

Polarized Cathode Development Update

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Background

- We've been working on producing polarized sources with NEA deposition.
 - QE and polarization rates are generally good, but cathode lifetimes are comparatively poor.
 - Have been working on trying to make more robust cathodes with longer lifespans by experimenting with different thin films on the base GaAs cathode layer.
 - Currently using layers of Cs, Te, Sb, K, first to replicate prior results and then to (hopefully) improve upon them.

Previously performed Deposition procedure(s):

Procedure has been to activate Te,Cs,K with Sb,Cs,K deposition.

The procedure went as follows:

(i) Te deposition followed by Cs [1]

(ii) Deposition of another layer of Te [2]

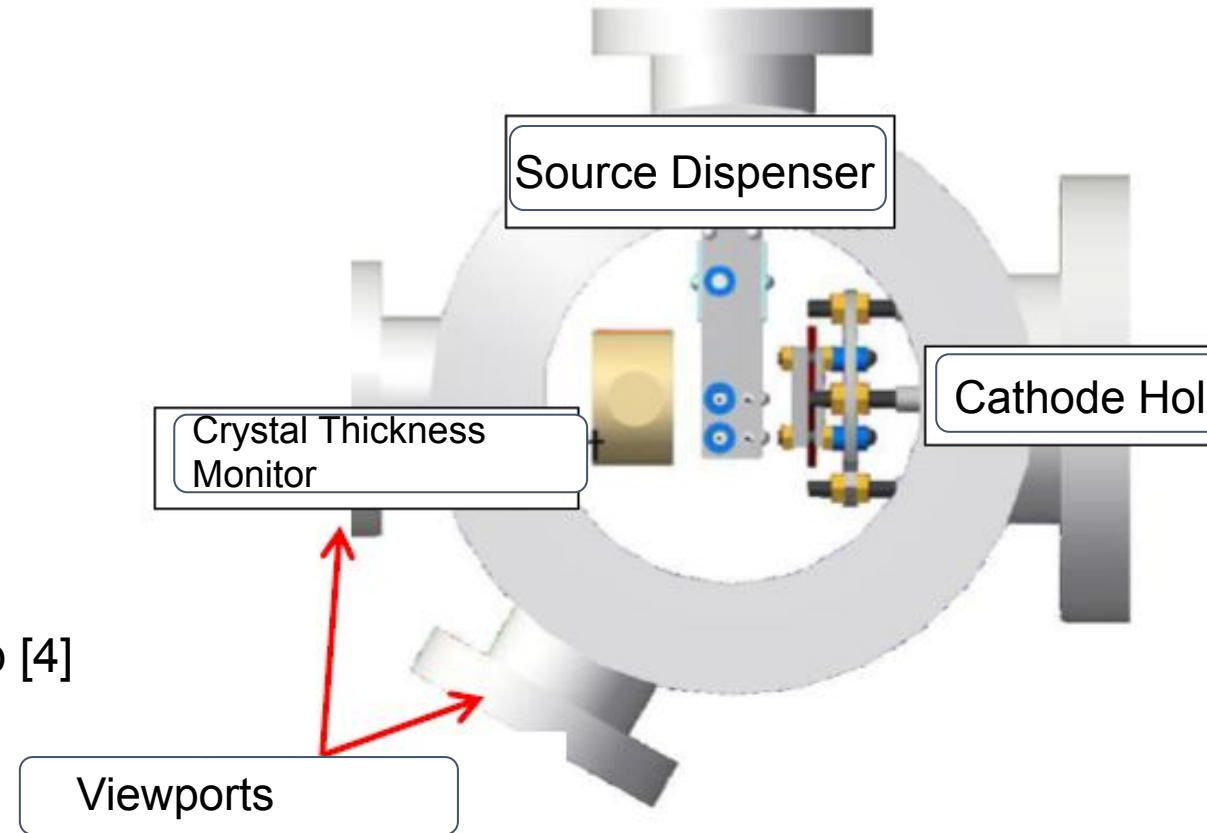
(iii) K,Cs deposited [3]

(iv) After Cs, add a layer of Sb [4]

