# LAr R&D Progress Updates

Yichen

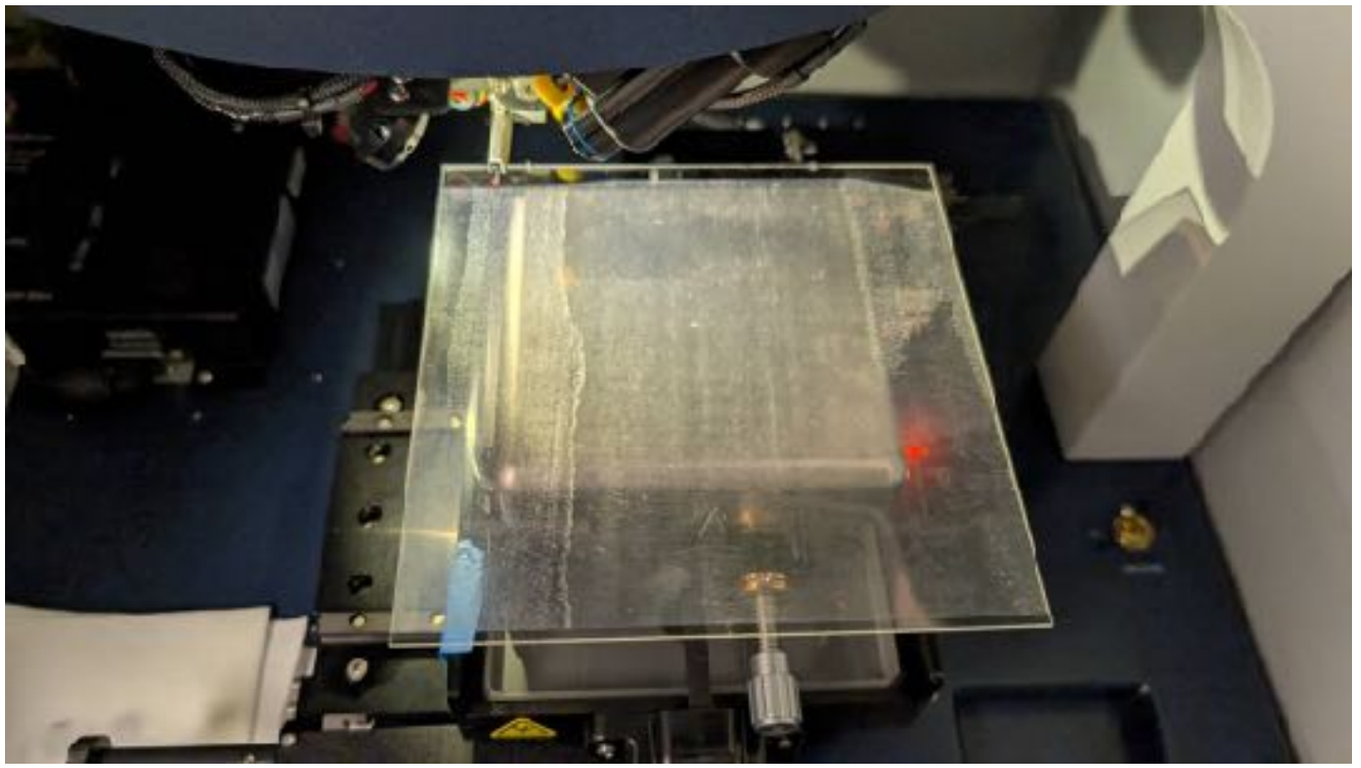
11/14/25

# Lab Safety and Space Management

- **ESR Updates**
  - Our current experiment ESR# PO-109-2023 expiring on 12/13/2025
  - In the process of renewal
  - I will have trainings up to date this weekend
- **6000 Gallon LN2 tank refill**
  - PO dispatched to procurement
  - Coordinating with Airgas for delivery
  - It may require full evacuation of the parking lot due to the construction on the north side of building 510
- **EEI Inspection**
  - Inspection for the vacuum pump for DUNE HV test in RM 2-224 (COMPLETE)

