Coaxial STM Tips for Spatially Dependent QE Measurements
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Photocathodes are a source of electron beams and have a range of applications.
Cesium Antimonide Has a High Quantum Efficiency

STM image of Cesium Antimonide

Goal: collect both photoemission and surface morphology information
Spatially Dependent QE Measurements

STM tip

Cs

Cs

Cs

Cs

e^-
e^-
e^-
e^-
Our STM design requires the tip to be mounted on a tip holder.

**Problem:** The Tip Holder is Conducting and Too Large

How do we get around this?
Problem: The end of tip has to remain conductive and sharp

- Tungsten tip
- Kapton
- Gold
• Apiezon wax melted at ~ 230 °C for 3 minutes
• Apiezon wax easily dissolves in Chloroform
Insulating the STM tip with Kapton

- 10 V for 5 min
- Self limiting reaction
- Control over where deposition occurs

\[ nM + ne^- \xrightarrow{Voltage} M_n \]

Monomer Polymer

Poly(pyromellitic dianhydride-co-4,4'-oxydianiline), amic acid emulsion
Heated for 45 min at 190 °C then for 30 min at 350 °C

Kapton deposition at 10 V for 5 min

Wax protection (wax heated to ~230 °C)

Heated for 45 min at 190 °C then for 30 min at 350 °C

STM Tip Before and After Kapton Insulation
Sputtering Gold on the Insulated STM tip

Kapton deposition at 10 V
for 5 min
Conclusion

• We have prepared an insulated STM tip that would allow us to simultaneously measure quantum efficiency and surface morphology

Future Directions

• The next step is to sputter gold on the tip

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