

Mirror Reflectivity Measurements at Small Mirror Test Stand

Jihee Kim (BNL, jkim11@bnl.gov), Jan Vanek (UNH), Mahmodol Mojumder (SBU),
and Zhoudunming (Kong) Tu (BNL/SBU)

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ePIC pfRICH Engineering/Design Meeting

Overview

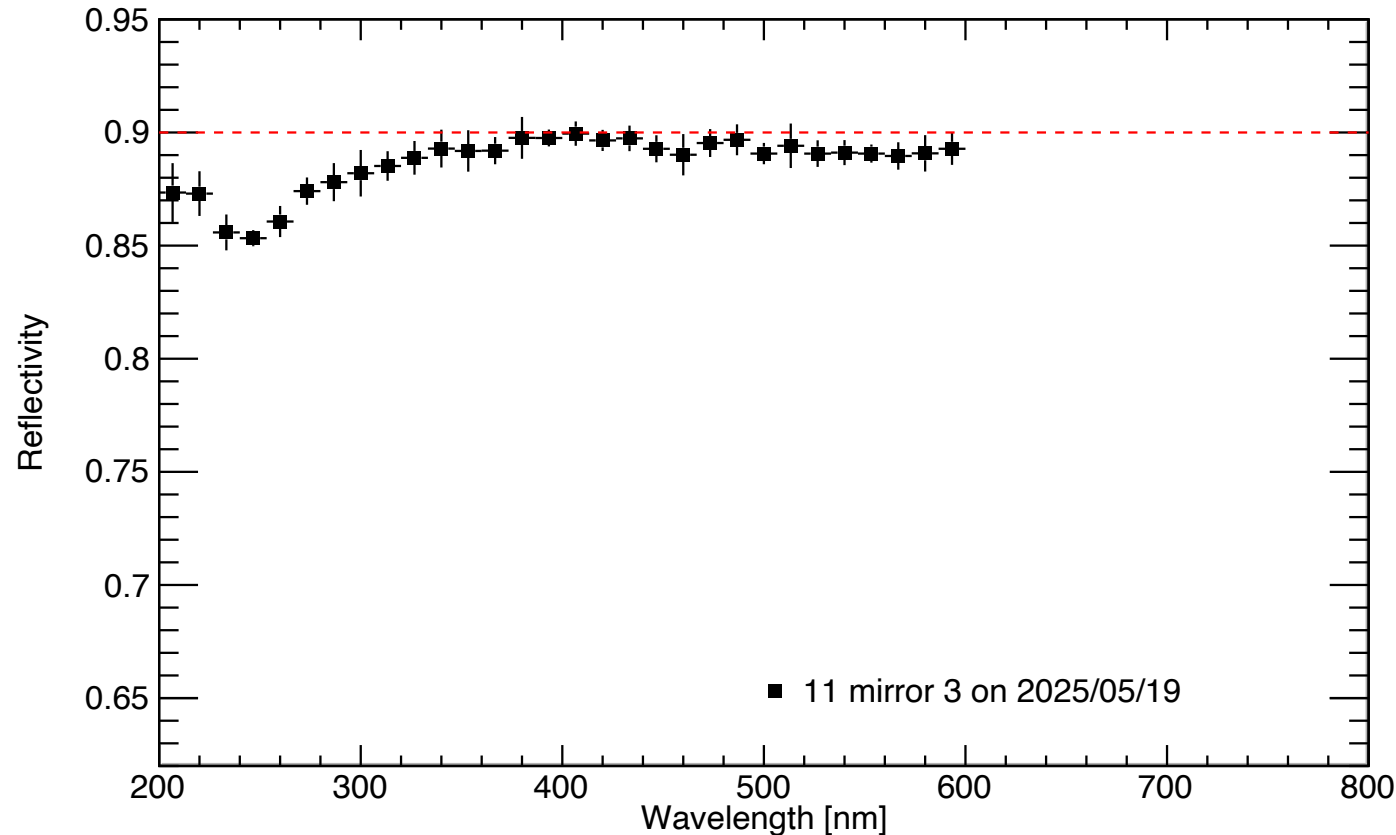
- Performed direct light measurement.
- Continued to take small mirror reflectivity measurements.
 - Coating batch 11: mirror 3, aka reference mirror (cross-check)
 - Coating batch 57: 6 mirrors (new)
 - Changed SiO₂ protection layer thickness

Small Mirror Reflectivity Results – Ref.

Coating Batch 11 mirror 3
with 5.09 kA Cr and 12.36 kA Al

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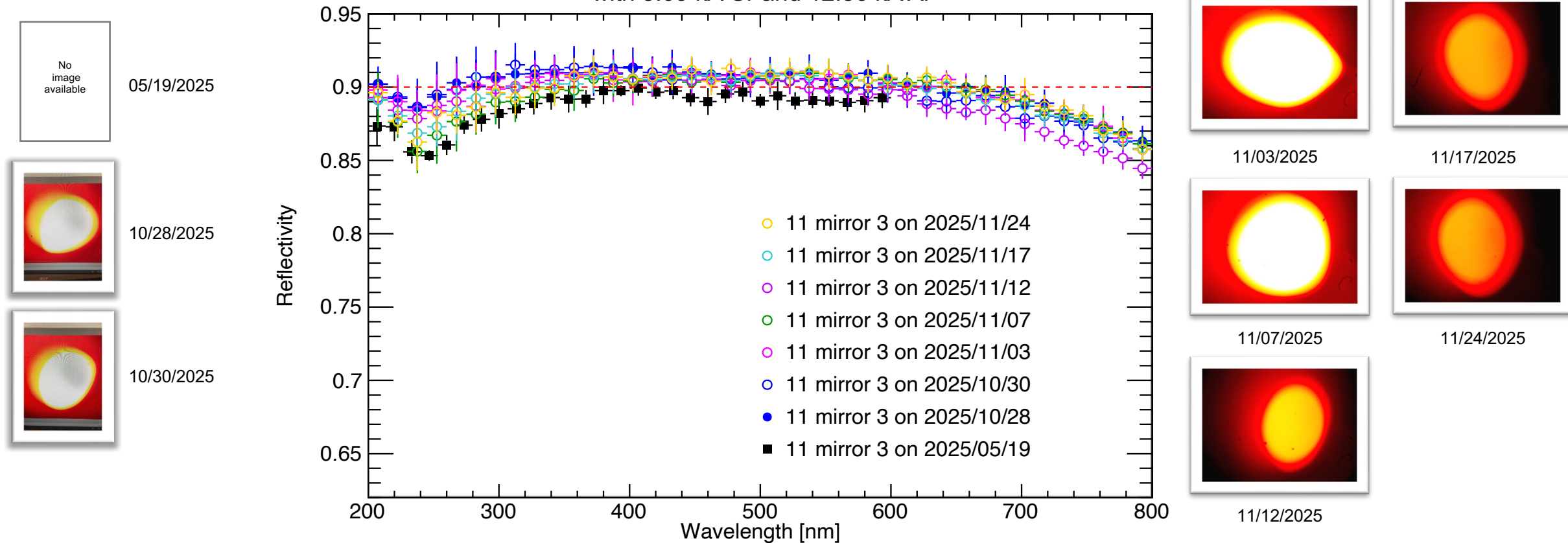
11 3
05/19/2025



The reflectivity of Coating Batch 11, Mirror 3, is used as the reference.

