LAr R&D Progress Updates

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5/20/25

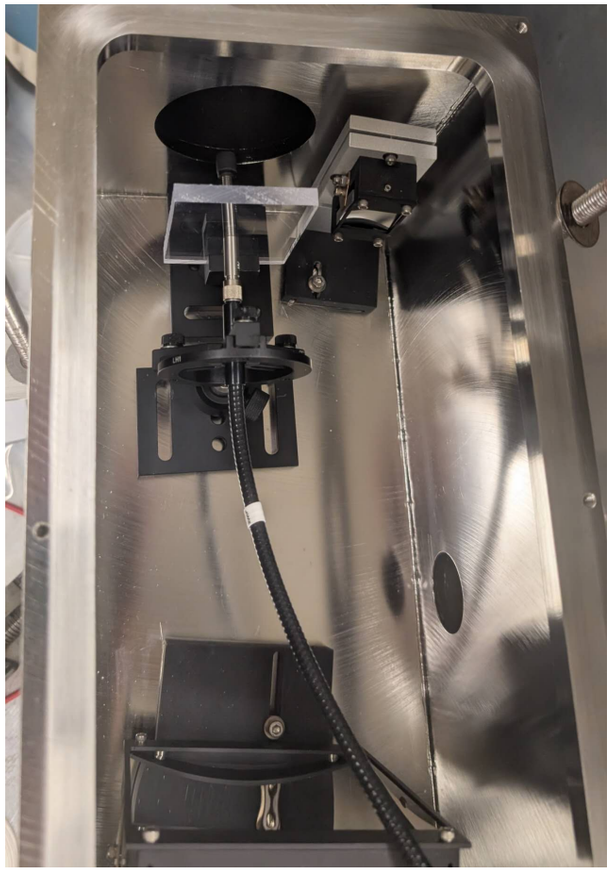
BROOKHAVEN
NATIONAL LABORATORY

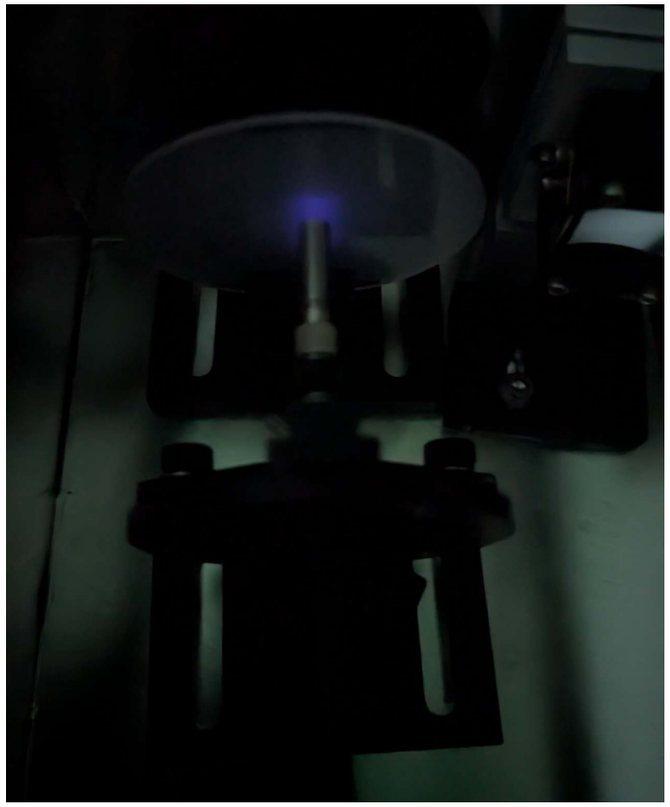
Lab Safety and Space Management

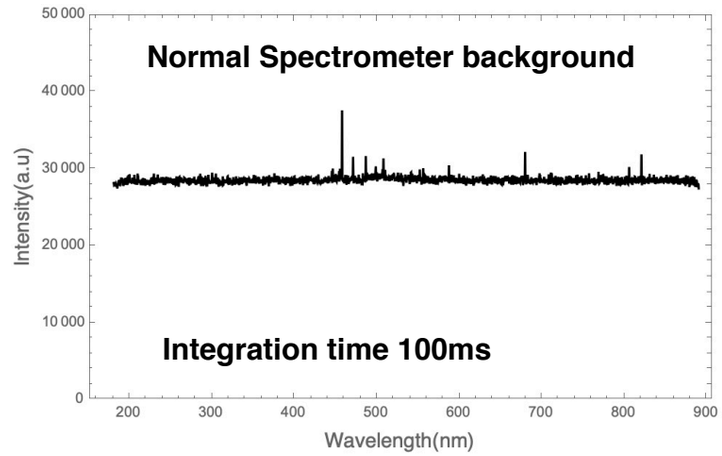
- **Rolling door maintenance**
  - The rolling door near our area was served
  - The shock noise when opening the door is not gone
- **Door locking issue**
  - Please check the highbay doors when you visit
  - After 4:30pm, all the doors should be locked
- **Building power outage**
  - Please let me know if there is any equipment damage associated with the recent outage

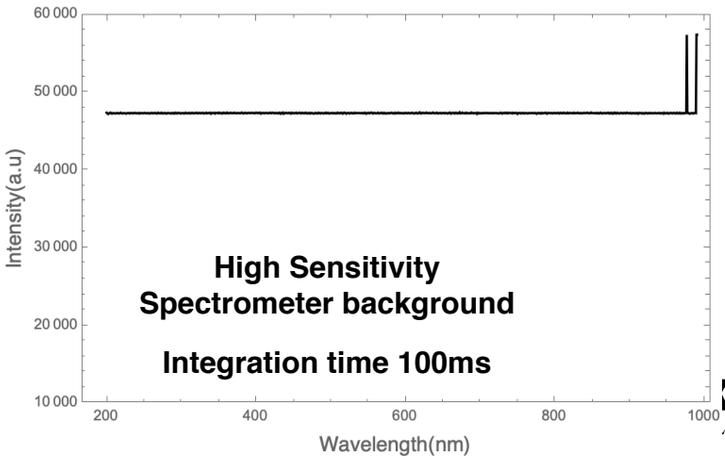
PTP coating emission measurement Updated

