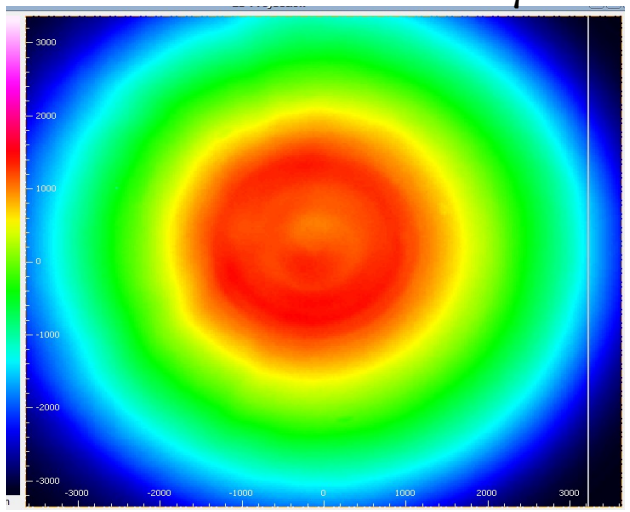
Transmission Setup: LED Source and Optics

LED Properties



LED @ 100 mA

Beam diameter = 6675 μm

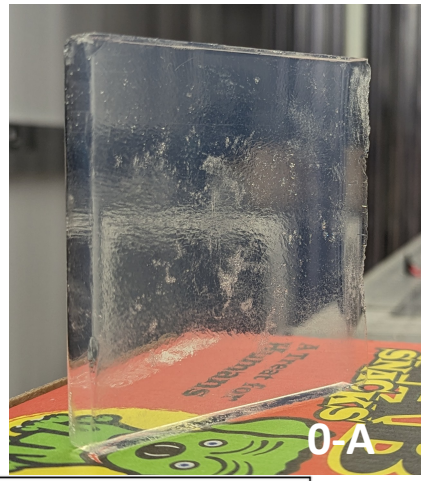


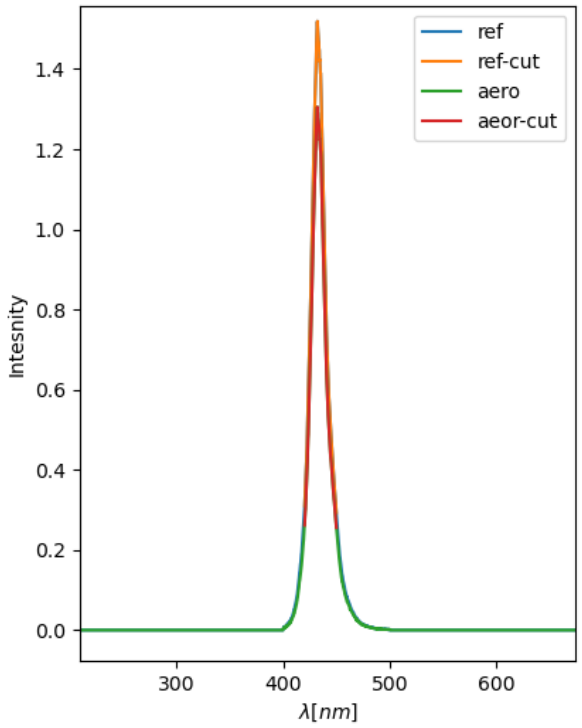
Transmission setup

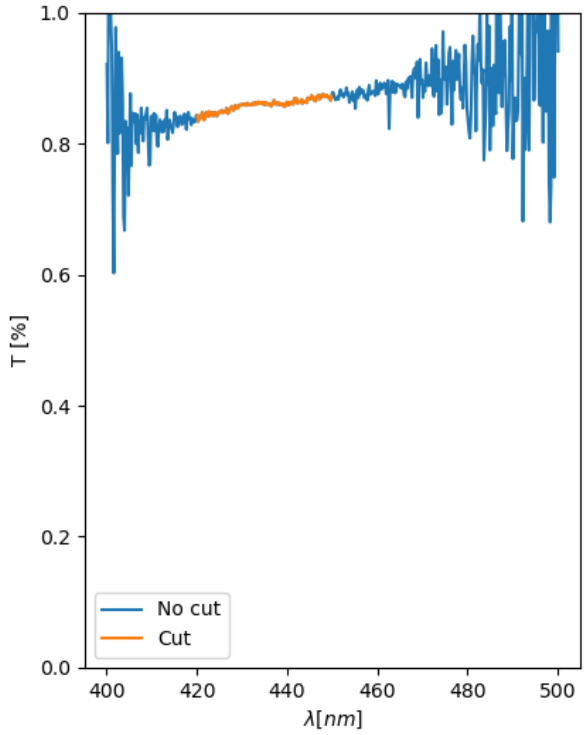
Transmission Measurements: 0-A

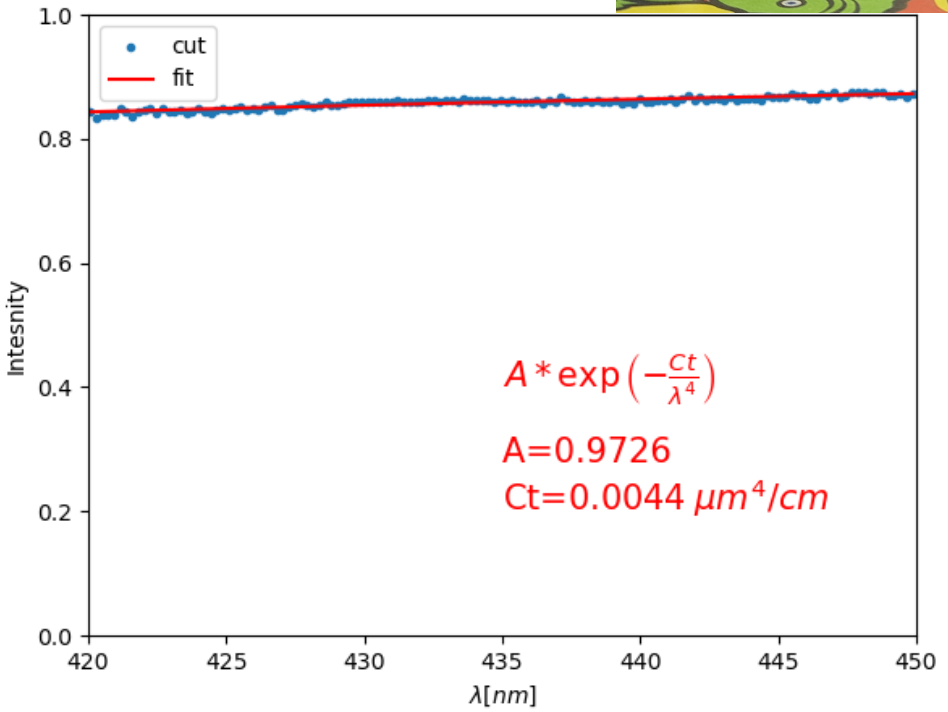
❑ Total Transmission Results

- Fit with Hunt formula $T(\lambda) = A \cdot exp(-Ct/\lambda^4)$
- A is measured transmission (1 is ideal)
- C characterizes aerogel clarity (0 is ideal)