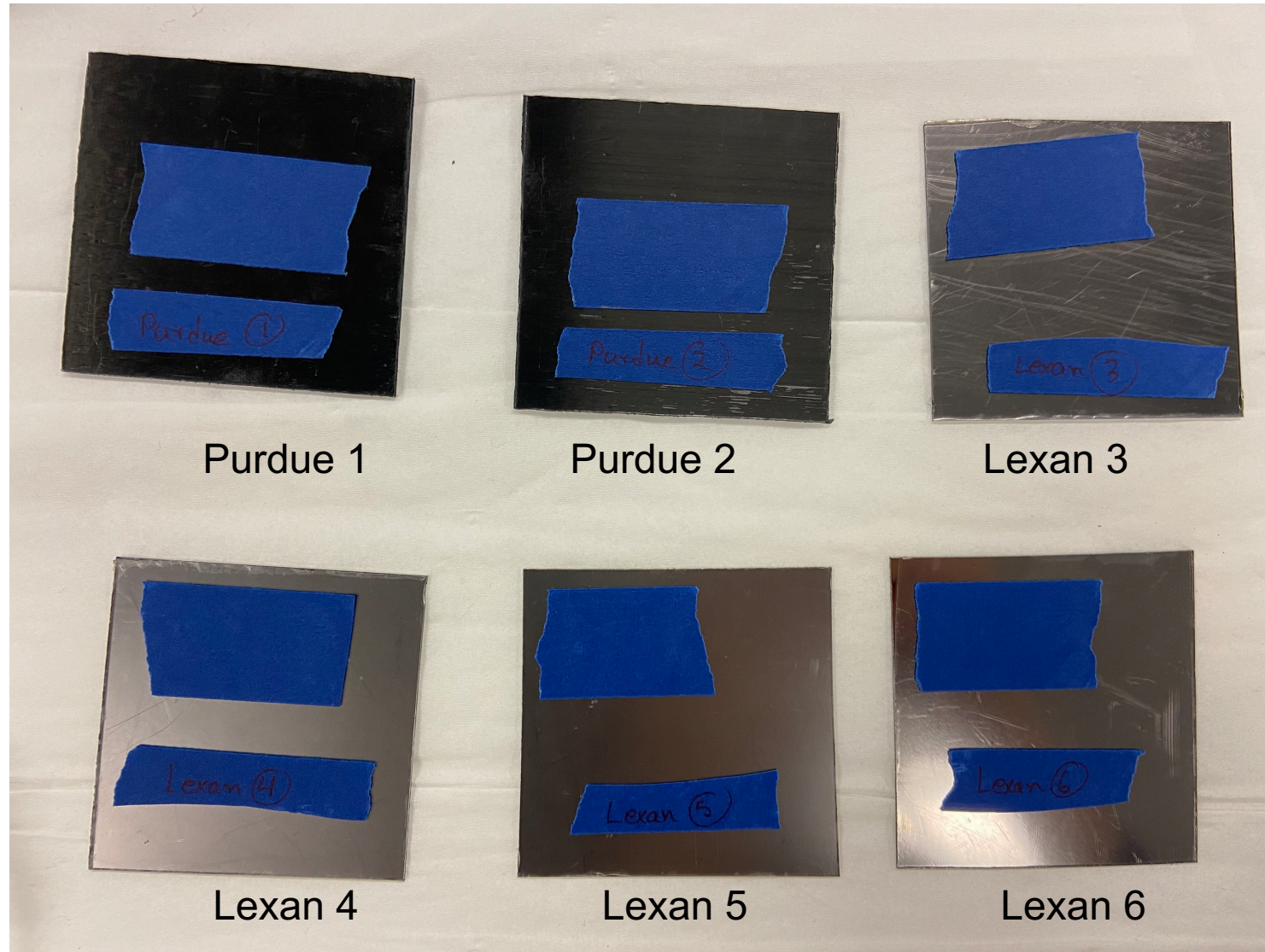
Small Mirror Reflectivity Results – Ref.

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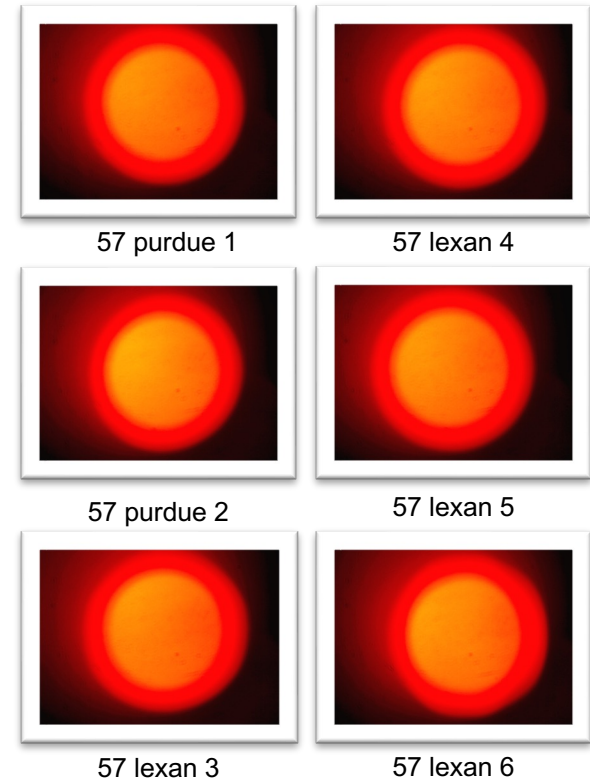
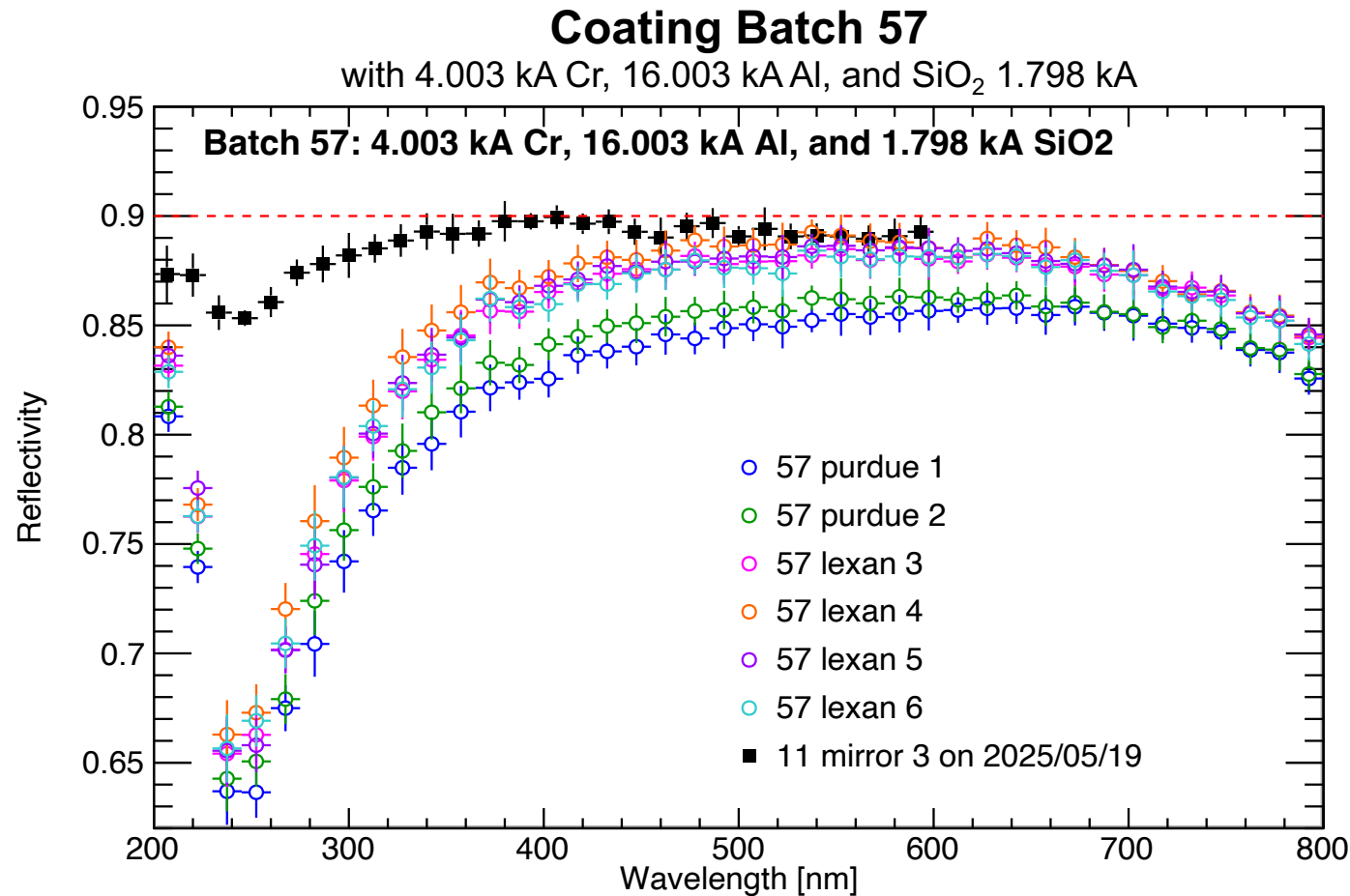


Re-measured the reflectivity of Coating Batch 11, Mirror 3 since new lamp was installed. Shown beam spot image with short exposure time and new measurements are consistent.

