

Lab 6 Aging Studies

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Scintillator R&D
10/7/22

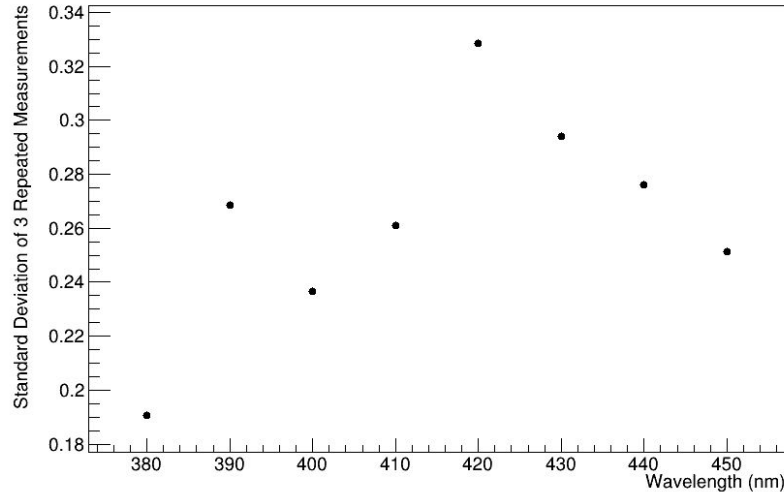
New Data + Results

- Stability measurements
 - Concern about the error associated with spectrophotometer measurements from the instrument itself
 - Solution: monitor stability by taking repeated measurements (3) on different samples
 - NOvA standard (N-27-09-NC)
 - Gore-DRP
 - One new extrusion sample
 - One 115101 TiO₂ coupon
- Aging of new extrusion samples (?)
 - Samples prepared by Alan
- Continuing coupon aging measurement additions

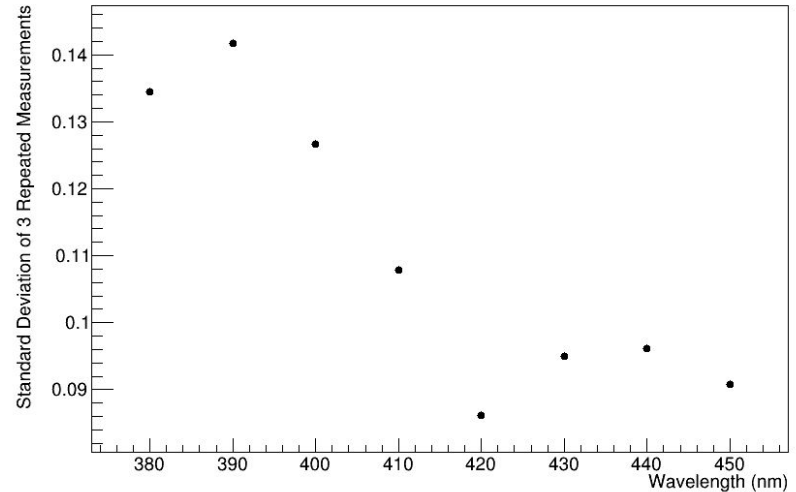
Stability Measurements - Standards

- 3 measurements, back-to-back, then take std. dev. of repeated measurement points at each wavelength
- These look small, especially GoreDRP... instrument is pretty stable?

Standard Deviation of Repeated Nova Measurements



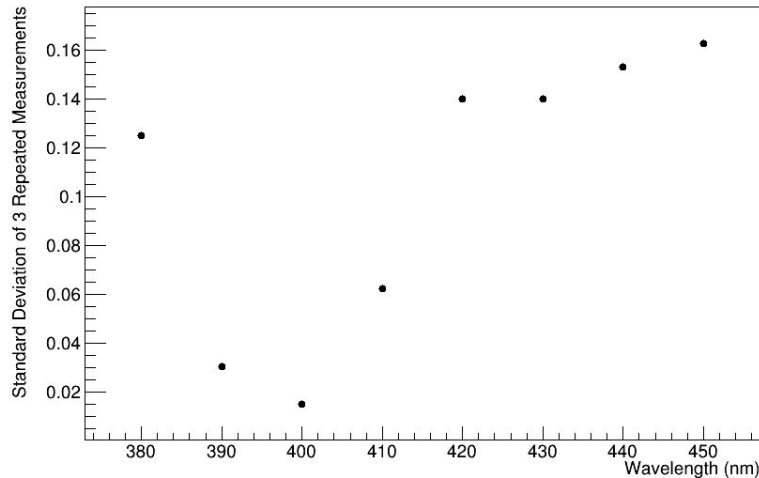
Standard Deviation of Repeated GoreDRP Measurements