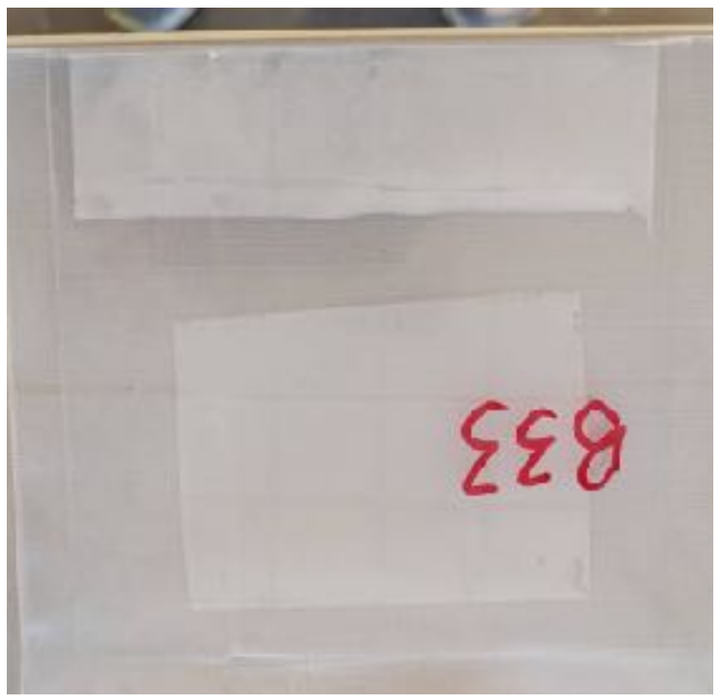

# Heating test preparation

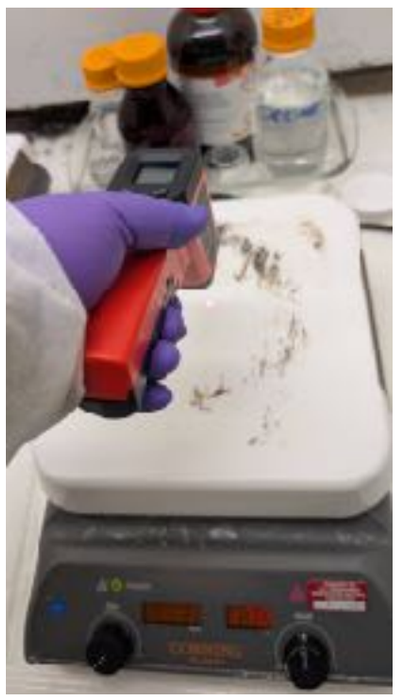
- **Thickness measurement before heating**
  - Chose S6, S7, S9 B33 samples and conducted 6-point thickness measurement with profilometer
  - Got some experience on profilometer troubleshooting
  - Only conducted heating test on S6 this week, after heating thickness measurement TBD



# Cover plate preparation

- **Cover plate preparation**
  - Yimin sent a few 143.5 x 143.5mm substrates
  - All have pTP coating on
  - Conducted an initial heating test to remove the residual pTP on the B33 cover
  - Without a cover, residual pTP evaporation quickly above 150C
    - The heating plate surface temperature is found to be not very uniform
    - Heating setup revised for the sample heating test



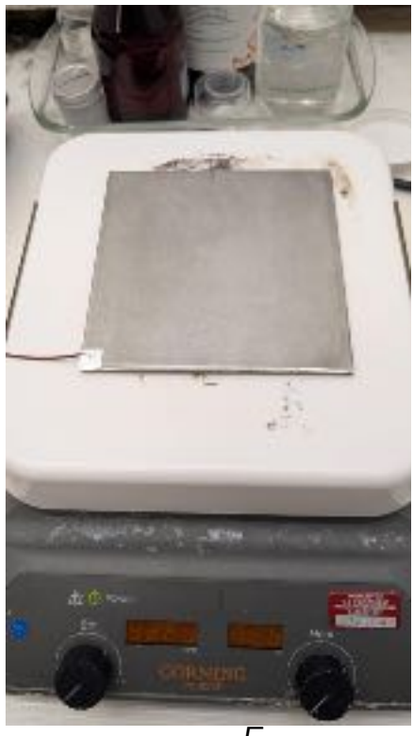



# Heating Test Setup

- **Heating device modification**
  - Aluminum plate with slightly larger size added on top of the heating plate
  - Temperature monitored with thermal couples
  - Dark aluminum foil put on top of the aluminum plate to help observation