Coating Batch #57 Mirror Samples

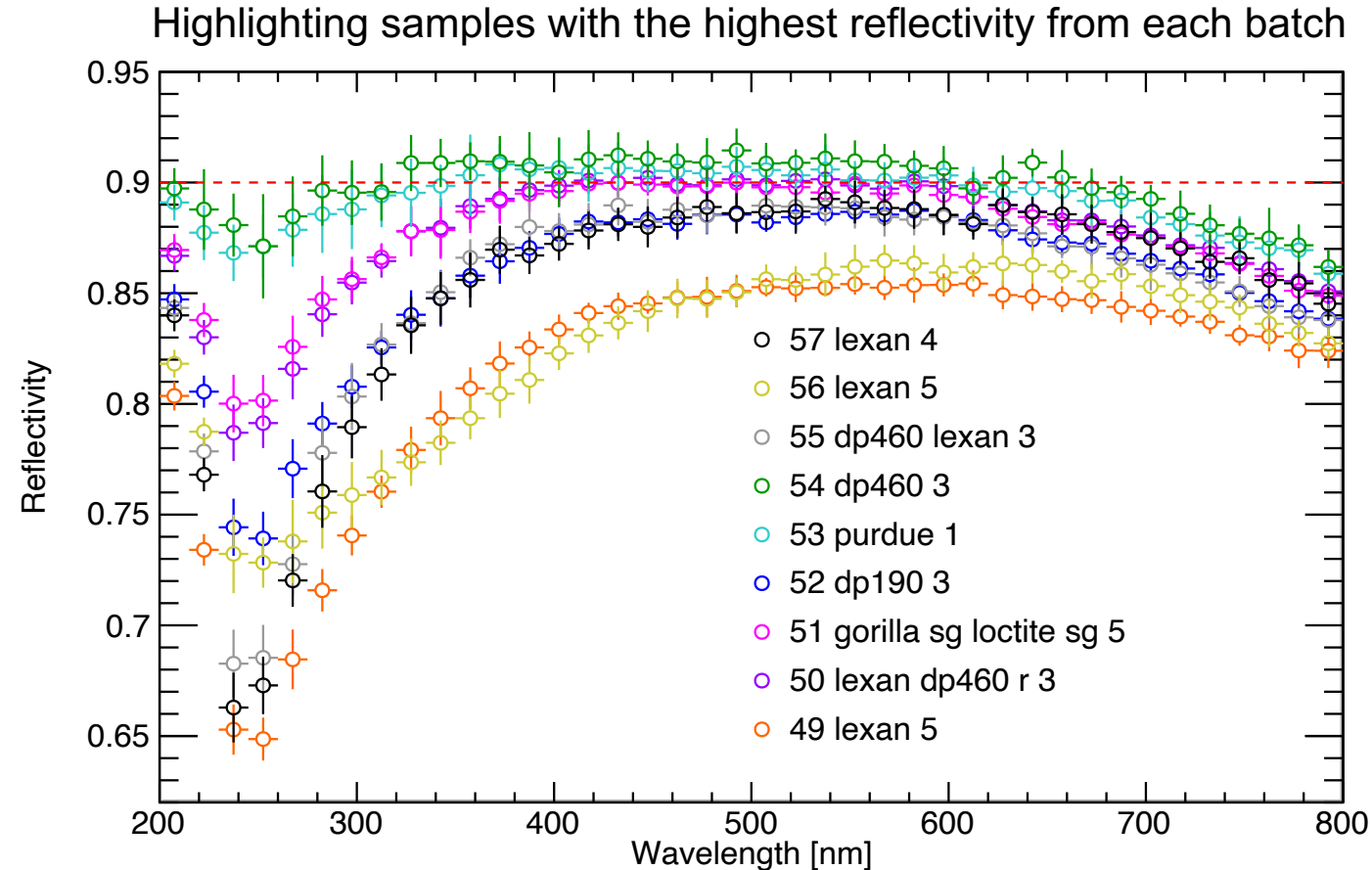


Small Mirror Reflectivity Results – #57



Coating Batch 57 mirrors show mixed reflectivity results —
lexan substrate shows the best, while others are lower (purdue substrate).

Mirror Coating Summary So Far

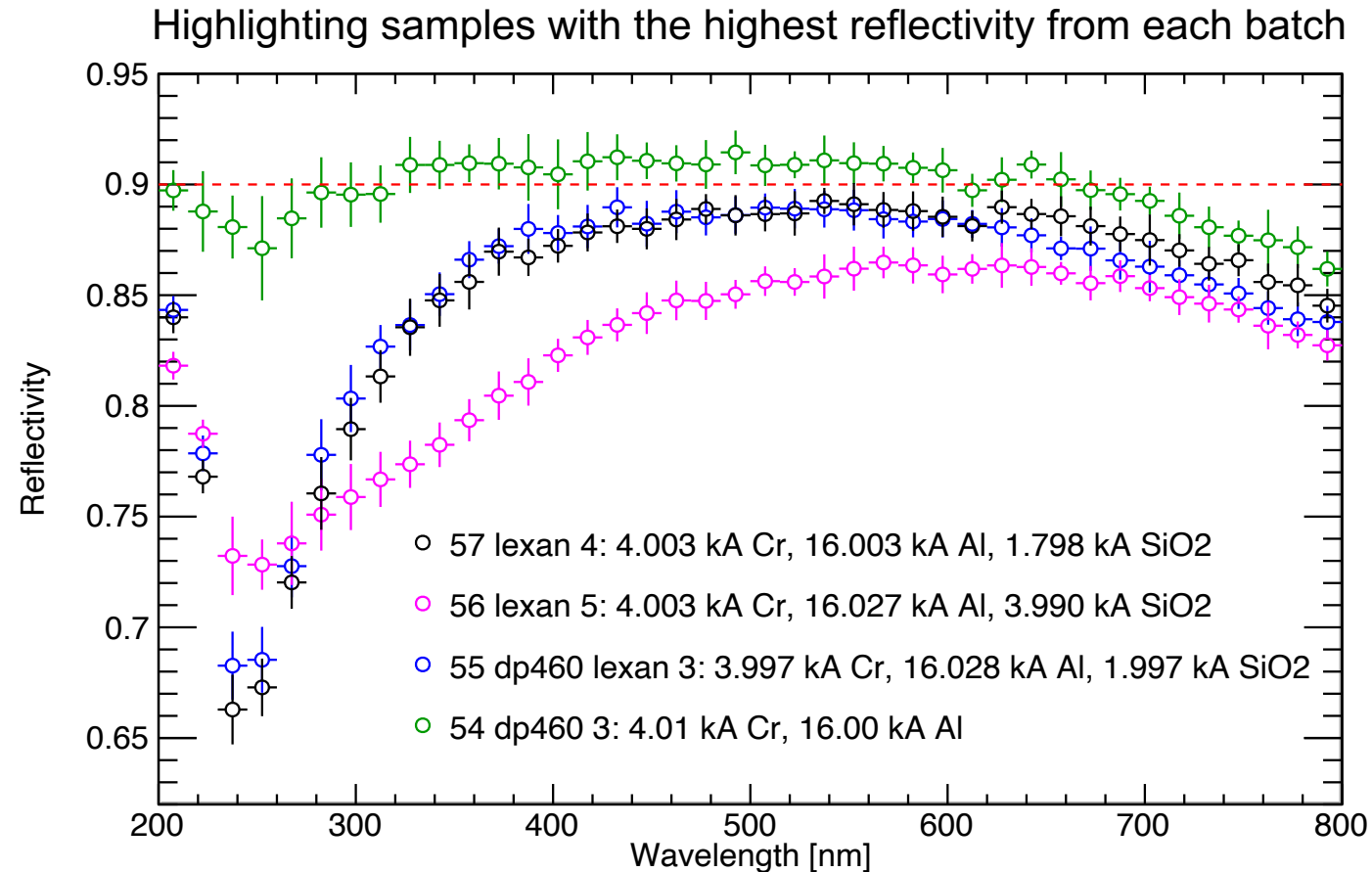


While keeping Cr and Al thickness unchanged from Batch 54, only varying SiO₂ protection layer thickness.