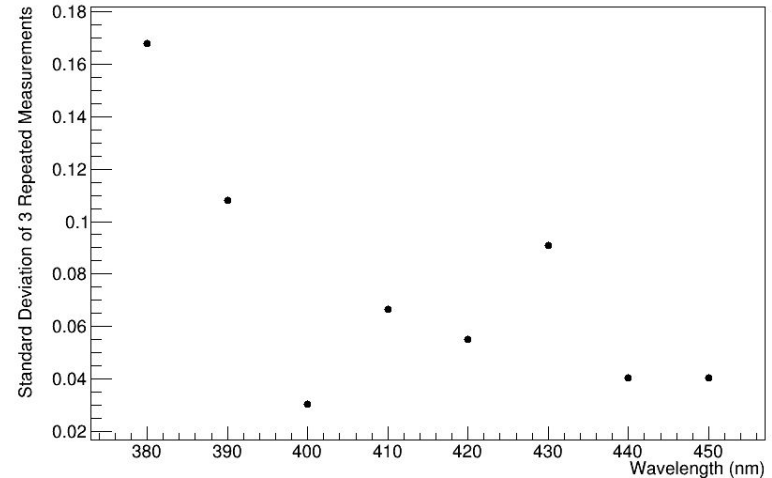
Stability Measurements - 115101 TiO₂ Coupons

- Again, these seem pretty low, lower than many of the std devs from the NOvA standard actually

Standard Deviation of Repeated Thin-Side Measurements

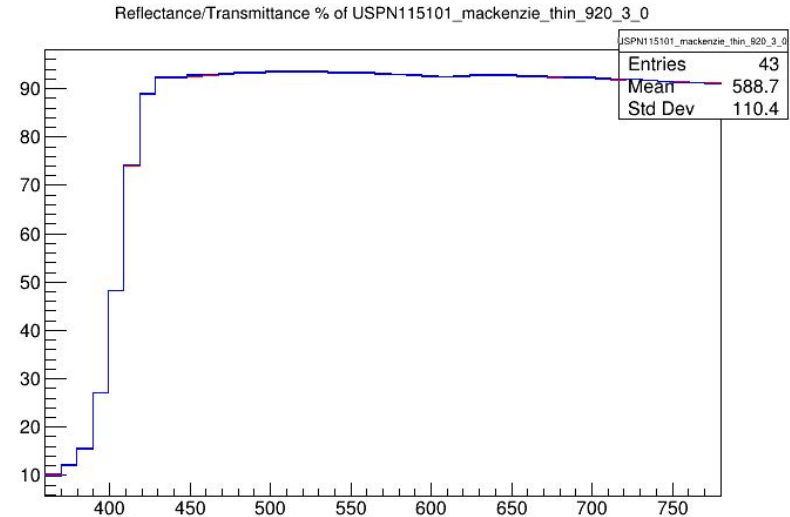
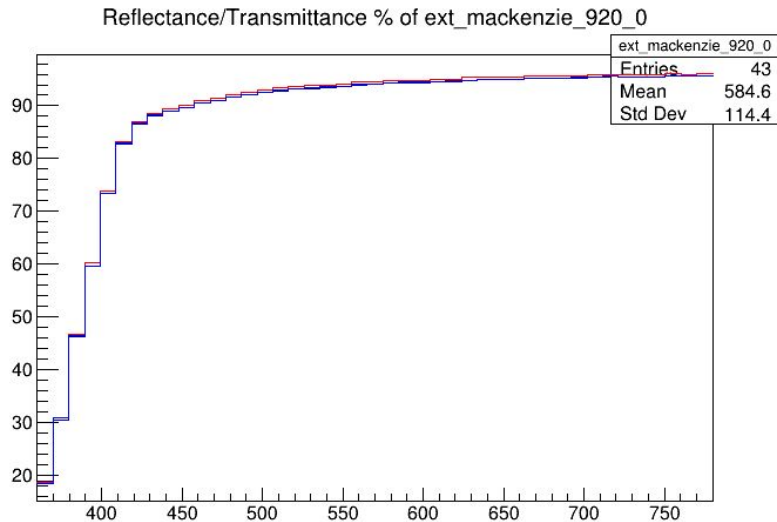


Standard Deviation of Repeated Thick-Side Measurements



Overlay the Repeated Measurements?

