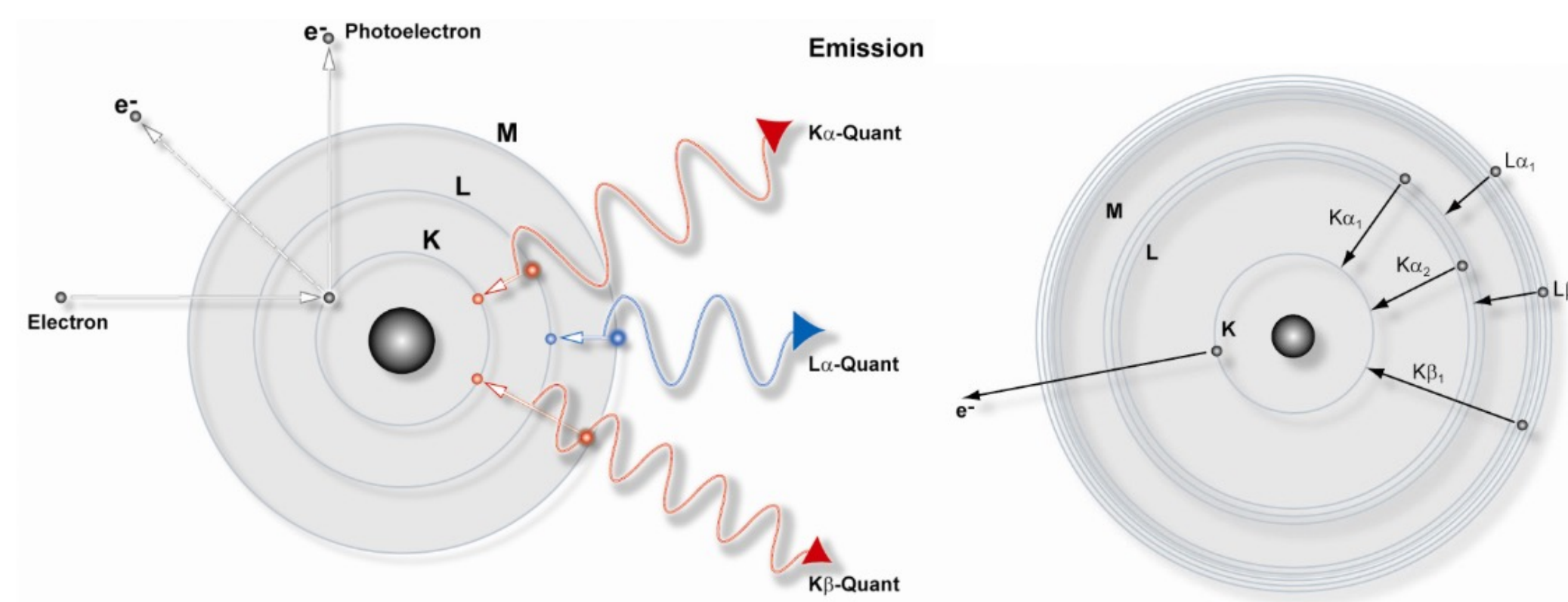


Introduction

Why monitor trace elements in the laboratory air?

- The air around us has large amounts of trace copper (⁶³Cu), zinc and other elements
 - ⁶⁷Cu is used to treat multiple types of cancer
 - Medical ⁶⁷Cu must be pure without atmospheric Cu
- How do we monitor trace elements in the air?