Coating Batch	Coating Cr [kÅ]	Total Thickness Al [kÅ]	SiO ₂ [kÅ]
57	4.003	16.003	1.798
56	4.003	16.027	3.990
55	3.997	16.028	1.997
54	4.01	16.00	0
53	5.04	20.22	0
52	5.75	23	0
51	5.29	21	0
50	5.51	22.02	0
49	6.01	23.99	0

Since coating batches 55 and 57 uses similar coating formulas, their measurement results also appear consistent with one another.

Mirror Coating Summary So Far



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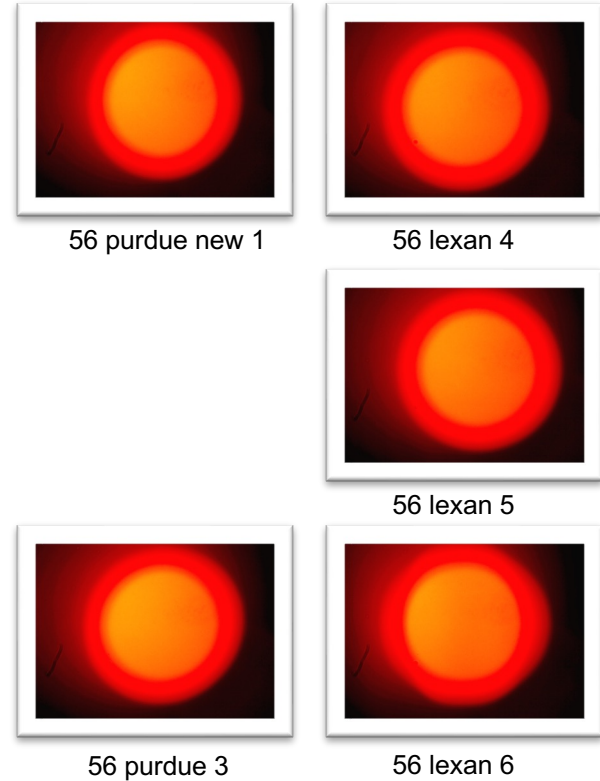
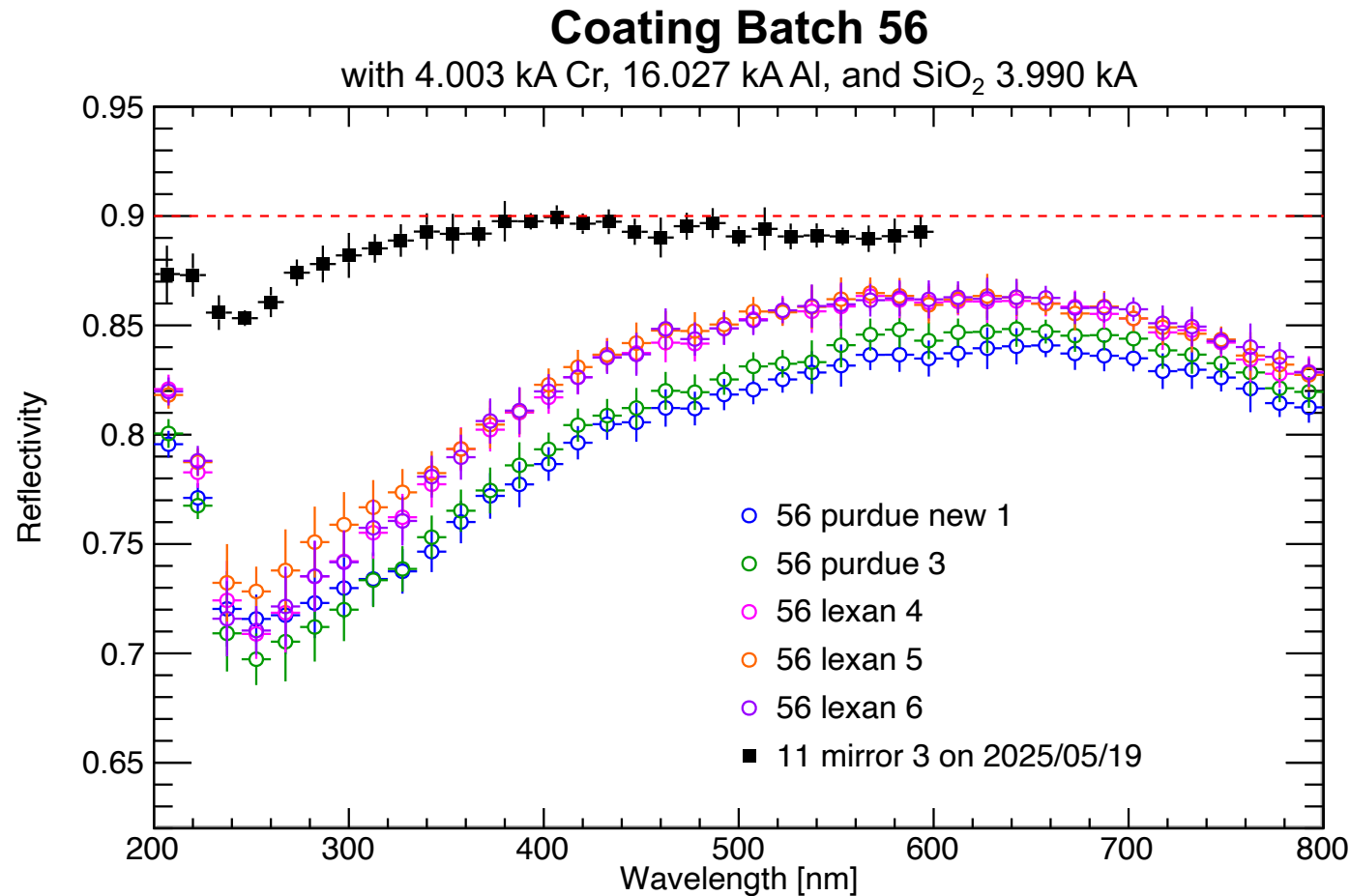
For batches 54 through 57 illustrating the impact of the SiO₂ protection layer thickness.
(Batch #56 is a test ground for upper limit of SiO₂)

Summary

- New Batch 57 mirror reflectivity measurements were performed.
 - Added SiO₂ protection layer thickness; Cr and Al thicknesses unchanged from Batch 54.
 - The Lexan substrate demonstrated the highest reflectivity, while the carbon-fiber substrate showed lower performance.
 - Beam-spot images displayed a nearly uniform appearance.
- To-Do List
 - Some scratch tests on SiO₂ mirror samples (vs one without SiO₂)
 - Helpful to determine how thick we need