- **Setup (Transmission mode)**
  - The same as the previous with collection on the back of filter
  - Light collection with 0.125 UV collimator+ UV fiber
  - High sensitivity UV spectrometer with 200nm LDL, borrowed from Thomas, much better SNR
  - Received a BC408 scintillator as a reference
  - A similar high sensitivity spectrometer is on order



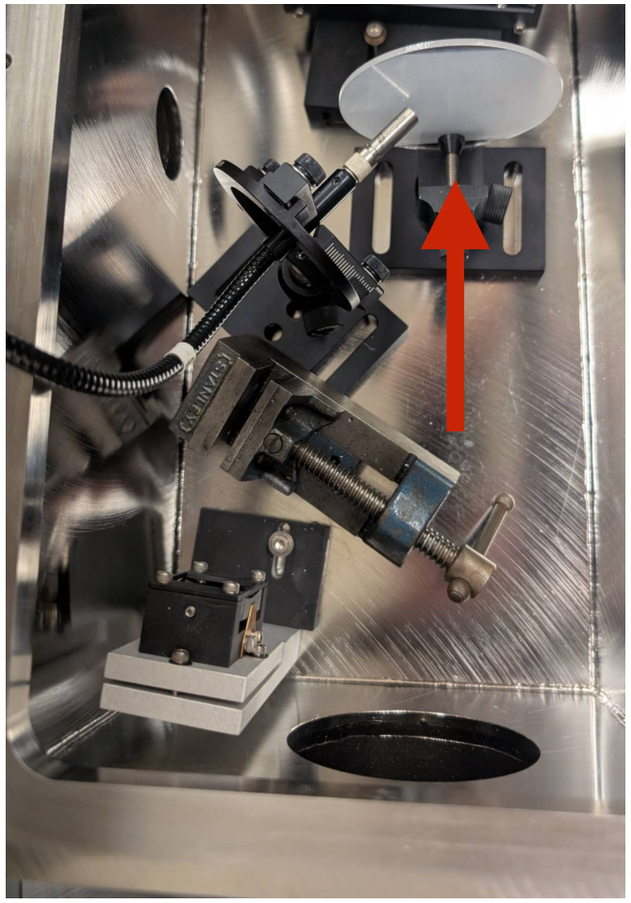


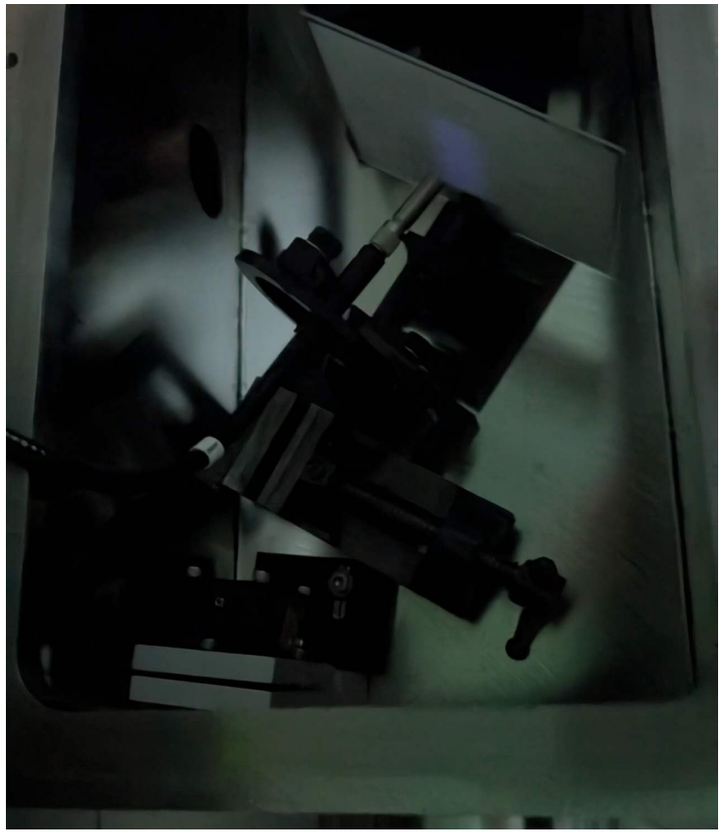


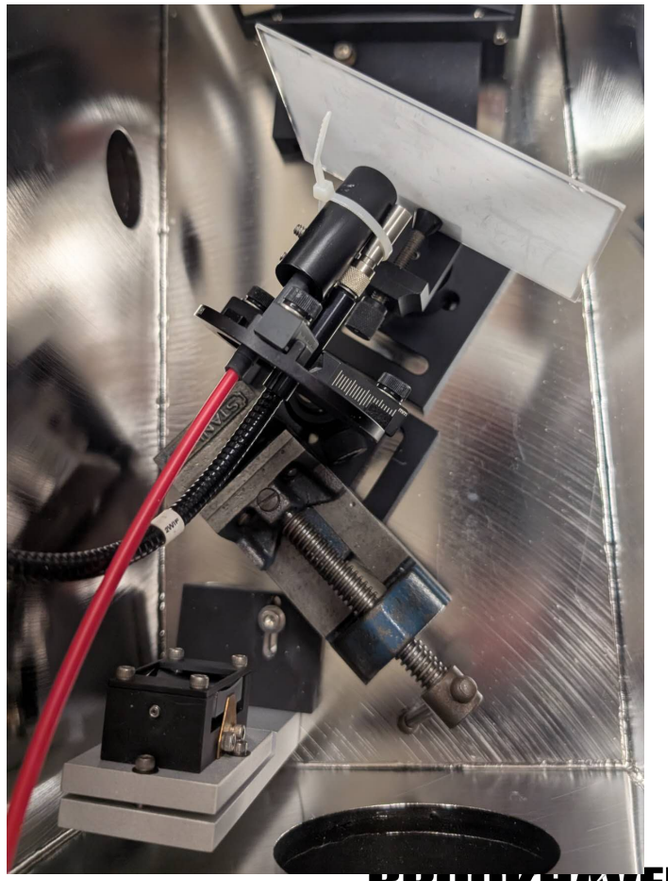


PTP coating emission measurement Updated

- **Setup (Reflection mode)**
  - Setup the collimator in front of the filter
  - Tried to achieve the maximum signal
  - Difficult to setup with the limited space, the collimator shadow also blocks some lights
  - Still was able to collect signal with lower amplitude