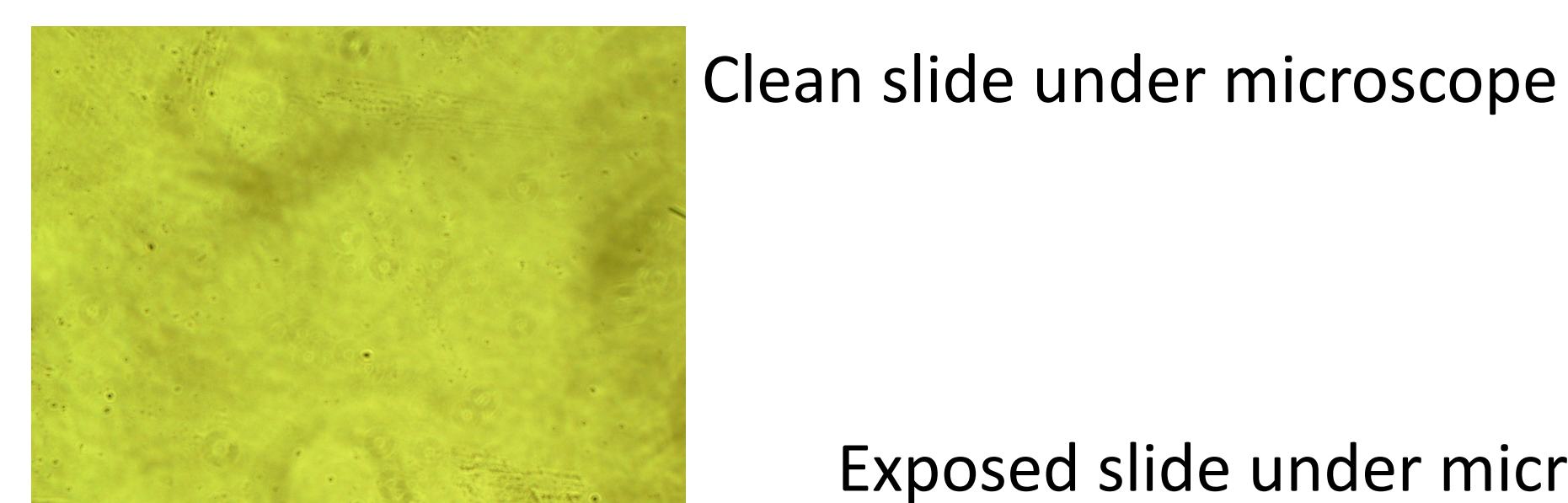
- X-ray fluorescence techniques (XRF) can identify trace elements by their K-shell emission lines
- Bruker S2 Picofox TXRF (Total Internal Reflection XRF spectrometer for our analysis)



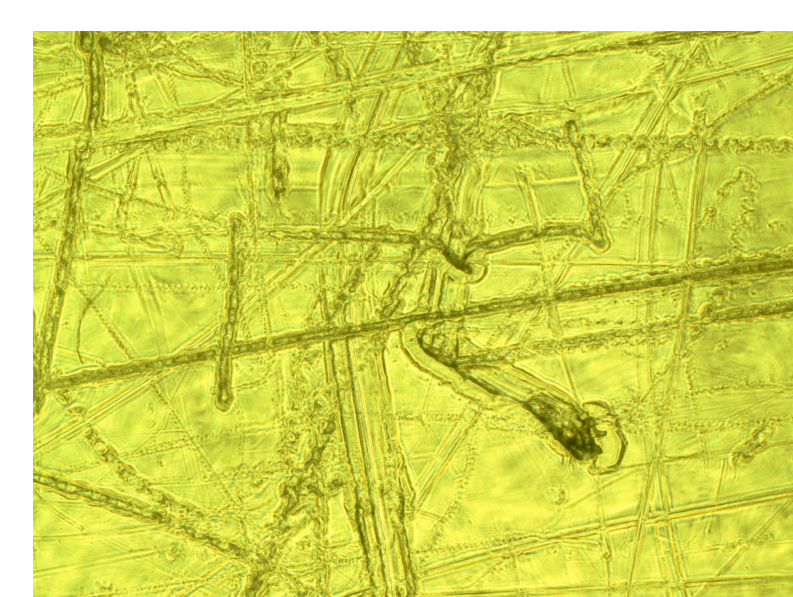
- Lighthouse Solair 3100 device used to count particles from <0.3μm to 10μm