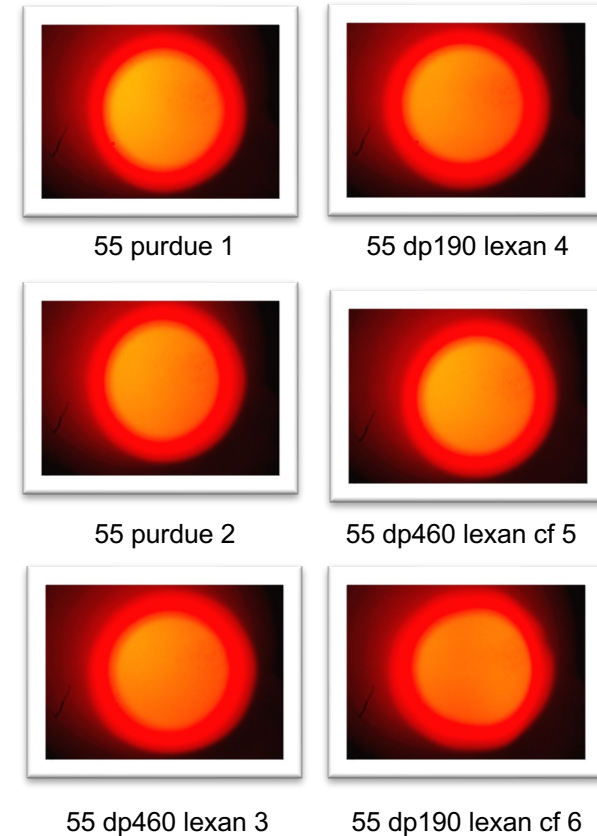
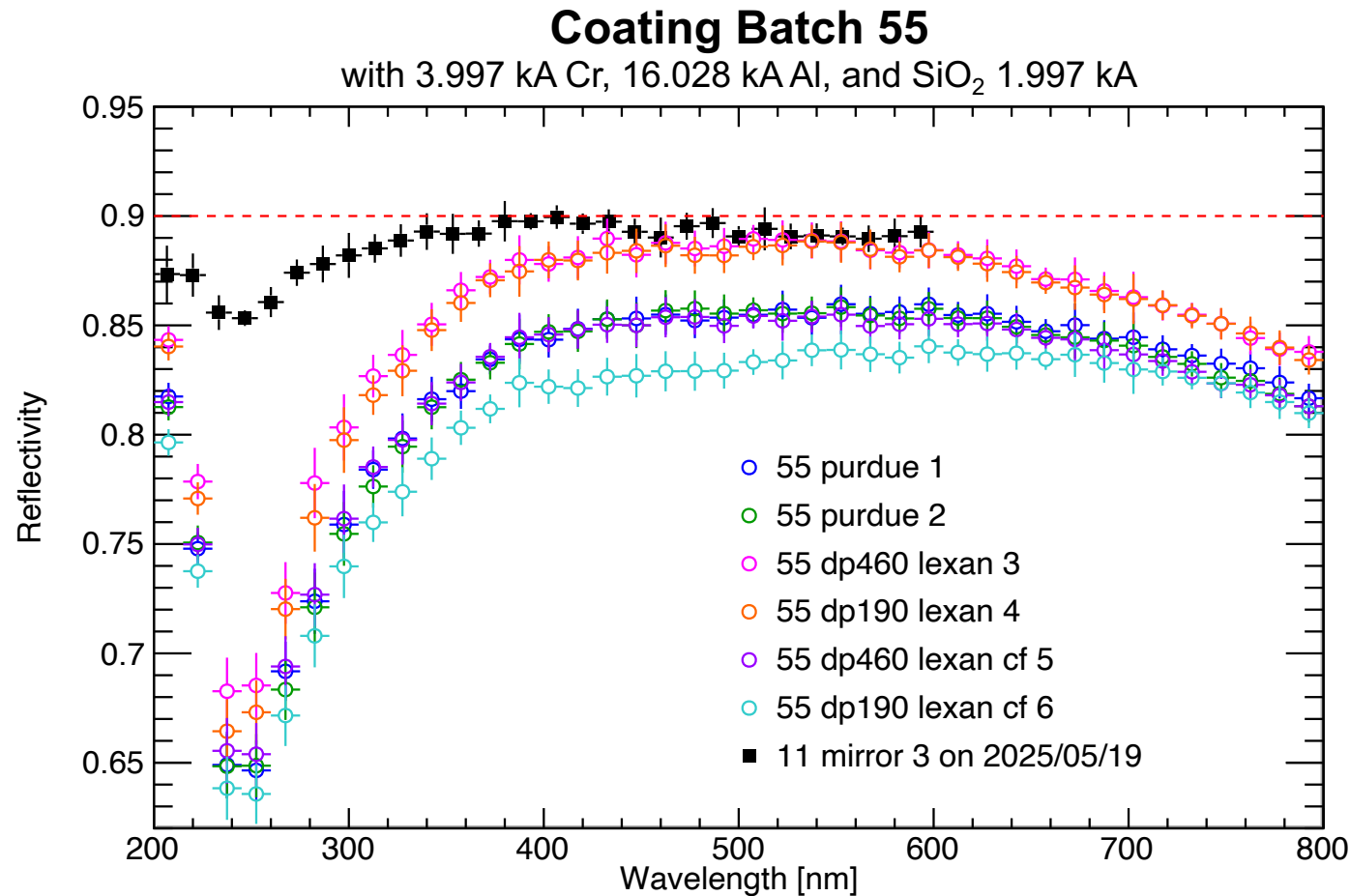
Backup Slides

