



## Chemistry and the World Around US

Jeff Spraggins

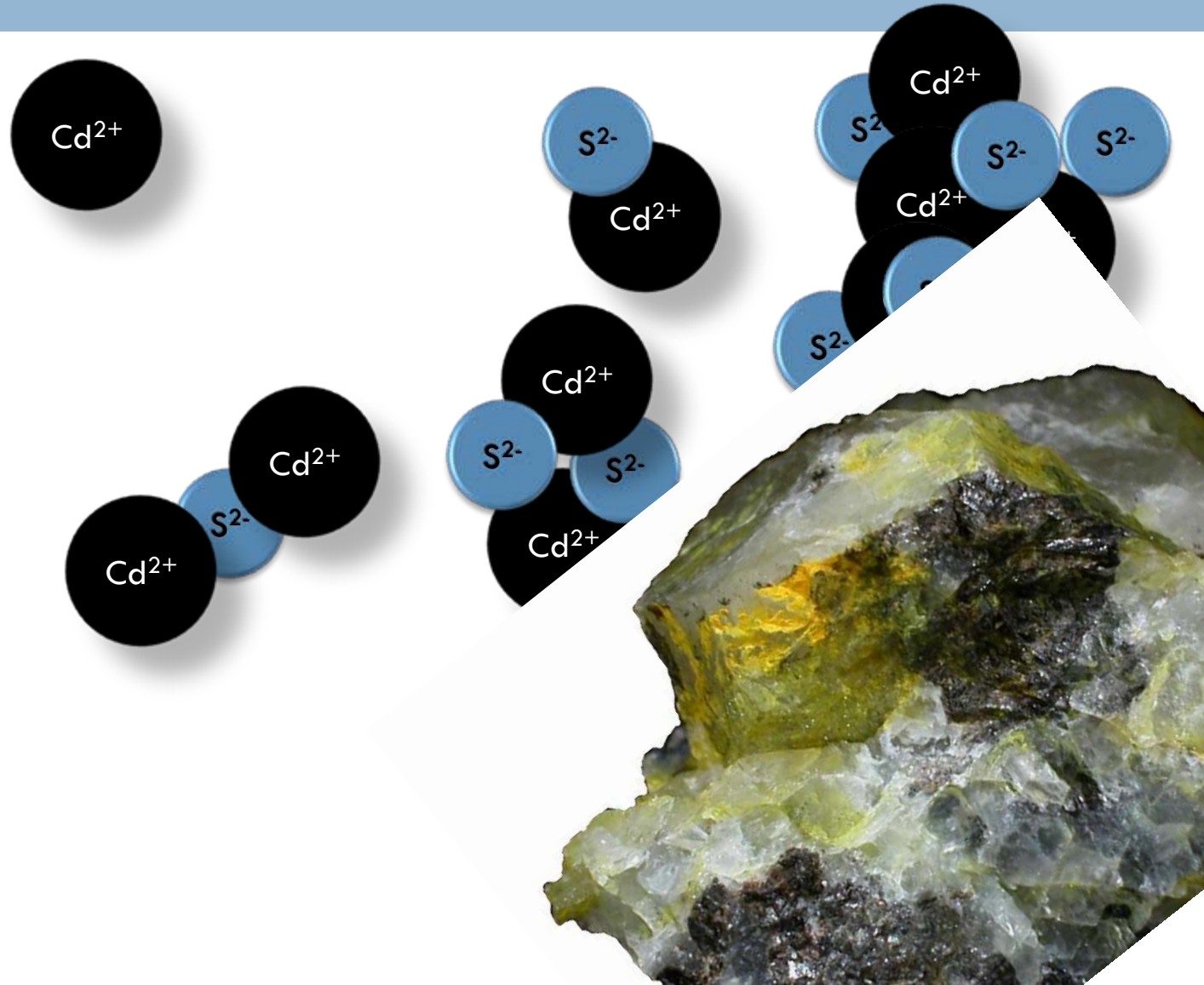