Quartz Slide Preparation

- Clean with 200 proof ethanol and lint-free wipes
- Soak in RBS50 solution and microwave in deionized water for 5 minutes
- Soak overnight in 10% HNO₃
- Rinse in 18MΩm deionized water and microwave again for 5 minutes
- Rinse with DI water and let it dry under HEPA filter
- Run slides through XRF to check for cleanliness



Exposed slide under microscope



Sampling Procedure

- Air samples
 - Samples are placed into plastic holders then later they will be exposed for 24-hour periods.
- Water samples
 - Samples are prepped by placing 1 μl of silicone in the center of the disc
 - Once silicone has dried place 0.5 μl of water sample in the center of the disc
- Run samples through XRF for 1000 second scan

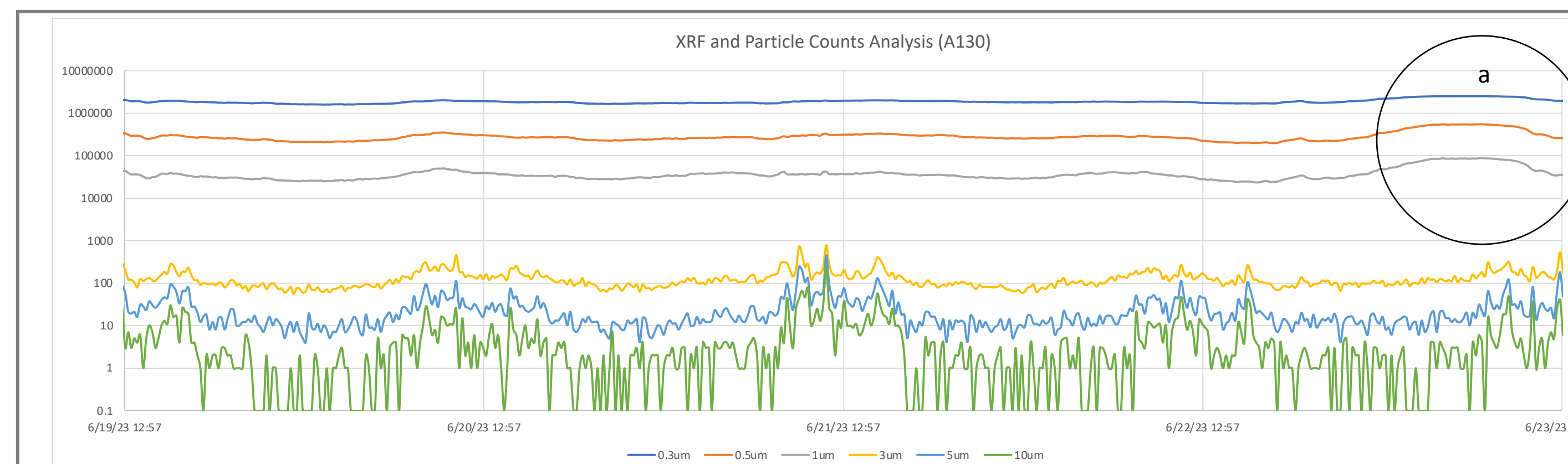


Conclusion

- Negative pressure tent will ensure a consistently clean environment to perform ⁶⁷Cu processing and separation
- No strong correlation was found between particle counts and Cu counts, more study is needed
- There is a lack of consistency in Cu counts in G101
- G101 shows higher Cu counts than A130 we are losing ⁶⁷Cu or too contaminated (further investigation needed)

Future Direction

- Conduct ICPMS studies to determine oxidation states, solubility of the environmental Cu and if it effect on the quality of Cu-67
- Standardize procedures for monitoring of trace elements in the lab air and reagents used
- Experiment with free-standing HEPA filtration to determine effect on Cu



- Lab A130 in 203 was used as a control (graph at left)
- Starting on 6/23 there is a continuous disturbance in both A130 data and G101 data (graph below)
- This is because of the Canadian wildfires that affected air quality in IL area (a, b)