Small Mirror Reflectivity Results – #56



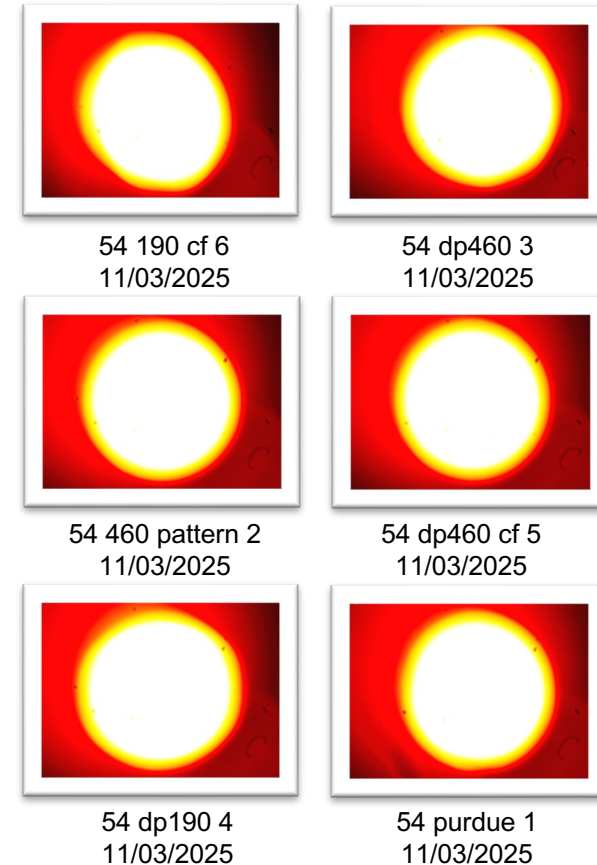
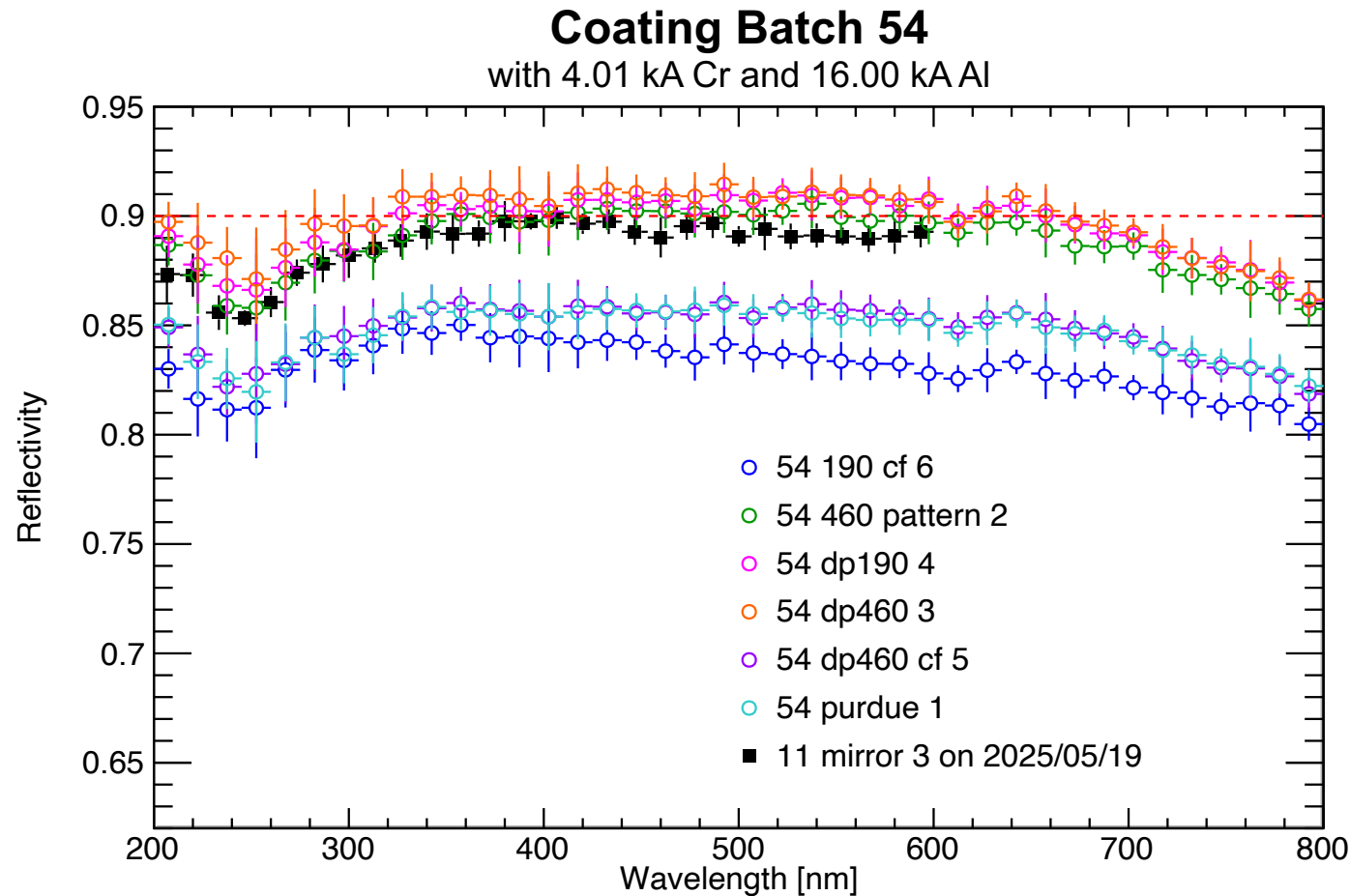
Coating Batch 56 mirrors show mixed reflectivity results — lexan substrate shows the best, while others are lower (purdue substrate). Overall, low reflectivity.

Small Mirror Reflectivity Results – #55



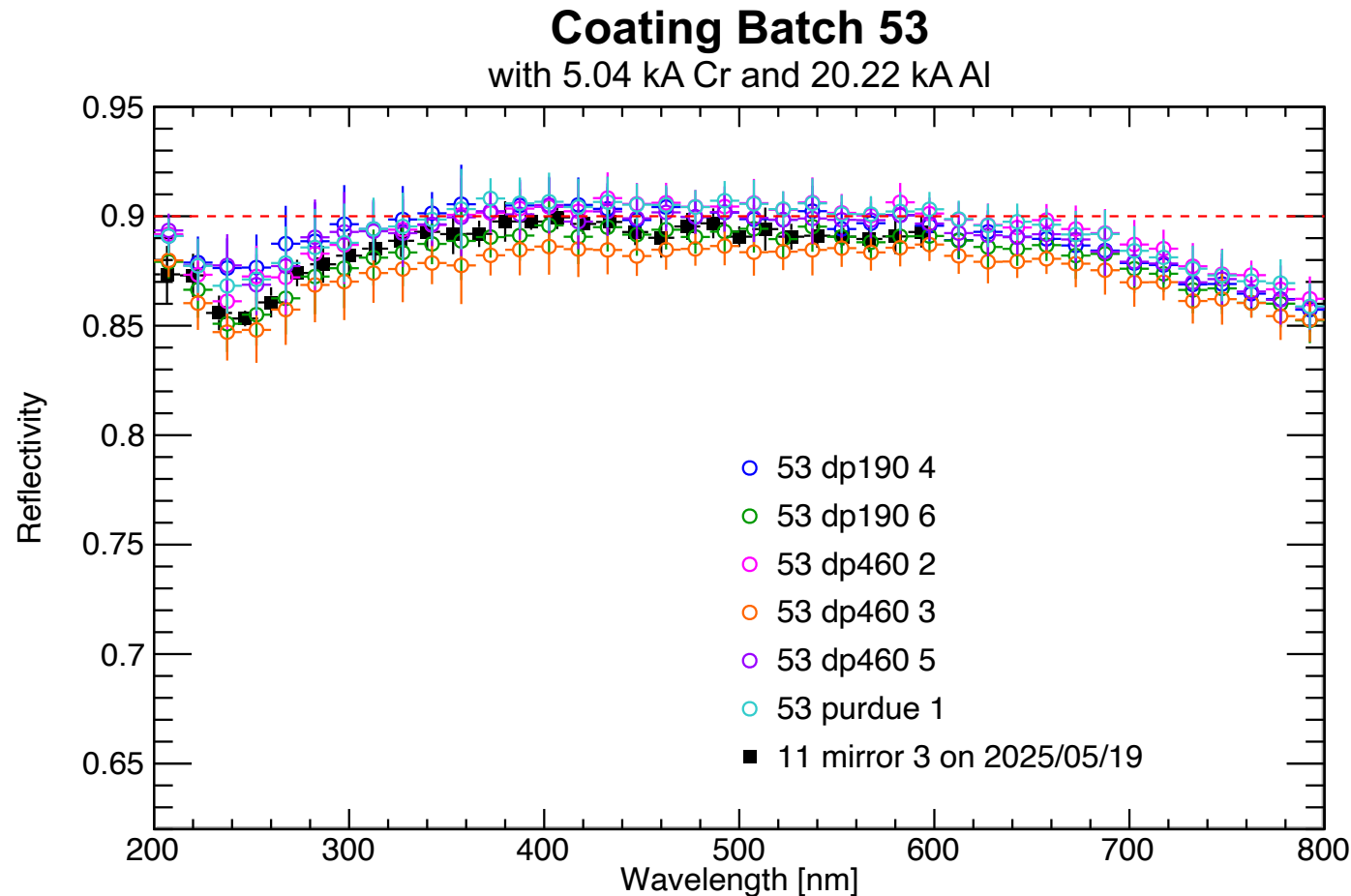
Coating Batch 55 mirrors show mixed reflectivity results —
lexan substrate shows the best, while others are lower (Lexan-CF and purdue substrate).