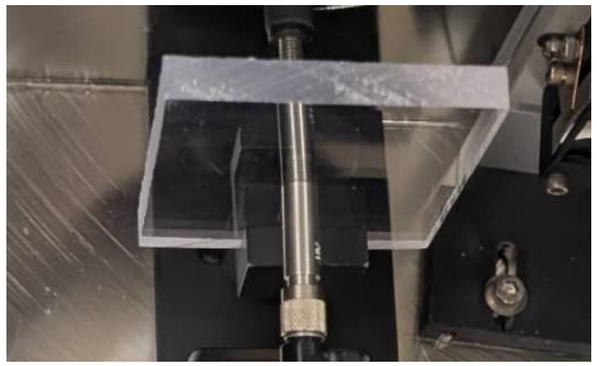


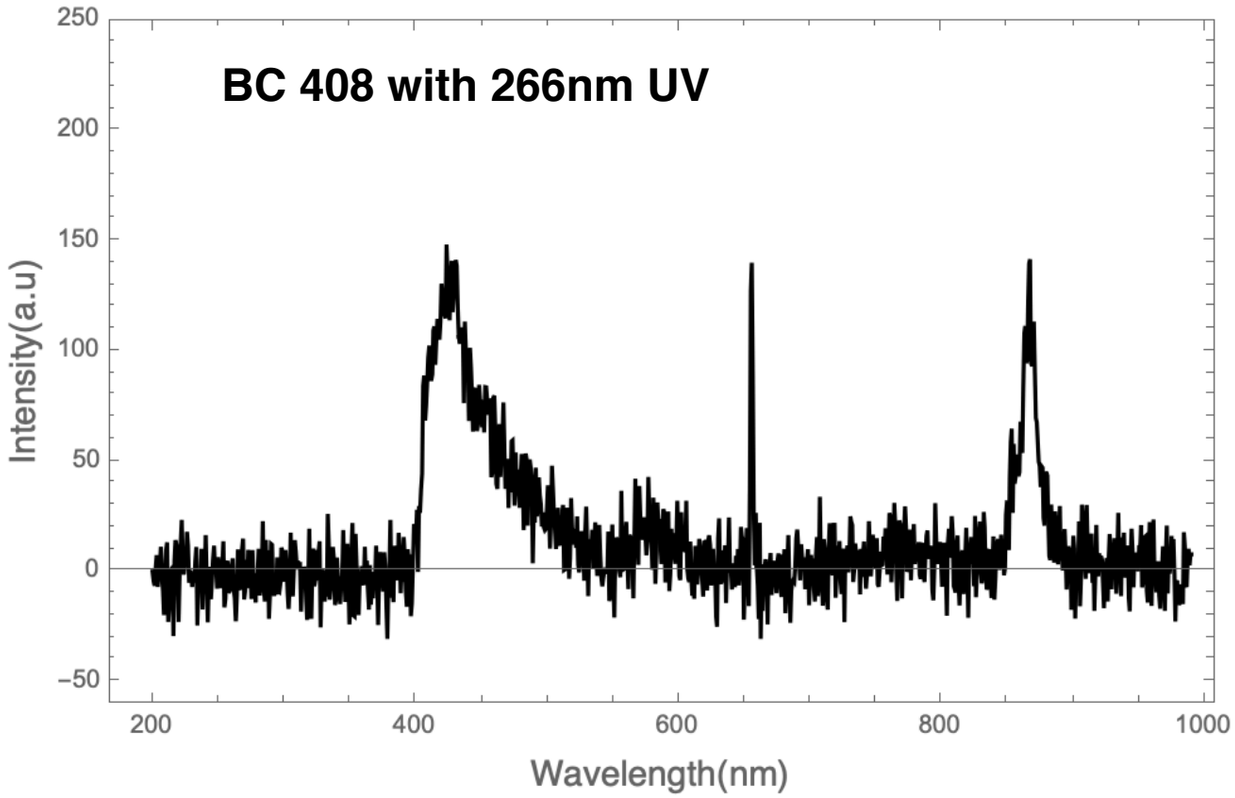


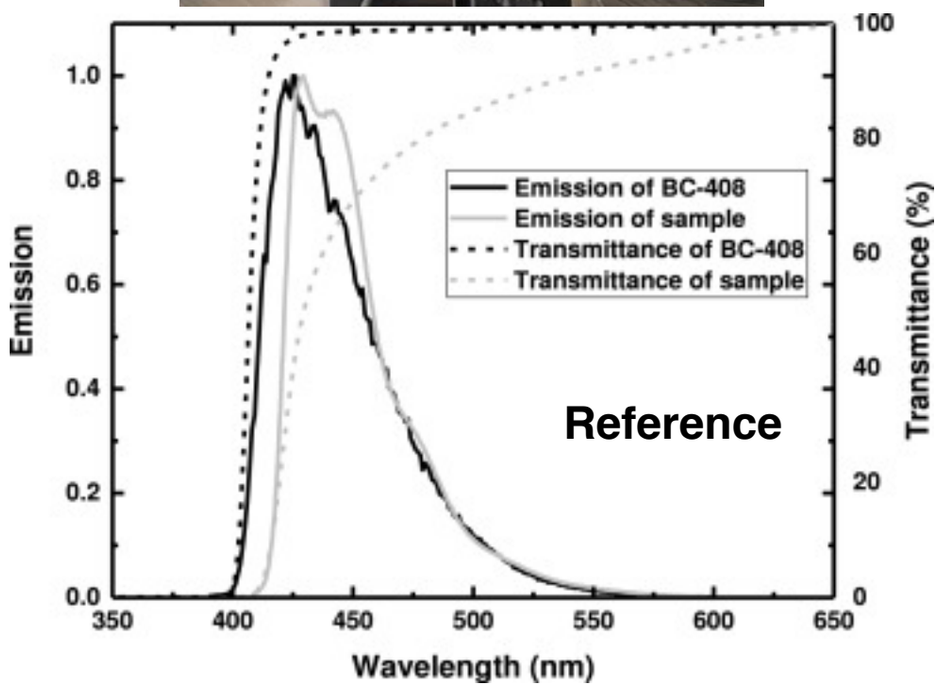


BC408 scintillator emission measurement

- **266nm single wavelength emission (Reflection mode)**
  - Received a sample of BC408 plastic scintillator from Sean
  - The emission observed on BC408
  - The emission spectrum agrees with the reference