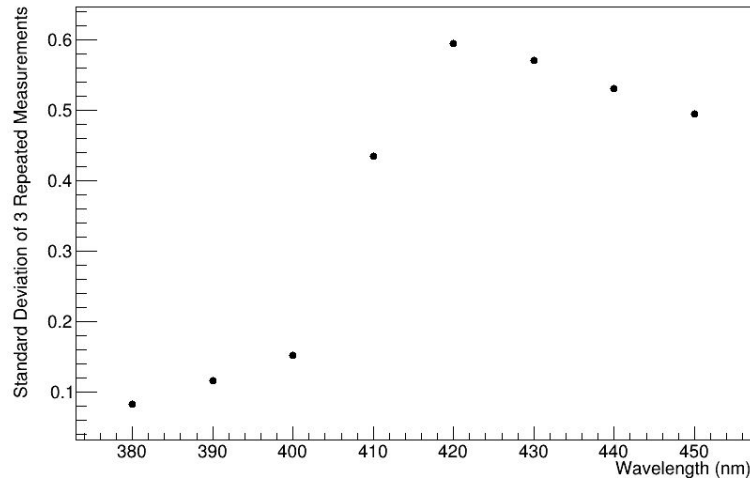
- You can't see much of a difference in the 3 repeated measurements by eye...
- NOvA standard has most visible differences in repeats



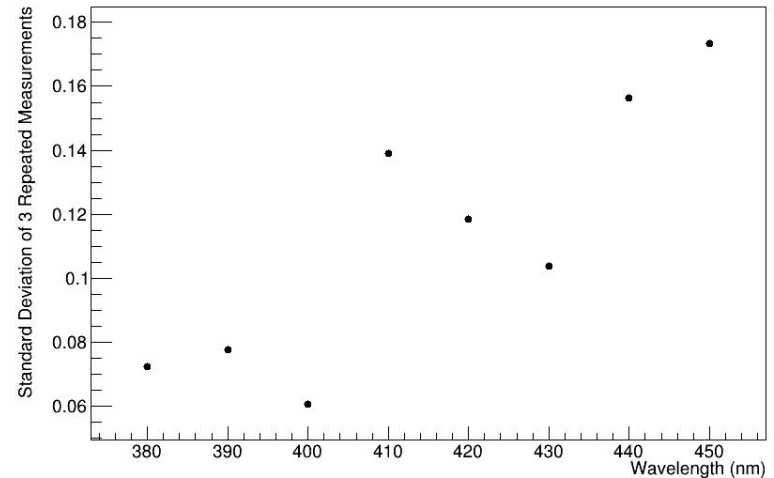
Stability Measurements - New Extrusions

- Side with thin layer of polymer still attached has much lower std dev than the outer cladding side