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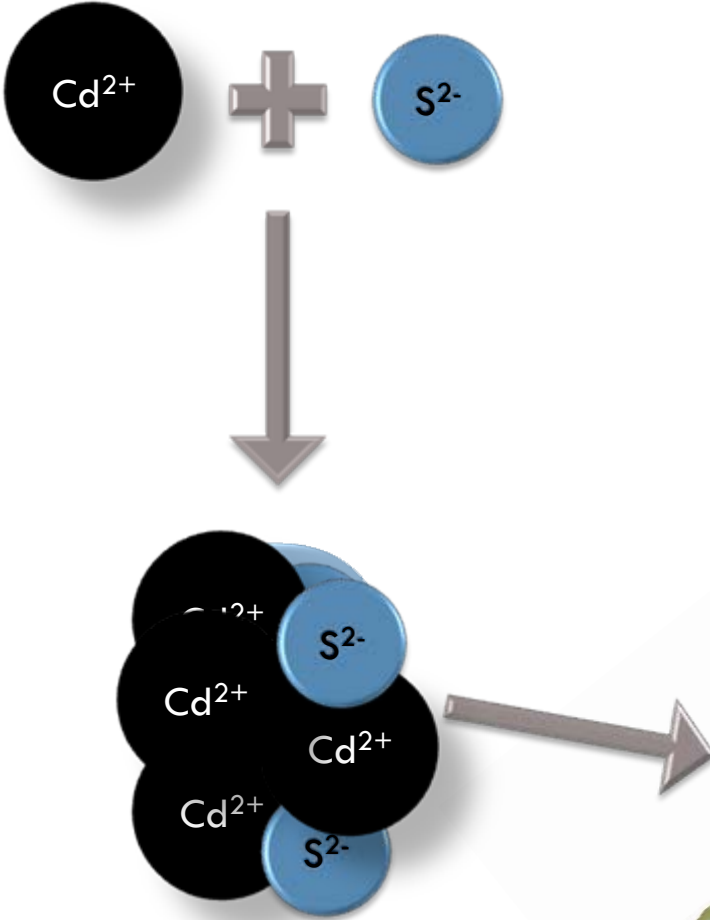
# Making Minerals (Greenocite)