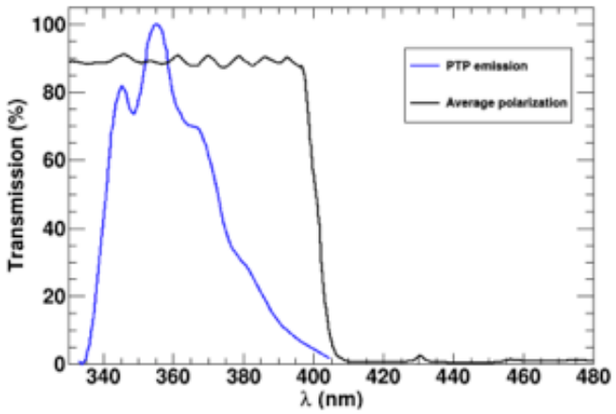




PTP coating emission measurement

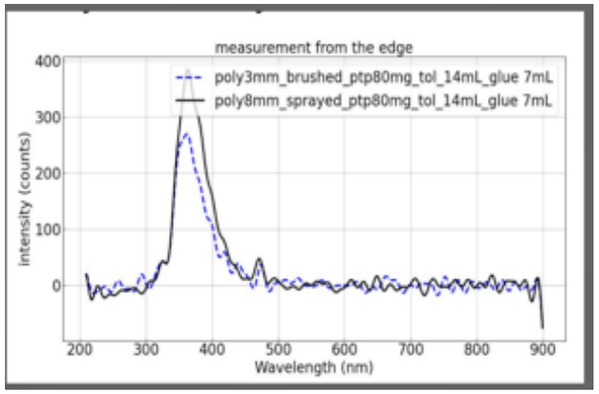
- **266nm single wavelength emission (Transmission mode)**
  - The emission is still low
  - This spectrometer has cooling on the CCD to ~-20C with much lower noise
  - The relative amplitude of the emission is comparable
  - Clear peak with long integration time 15-30 mins