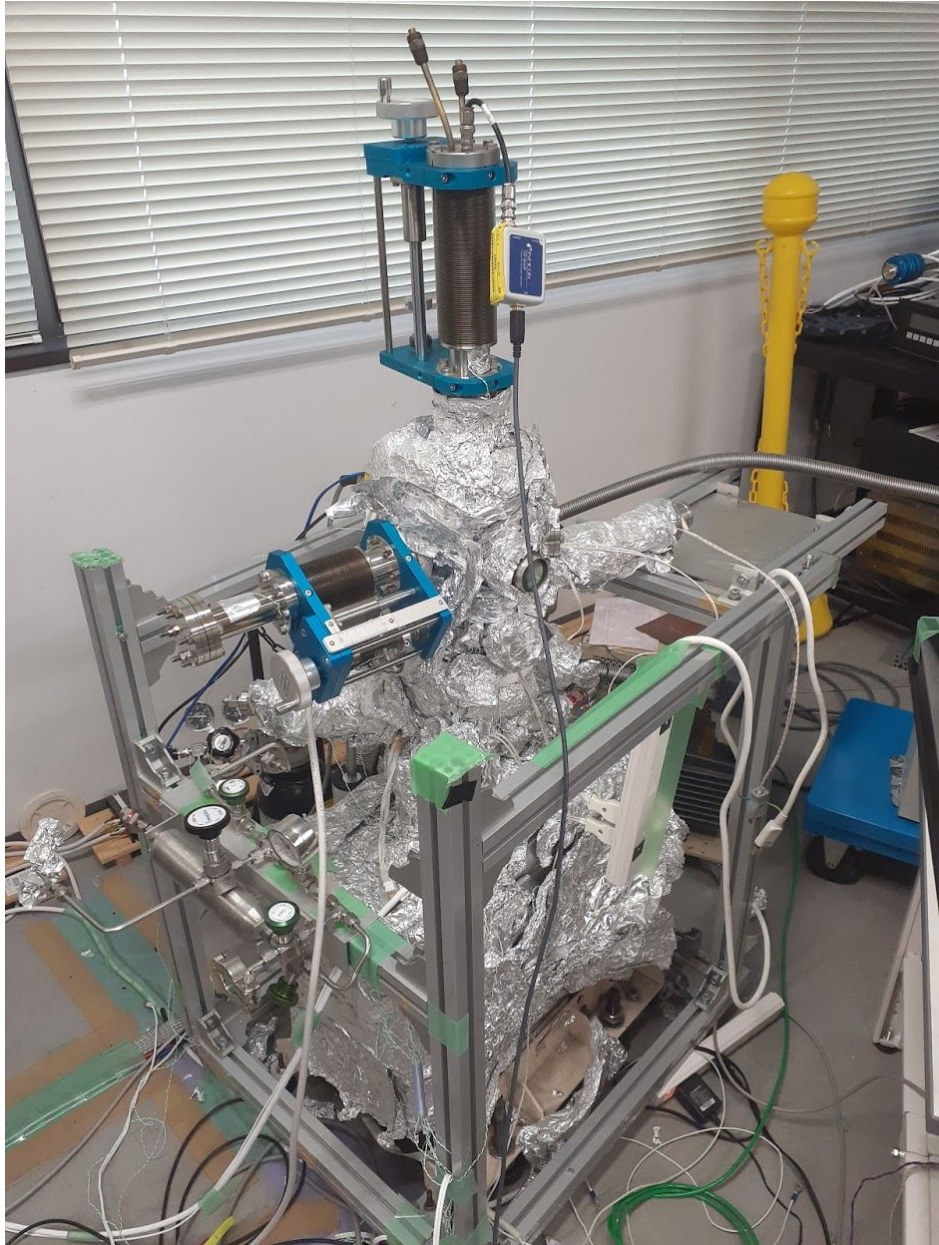
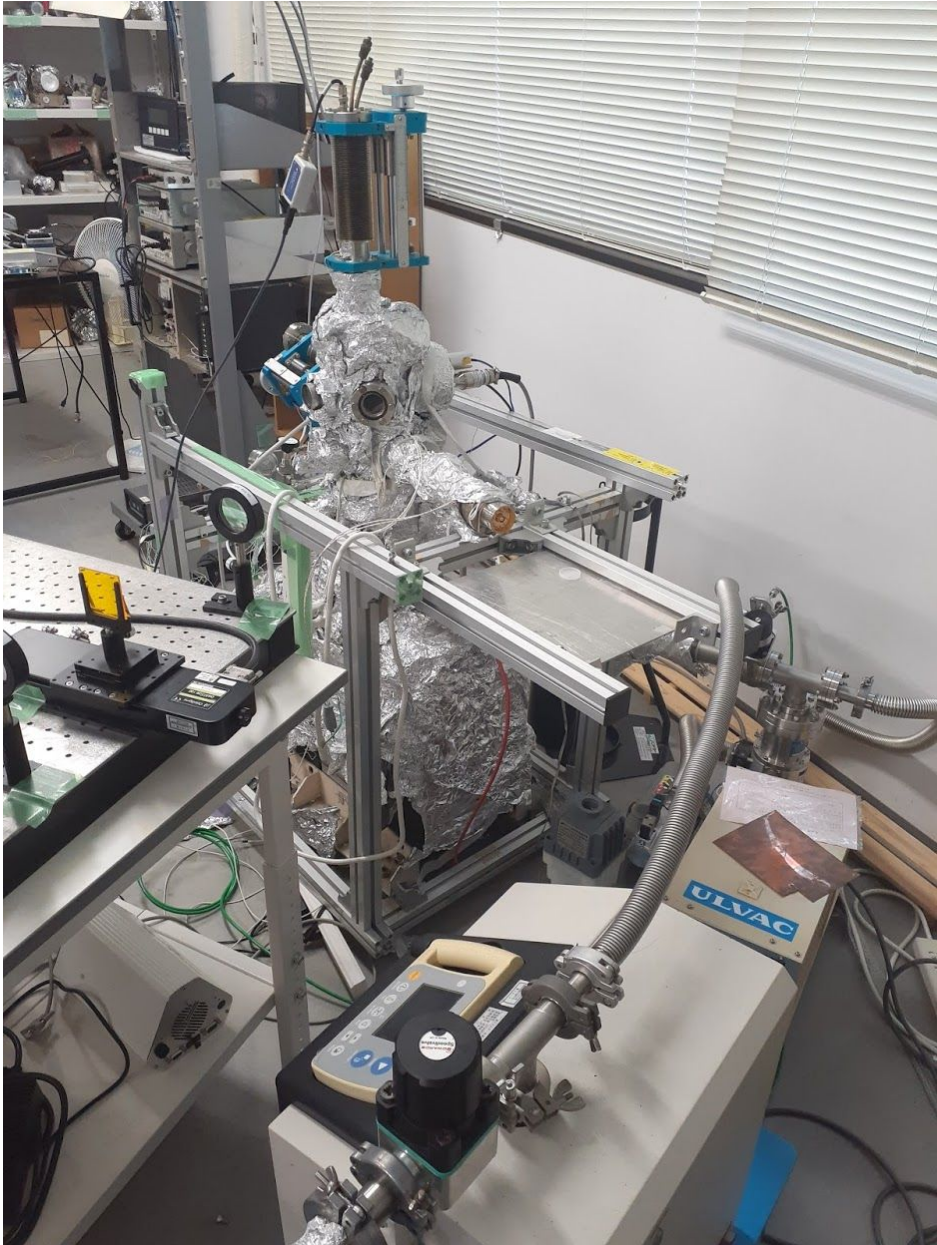
(v) Deposit a layer of Oxygen-exposed Cs, followed by Sb [4]