The Chemical  
Process



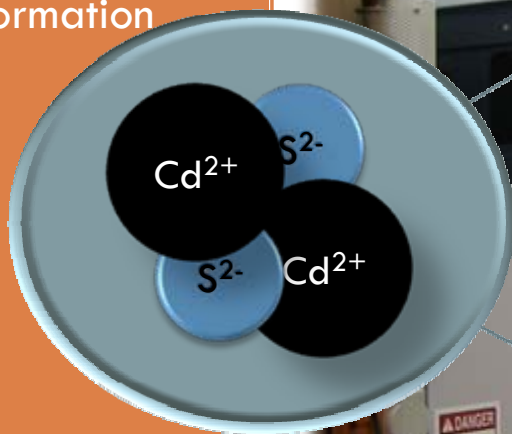
# Making Minerals (Greenocite)

The Question



# How do we address the question?

Understanding Metal Cluster Formation



Mass Spectrometry

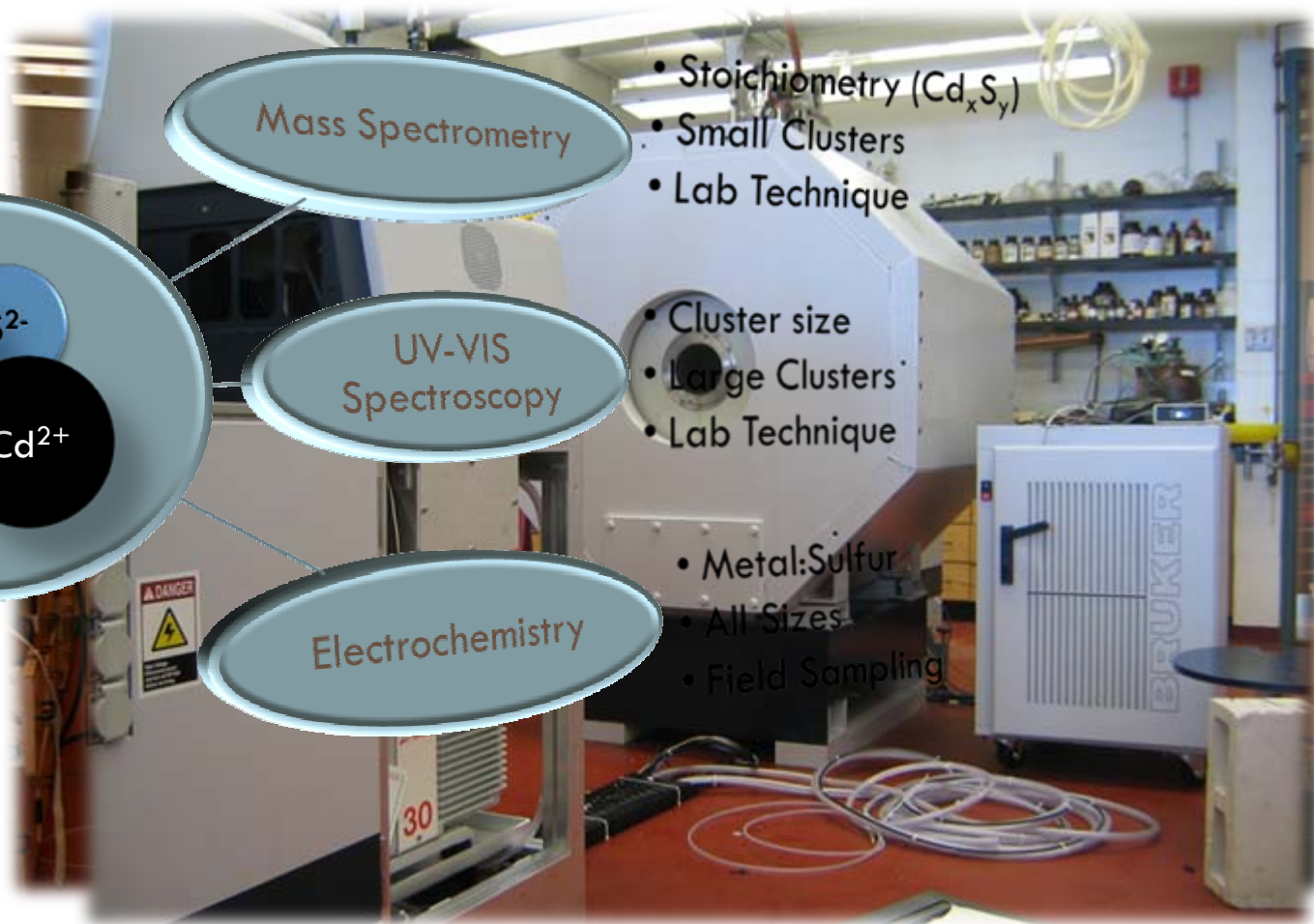
- Stoichiometry ( $\text{Cd}_x\text{S}_y$ )
- Small Clusters
- Lab Technique