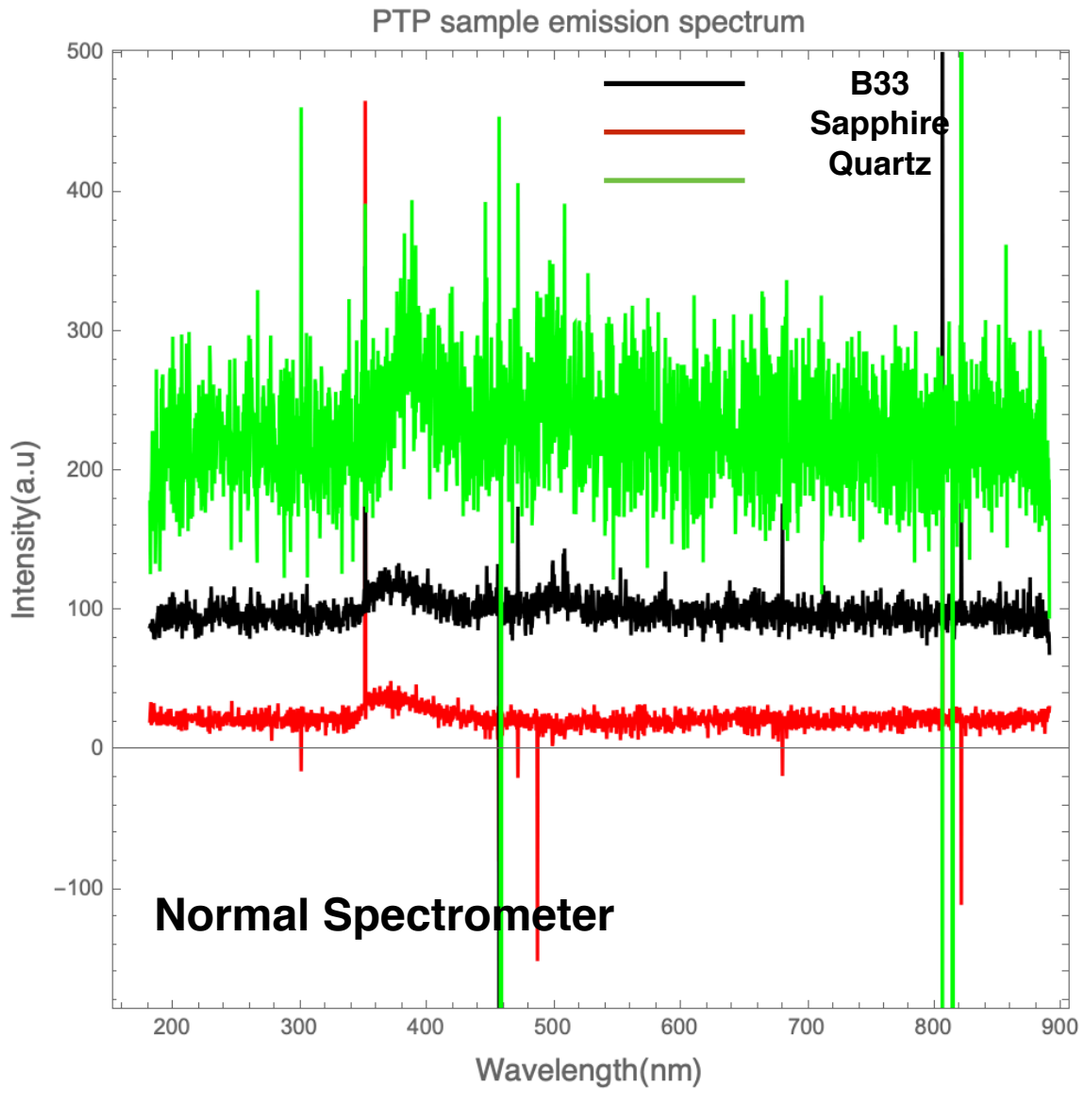
ARAPUCCA

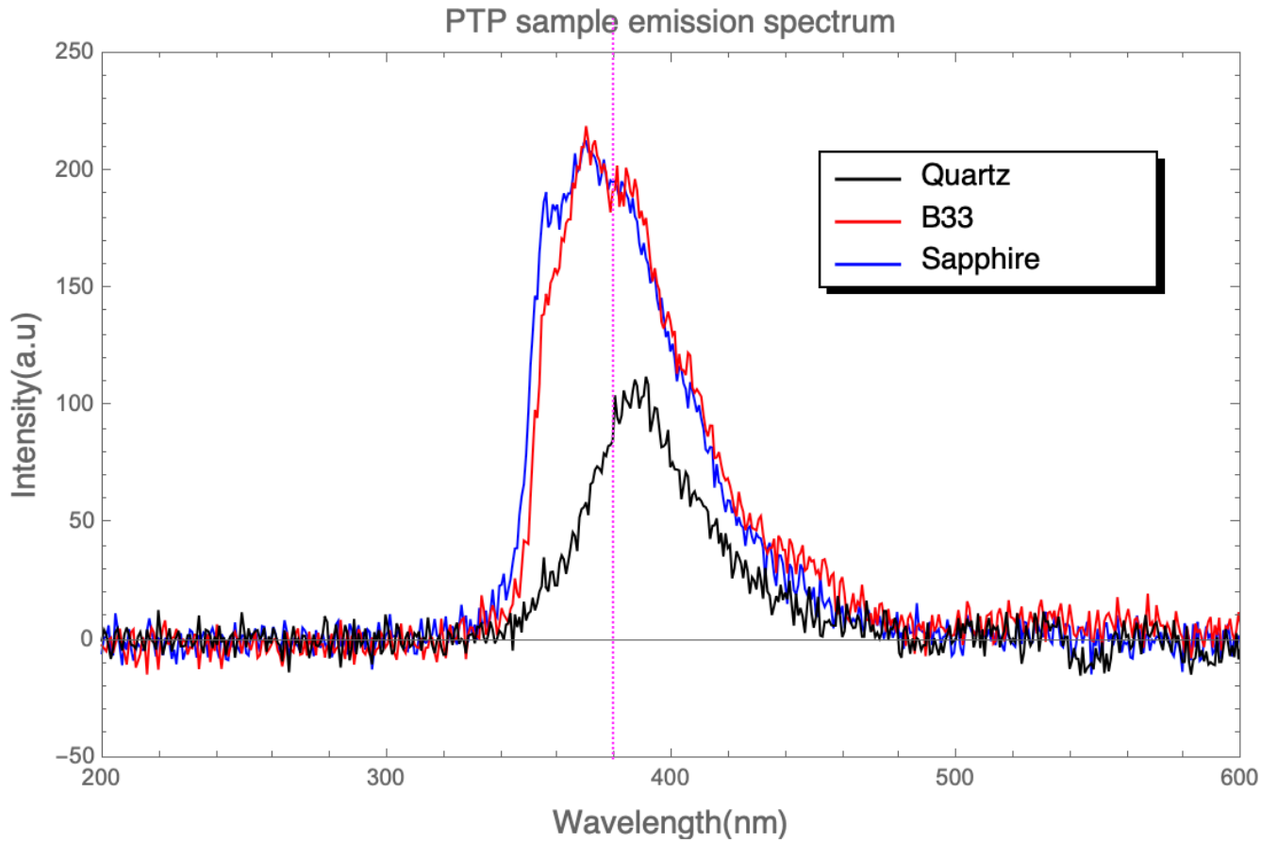


(a) Dichroic filter transmission and p-terphenyl emission spectra

SBU results







High Sensitivity Spectrometer