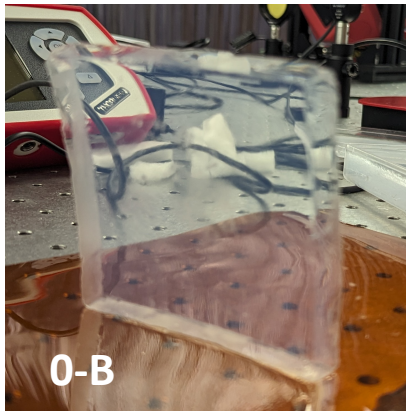


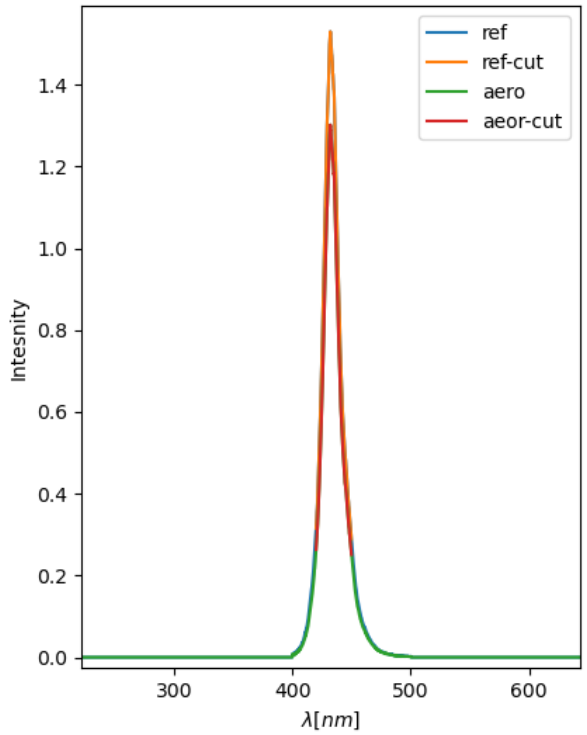


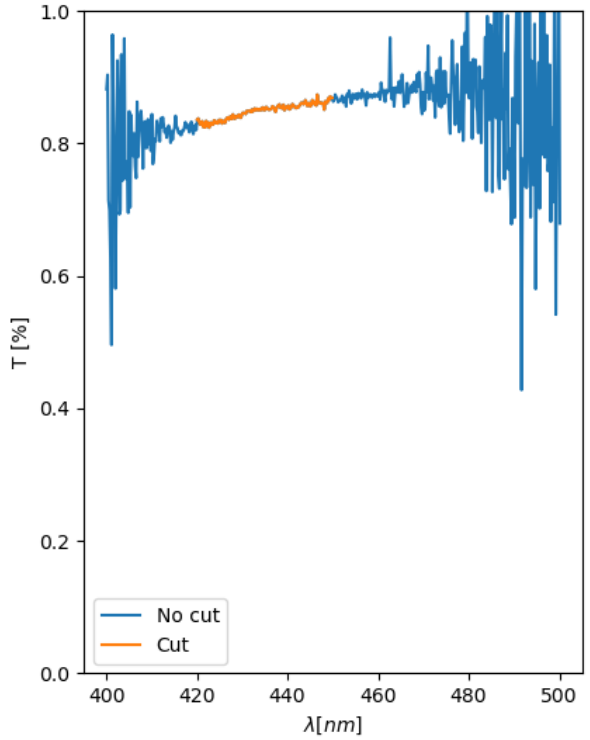
Transmission Measurements: 0-B

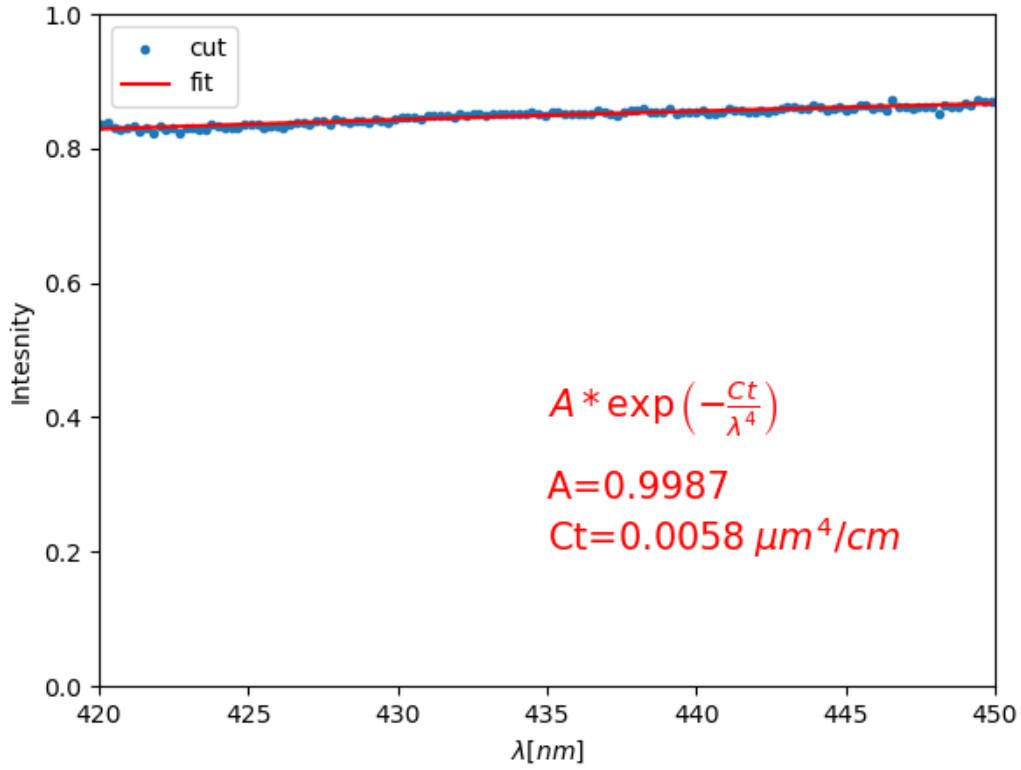
❑ Total Transmission Results

- Fit with Hunt formula $T(\lambda) = A \cdot exp(-Ct/\lambda^4)$
- A is measured transmission (1 is ideal)
- C characterizes aerogel clarity (0 is ideal)









Next Steps

- Mechanical measurements
  - Still looking for best way to assess the mechanical properties of the aerogel tiles:
    1. **Touch probes** require poking aerogel and could lead to damage
    2. **CCD scanner** may be able to us to determine length, width, and thickness on edges of aerogel, but not how thickness varies away from perimeter (e.g. at center of tile)
    3. **Precision mold** that aerogel tiles were required to fit into
  - ➢ Do we have required aerogel tile tolerances, e.g. length , width, planarity?

- Optical measurements
  - Validation of Transmission measurements –attempt to measure a piece of aerogel in monochromator tomorrow
  - Investigate diffuse and reflection measurements
  - Extend transmission fit to include absorption length (extended Hunt formula)
  - Setup capability to scan area of aerogel tiles
  - Surround setup in dark box
  - Implement additional LEDs to sample other wavelengths (365 nm, 505 nm, 625 nm)

- Setup index of refraction measurement stand
  - Will attempt to measure n by refracting light through corners of aerogel
  - Two wavelength available: 409 nm and 639 nm