Standard Deviation of Repeated Polymer-Side Measurements

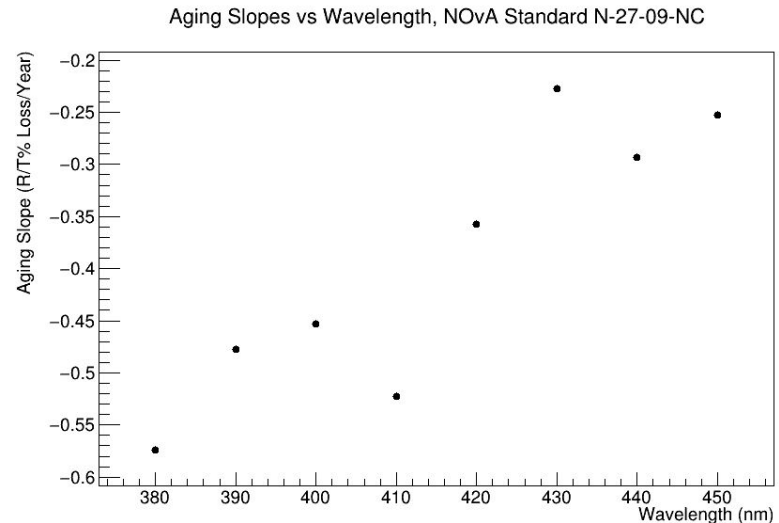
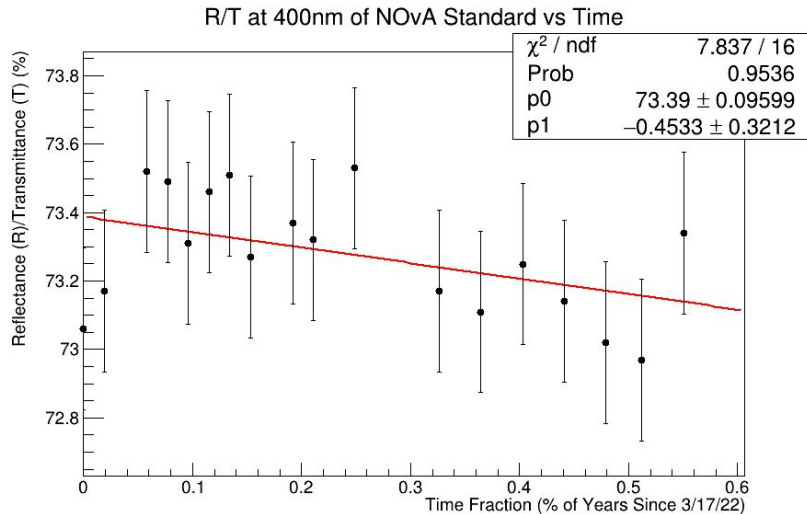


Standard Deviation of Repeated Cladding-Side Measurements



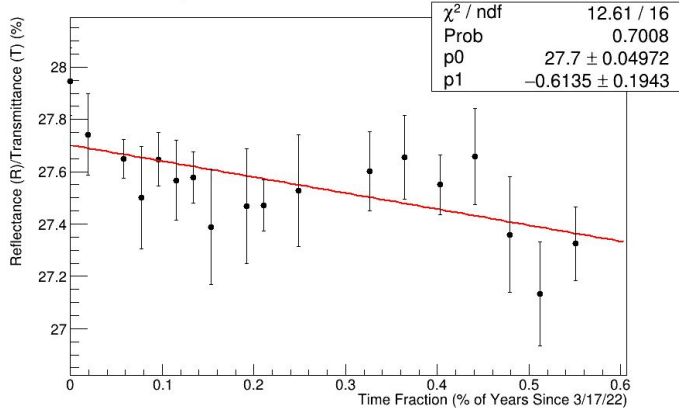
Updated Aging Analysis - NOvA Standard

- Added a few new points and also added errors from stability measurements
- For a given wavelength, I only have 1 error, so all error bars are the same, but gives an idea of instrument uncertainty



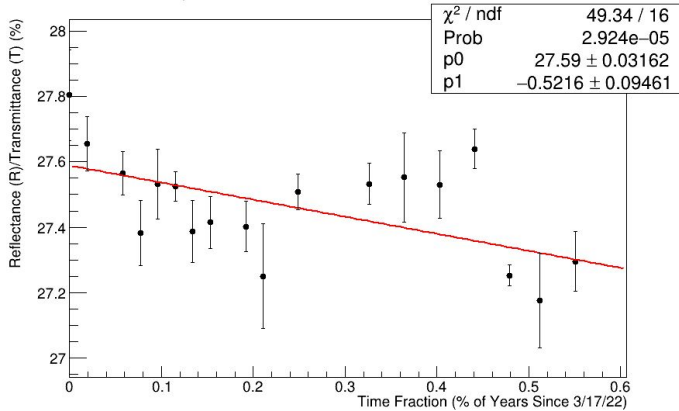
Updated Aging Analysis - TiO2 Coupon 115101