- The temperature distribution is uniform on the plate surface

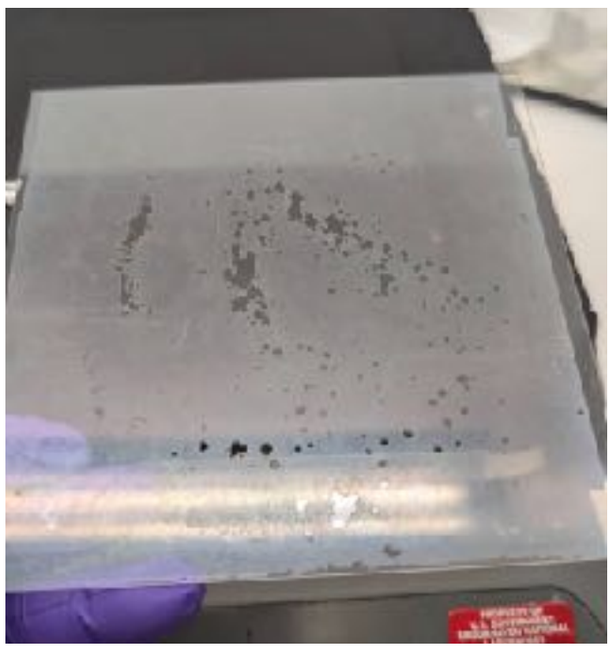

**1st version**



**Rev version**

# Heating test on B33

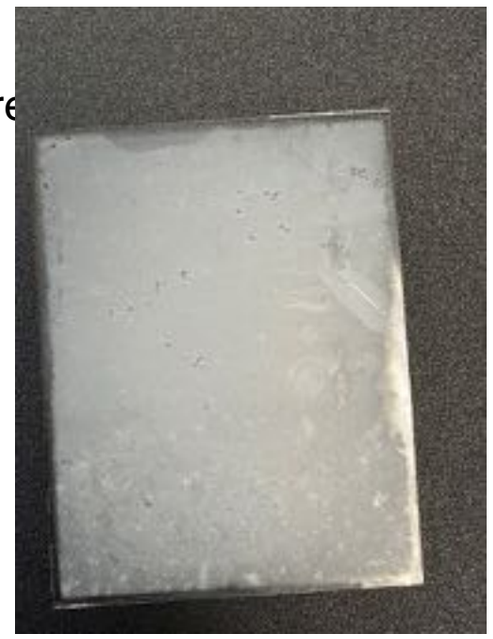
- **Heating test on S6**
  - Following Yimin's instruction
  - Heating the plate to 170C and maintained for 1 min.
  - The change is quite obvious by visual
  - Some pTP stripped off attaching to the cover plate, also my due to operation
  - Slightly change on the uniformity
  - May have overheating problem
  - Will check the thickness with profilometer later