Small Mirror Reflectivity Results – #54



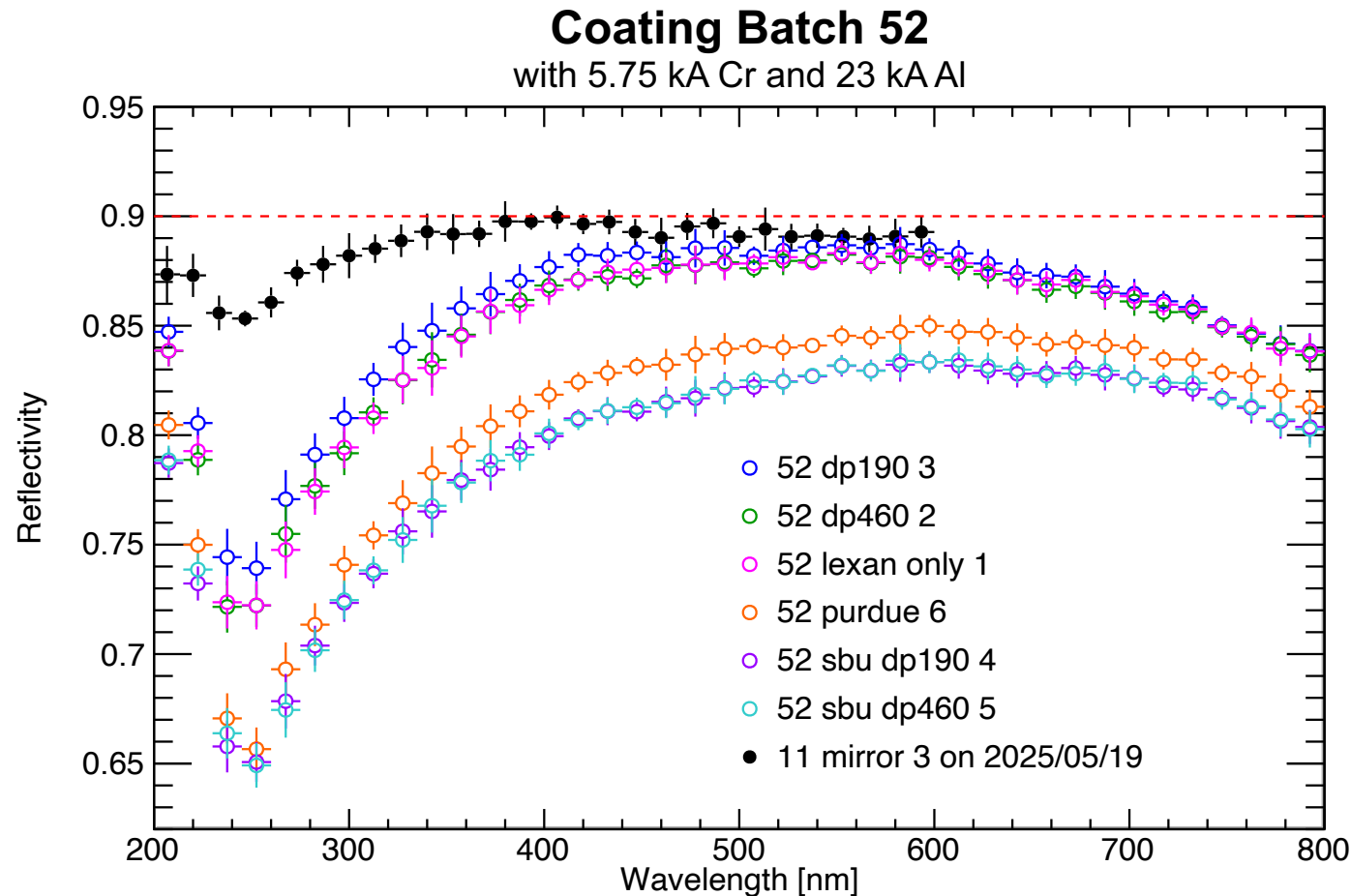
Coating Batch 54 mirrors show mixed reflectivity results — some nearly match Batch 53 or better, while others are lower (Lexan-CF and purdue substrate). Some mirrors were tightly fitted in the holder.

Small Mirror Reflectivity Results – #53



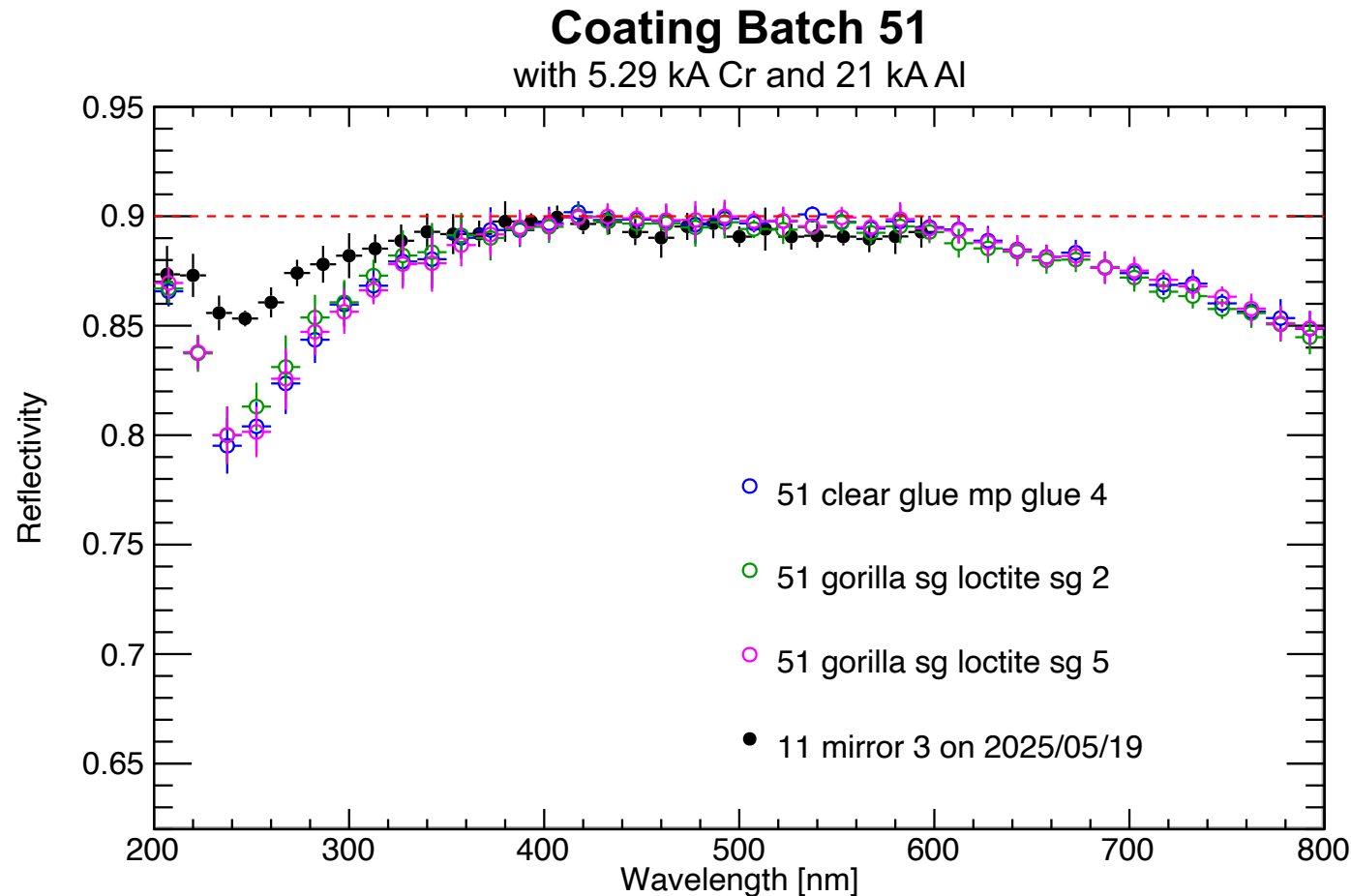
The mirrors from Coating Batch 53 achieved approximately **90% reflectivity** across the 350 – 650 nm range. Overall, these mirrors show **improved reflectivity** compared to previous batches.