Average Thin-side R/T at 390nm of 115101 vs Time

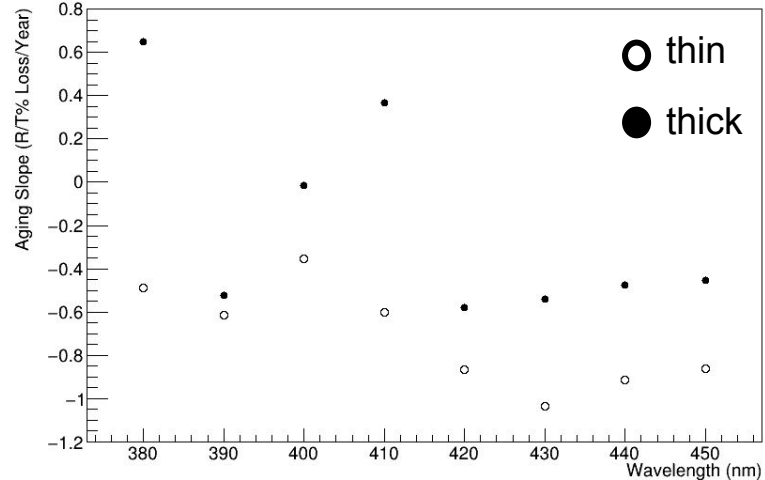


- Still some odd issues here... not sure why I get 2 positive aging slopes on the thick side