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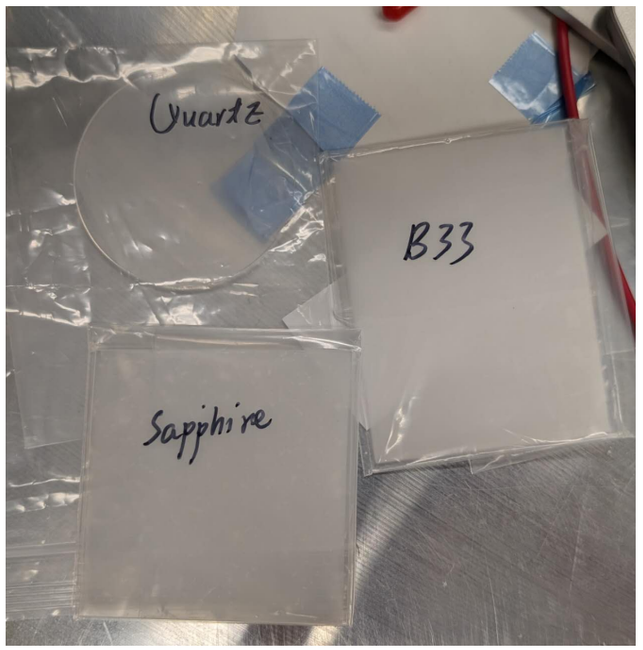
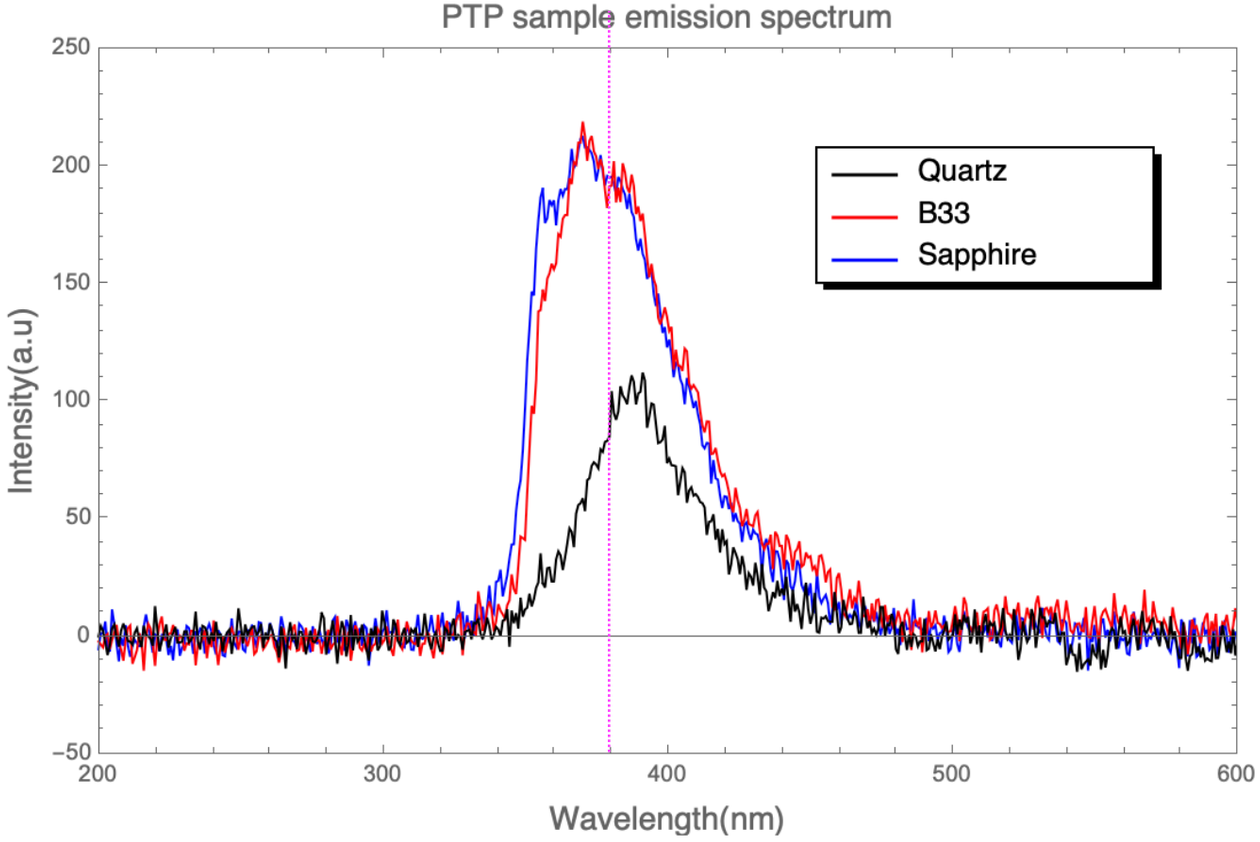
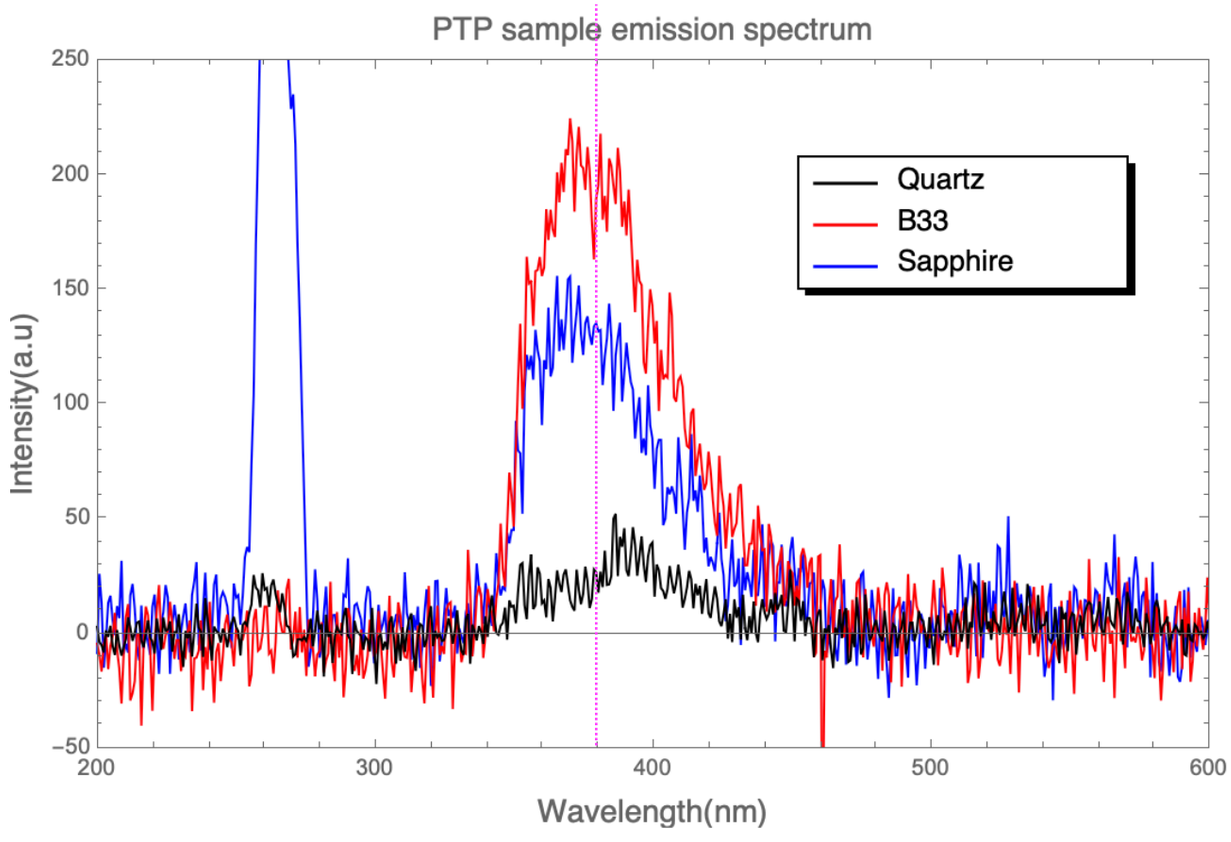
PTP coating emission measurement