Small Mirror Reflectivity Results – #52



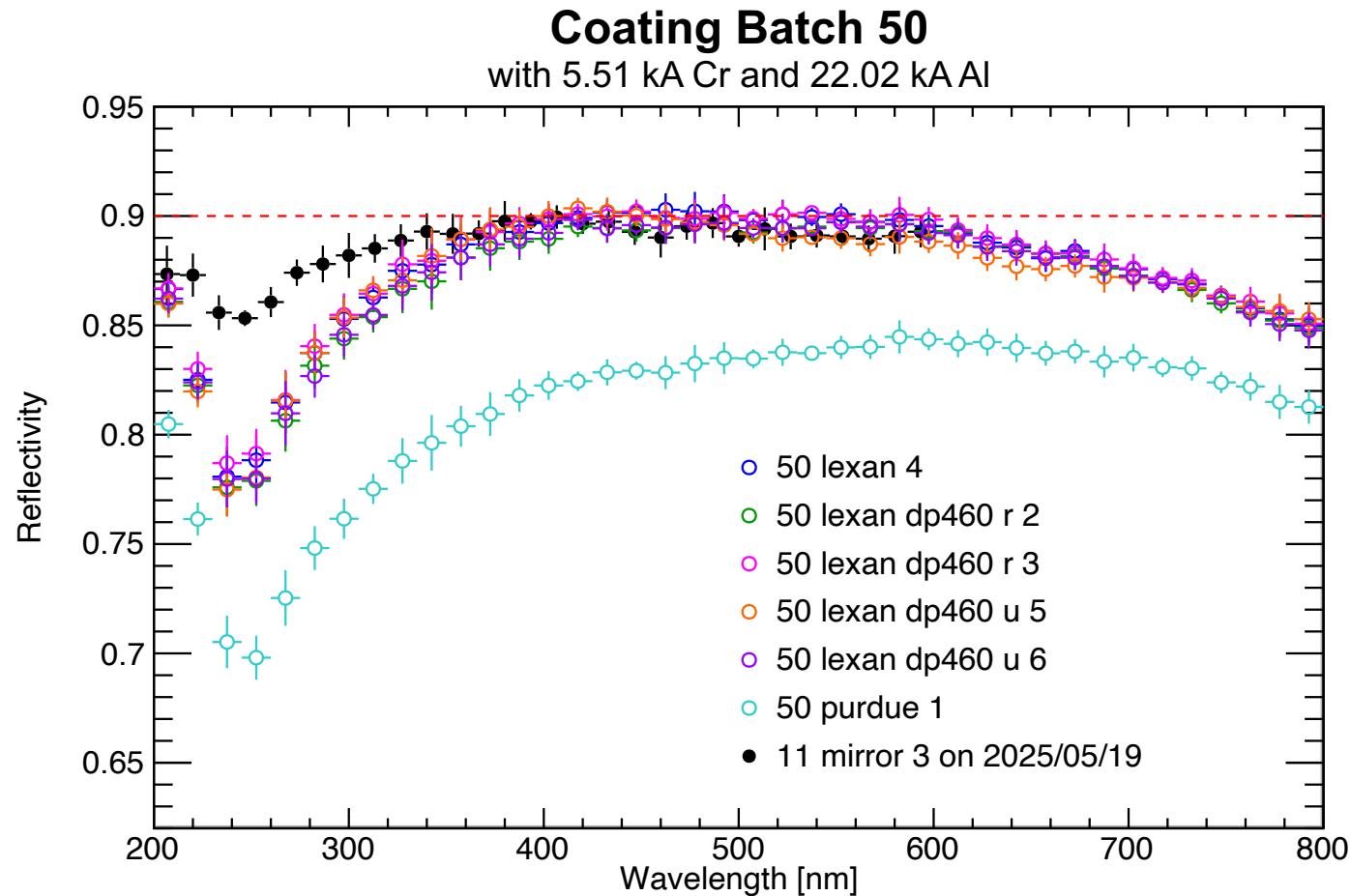
Coating Batch 52 mirrors show mixed reflectivity results — some nearly match the reference (within 1–2%), while others are lower (82–84%). Some mirrors were tightly fitted in the holder.

Small Mirror Reflectivity Results – #51



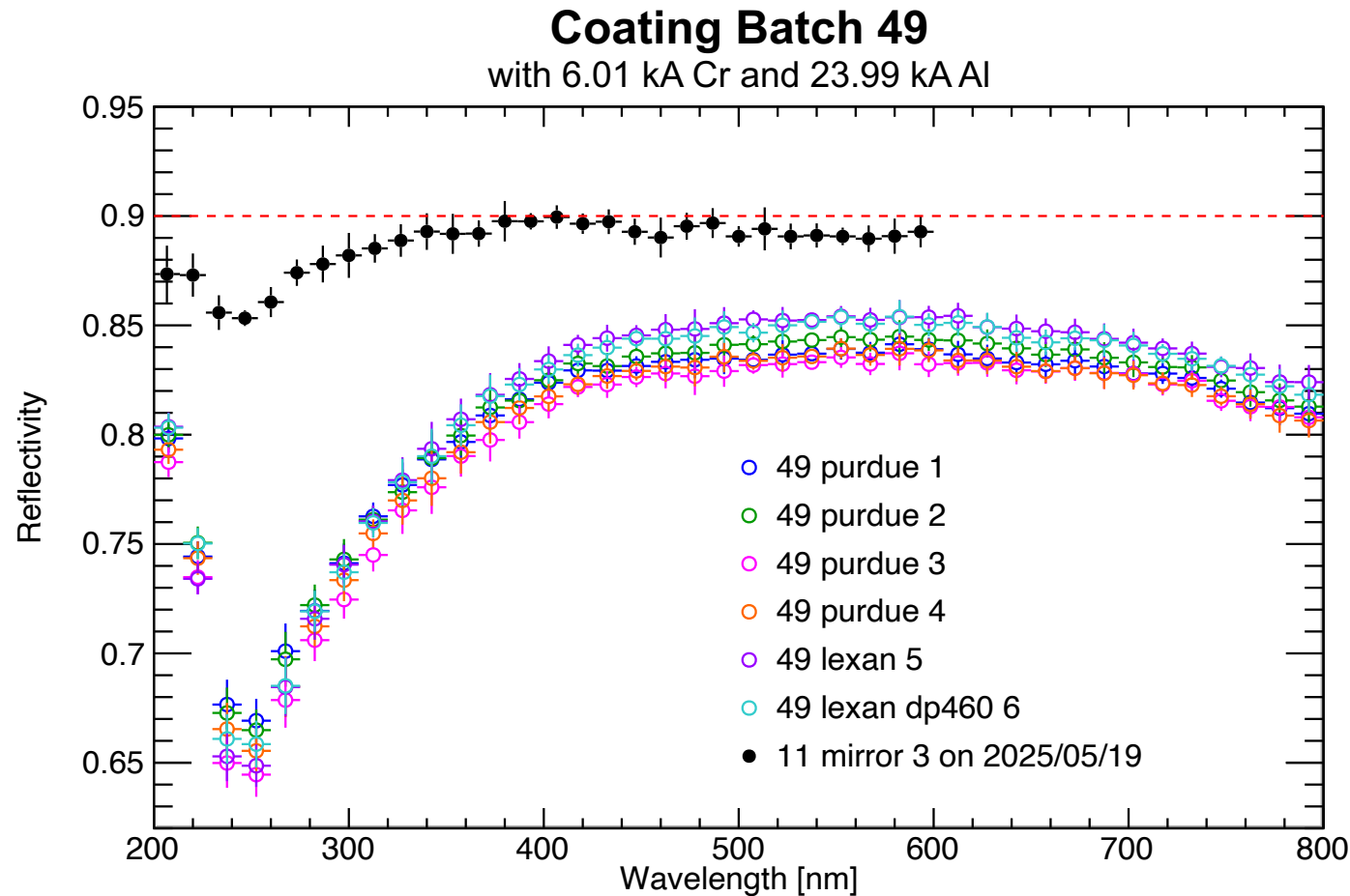
Mirrors from Coating Batch 51 exhibit approximately 90% reflectivity in the 400–600 nm range.

Small Mirror Reflectivity Results – #50



Mirrors from Coating Batch 50 show approximately 90% reflectivity across 400–600 nm, with *Purdue 1* as an exception.

Small Mirror Reflectivity Results – #49



The mirror from Coating Batch 49 reaches a maximum reflectivity of **85%**.