Average Thick-side R/T at 390nm of 115101 vs Time

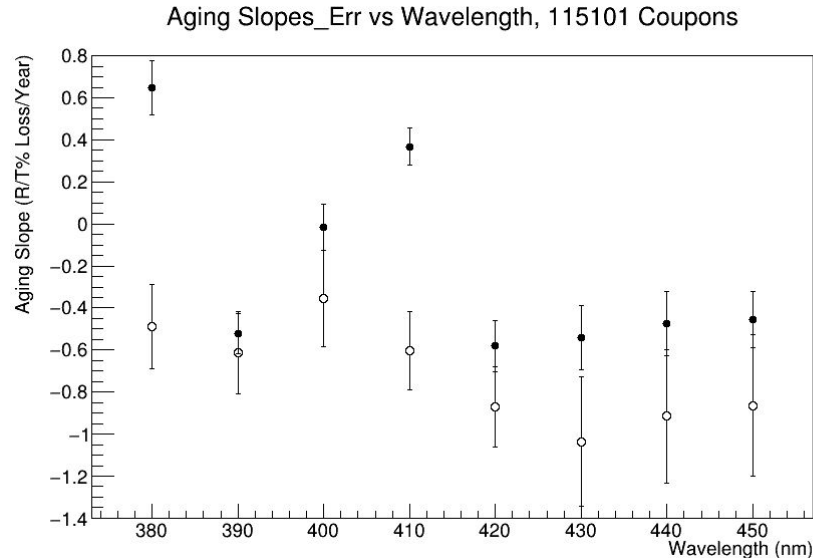


Aging Slopes vs Wavelength, 115101 Coupons



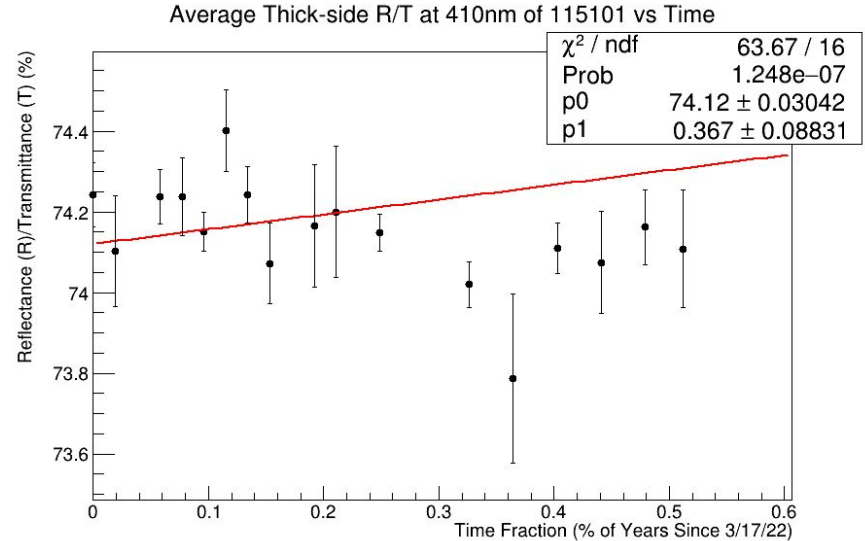
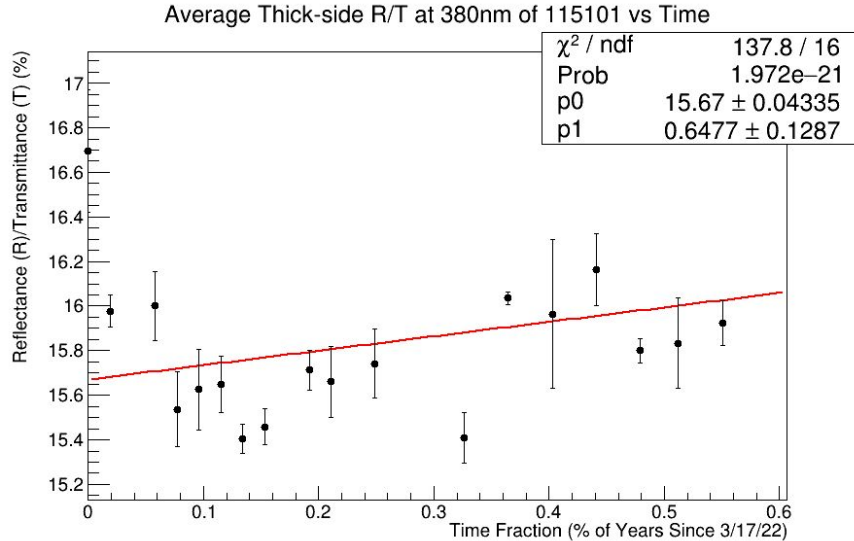
Errors on Aging Slopes?

- For the TiO₂ coupons, I can also make the aging slope vs wavelength plot with errors if I access the errors from the ROOT fit
- The extrusion plots and standard plots have large errors compared to the slope



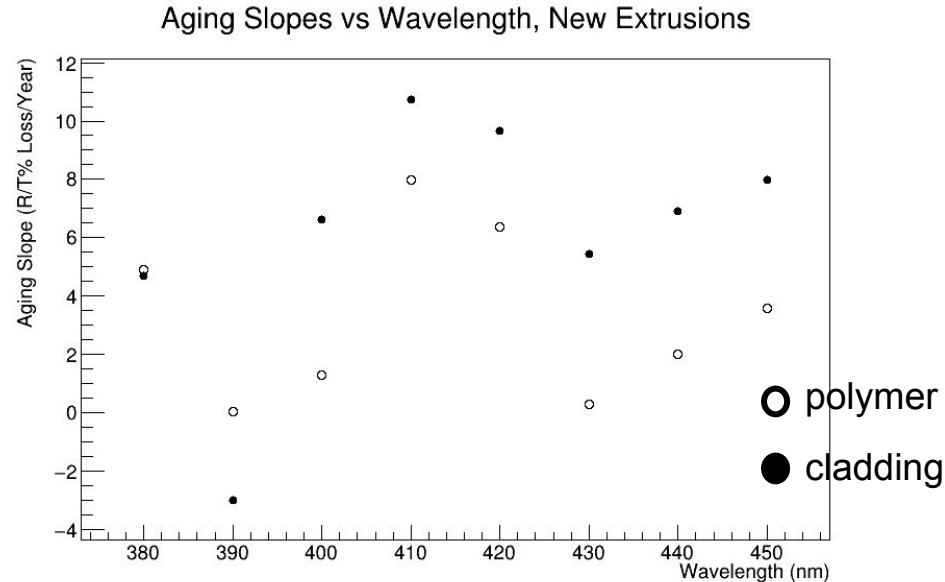
Bad Points? Thick-side Positive Slopes

- Here's what those pesky + slope points look like...



New Aging Analysis - New Extrusions

- This plot looks pretty bad
- I truly just think we don't have enough data points yet, I have 5 measurements for these, 1/week
- Next slide shows the fitted aging plots for 2 of these points, specifically the 420nm points



New Aging Analysis - New Extrusions, 420nm

- If I look at these and errors from std devs, they could be consistent with a straight line / flat slope
 - (I do have multiple measurements at each date here, each error bar is different)