- **266nm single wavelength emission (Reflection mode)**
  - The emission is very low in general
  - Tried get the maximum collection
  - Take much longer integration to get about the same amplitude for comparison, ~40-60mins
  - Amplitude is correlated with the coating quality
  - The emission approximately agrees with the transmission mode





Transmission Mode

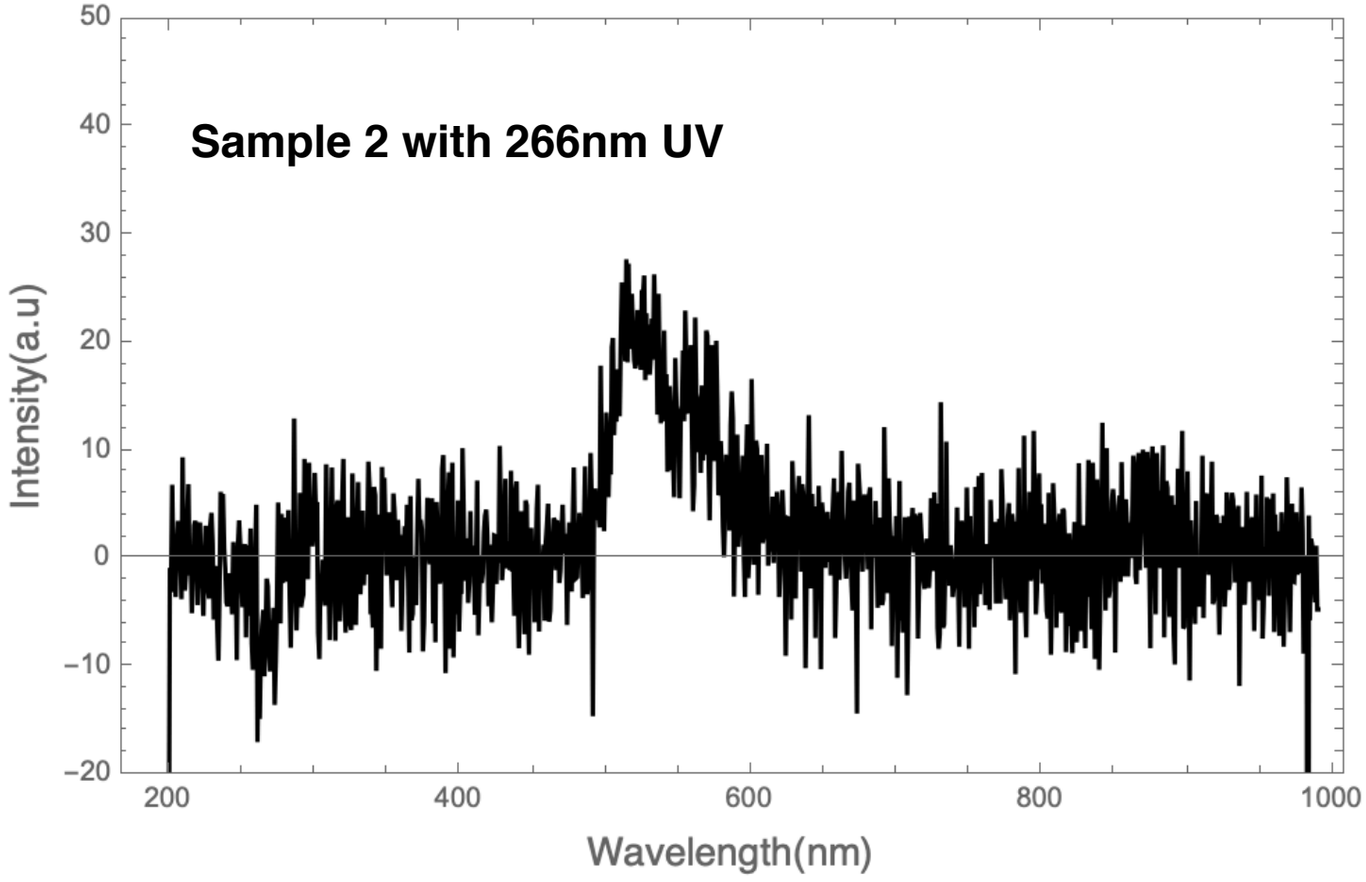


Reflection Mode

Diamond Samples Emission Spectrum

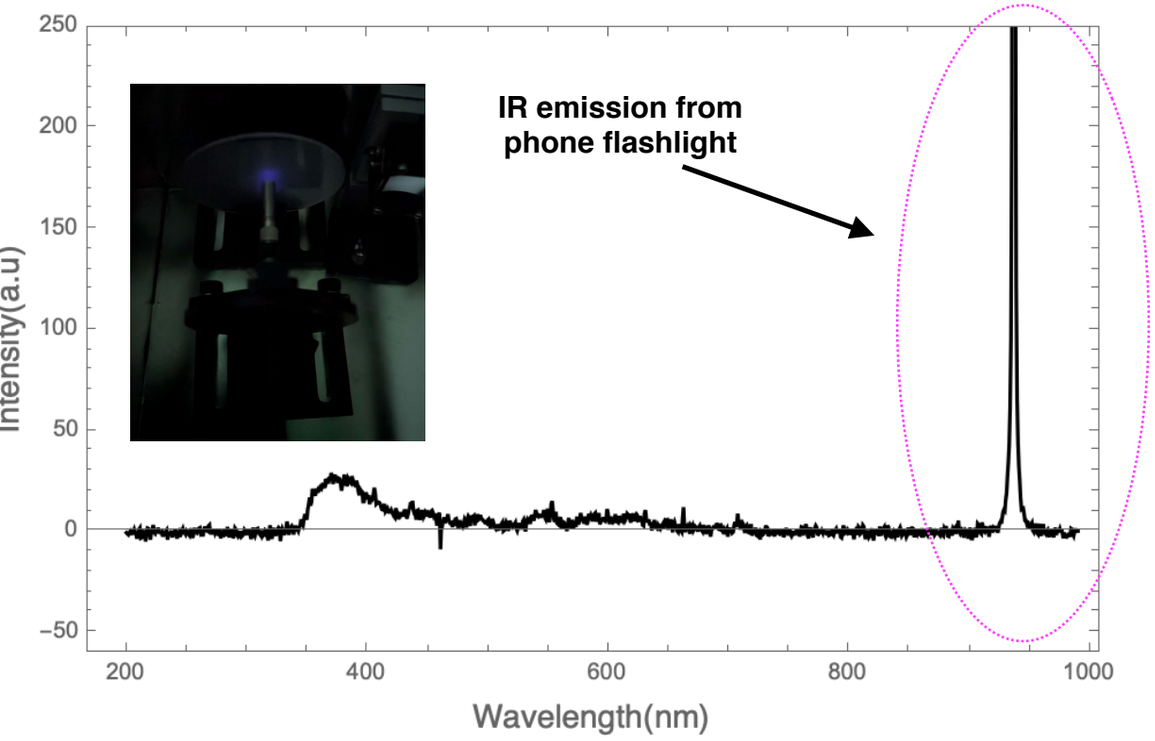
- **266nm single wavelength emission (transmission mode)**
  - Still no signal on the full diamond sample(sample 1)
  - Weak emission on diamond powder coating sample (sample 2)
  - Only tried with transmission mode