(vi) K,Cs [5]

for comparison, (x) another layer of O-exposed Cs
etc.



Our Setup: Vacuum Chamber



Our Setup: Xenon lamp

Used for testing QE response from cathode with tunable wavelengths



Preparation for new experimental run



We are currently beginning a new run for Cathode production. We had planned to start last month but our vacuum pump needed to be serviced (currently out for work).

We also had to reconfigure the remade source holder to prevent shorts -- the previous wiring to the dispensers had to be reconfigured.

We acquired new Cs and K dispensers, along with Sb pellets we already had available.

In addition, we had an in-person meeting with Guo Lei from Nagoya for final material preparation and cleaning, along with DAQ/control system improvements.

As mentioned earlier, we are currently having our vacuum system repaired, and during that time also purchasing a new control PC. A new student has also joined the experiment and plans to write her (undergrad) thesis on this experimental run.

Summary

- New experimental run of thin-film cathode production set to start at HU
- Since B2GM, we've acquired materials and reconfigured our dispenser to avoid mechanical issues.
- Have also met with colleagues in-person for mechanical prep, etc.
- Originally planned to start last month, delayed by vacuum troubles.
 - During the repair time, upgrading our DAQ/control system
- We've also been continuing collaborative work with KEK and Nagoya and are exploring a potential test beam with LANL.