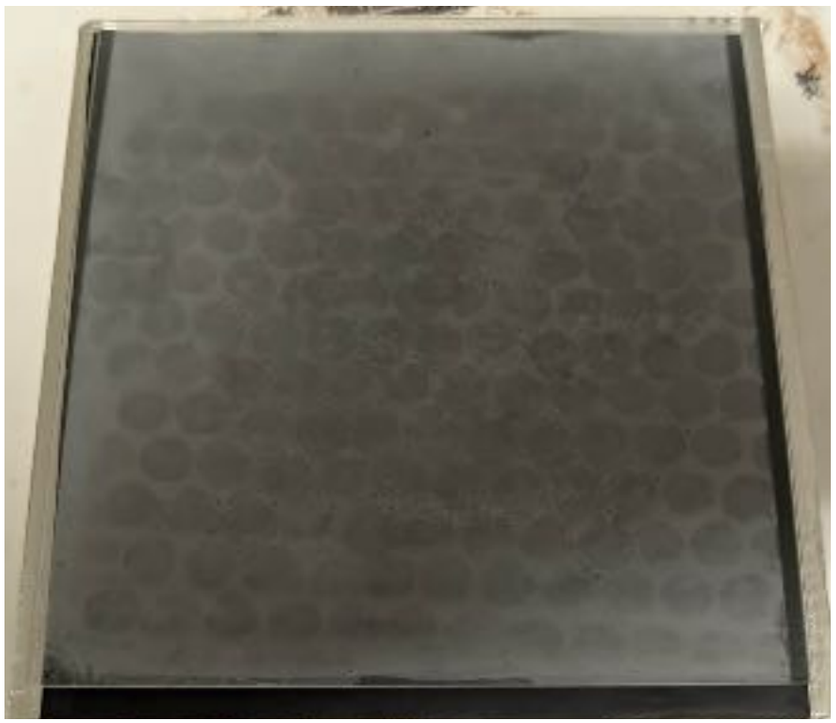


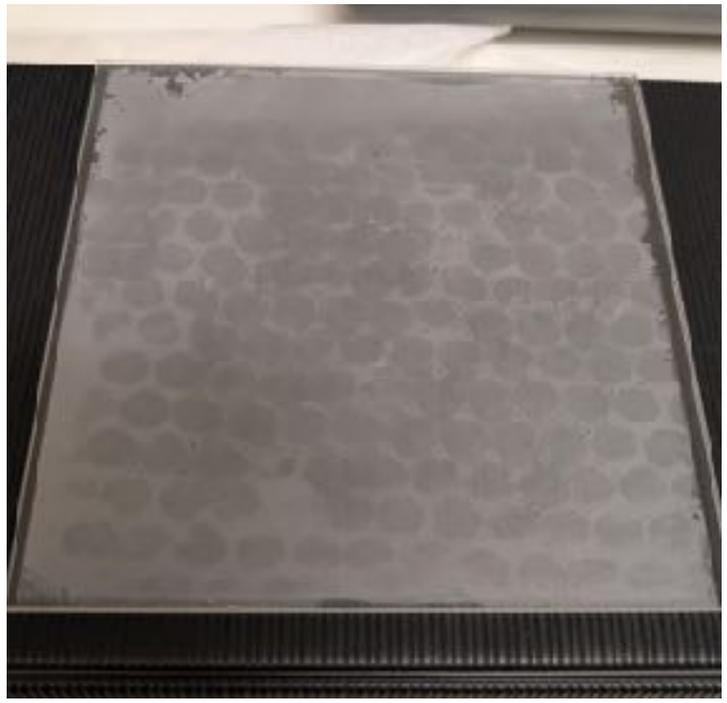
# Heating test on B33

- **Another attempt on the Quartz sample with patterns**
  - A Quartz substrate sample with the blanket with obvious patterns for easy observation
  - Using the modified heating plate
  - Cover plate from the last test flipped, using the residual pTP as temperature indicator
  - Heated up to 170C and hold for 1 mins(residual on the cover plate pTP disappeared)
  - Remove the cover plate after cooling
    - Only a little strip off on the edges
  - Still limited improvement on uniformity
  - Will go through the details with Yimin

**Yimin's results**







# 260-L System Upgrade Budget Estimation

- For the purity upgrade, we need to build a larger inline filter with about one order for magnitude more materials
- The budget estimation table below, total is **$7,339.92**

| Item | Description | Qty | Unit Price (USD) | Total (USD) |
|---|---|---|---|---|
| Short half nipple (stainless steel) | 6" Conflat flange, 4" ID, 8" length (Ideal Vacuum) | 1 | $500 | $500 |
| Long half nipple (stainless steel) | 6" Conflat flange, 4" ID, 24” length (Custom by KHY) | 1 | $1,000 | $1,000 |
| Molecular sieve filling | For short unit | 3 kg | $42/kg | $126 |
| GetterMax 233 Copper Catalyst | For long unit | 15 kg | $164/kg | $2,460 |
| End cap 6" Conflat → 2.75" | — | **2** | $250 | $500 |
| 2.75" Conflat → 1/2" Swagelok | — | 2 | $100 | $200 |
| 1/2" stainless tubing | 6 meters | 1 | $149 | $149 |
| Valves | Swaglok SS-8G | 4 | $358.73 | $1,434.92 |
| Relief valve (50 psi) | — | 1 | $120 | $120 |
| Heating tape | — | 6 | $75 | $450 |
| Plumbing fittings | Avg. $35 each | **10** | $35 | $350 |
| Stainless steel wool & mesh | McMaster-Carr | 1 | $50 | $50 |
| Insulation material | Available on hand | — | $0 | $0 |
| Heating controller | Available  on hand | - | $0 | $0 |