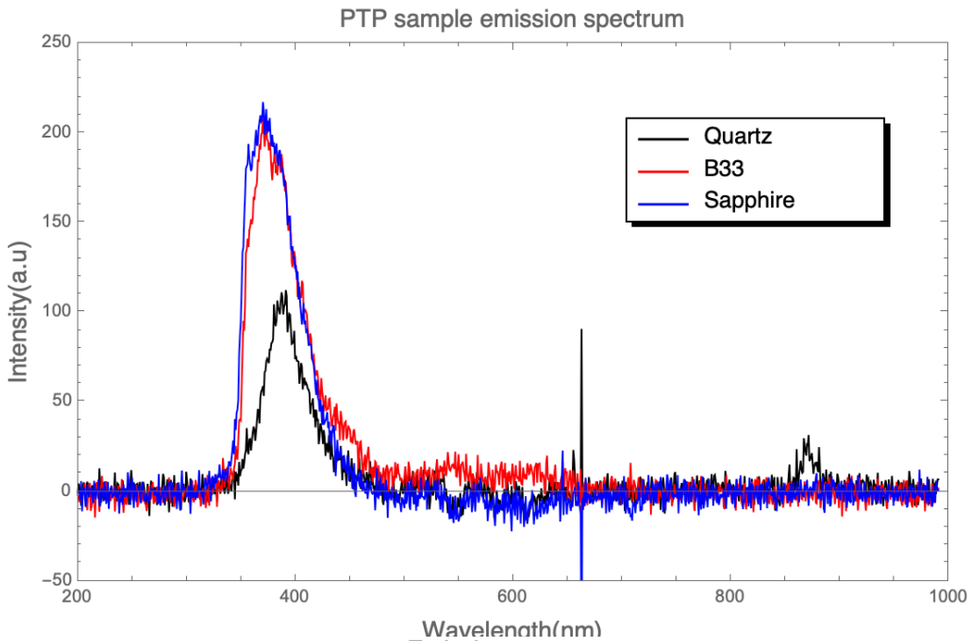
Sample 1 **Sample 2**

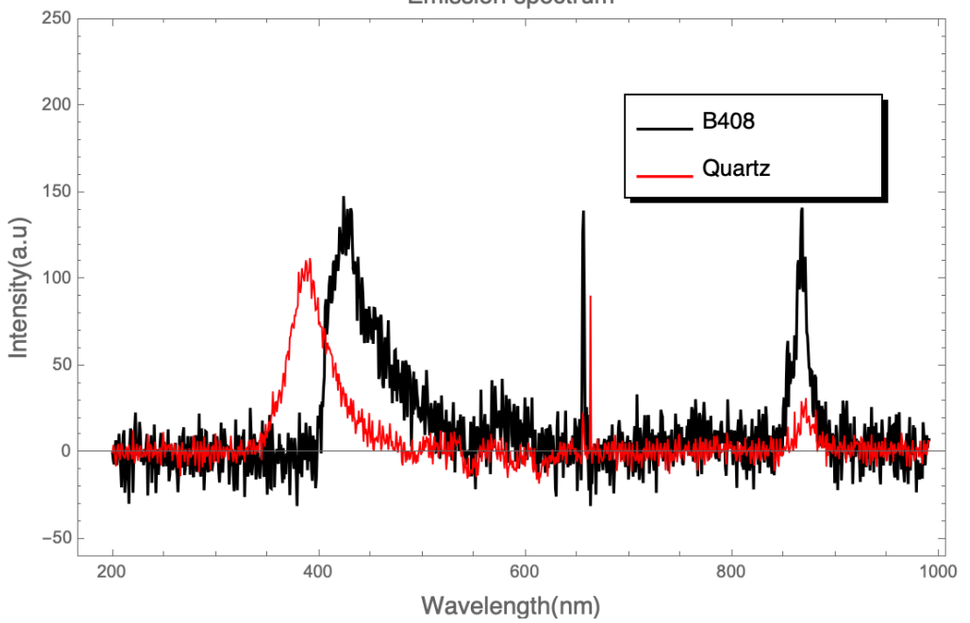


PTP coating emission measurement

- **Some additional observations**
  - The night version mode on the phone has IR emission from the LED
  - There is a peak for quartz sample at IR region <900nm, close to the IR peak observed on BC408







Discussion with LaserFiberOptics

- **Sample production**
  - Jay, Milind and me had a discussion with Yimin about the current progress and future plan
  - Yimin has installed the temperature control system with succeed coating in the lab to a larger coating machine
  - He is going to product 60 pcs(20 each for B33, sapphire, quartz) with 143.75 x 143.75 mm size specified in the current contract
  - The samples are expected to delivery by the end of June, extending the current contract for another month for some contingency
  - Initiating another R&D subcontract with Yimin for future development