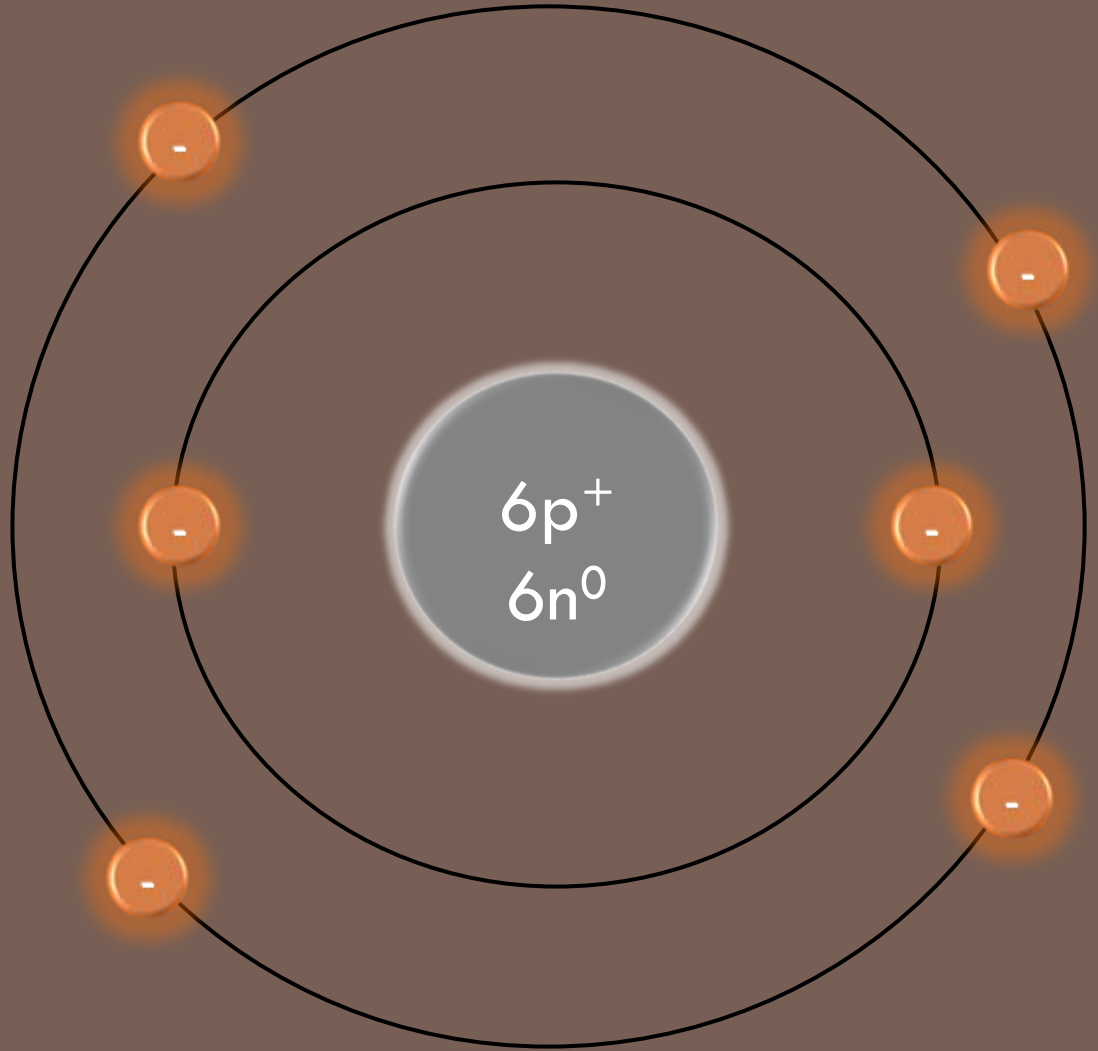
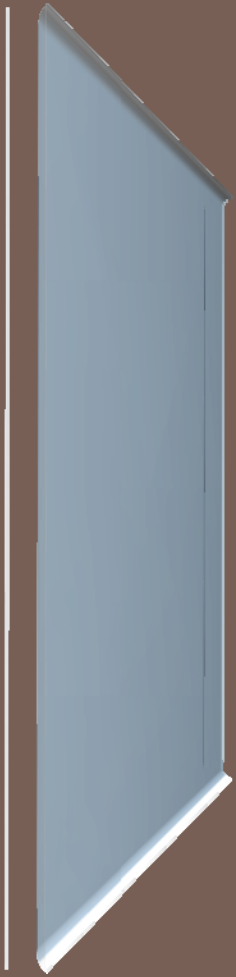
UV-VIS Spectroscopy

- Cluster size
- Large Clusters
- Lab Technique

Electrochemistry

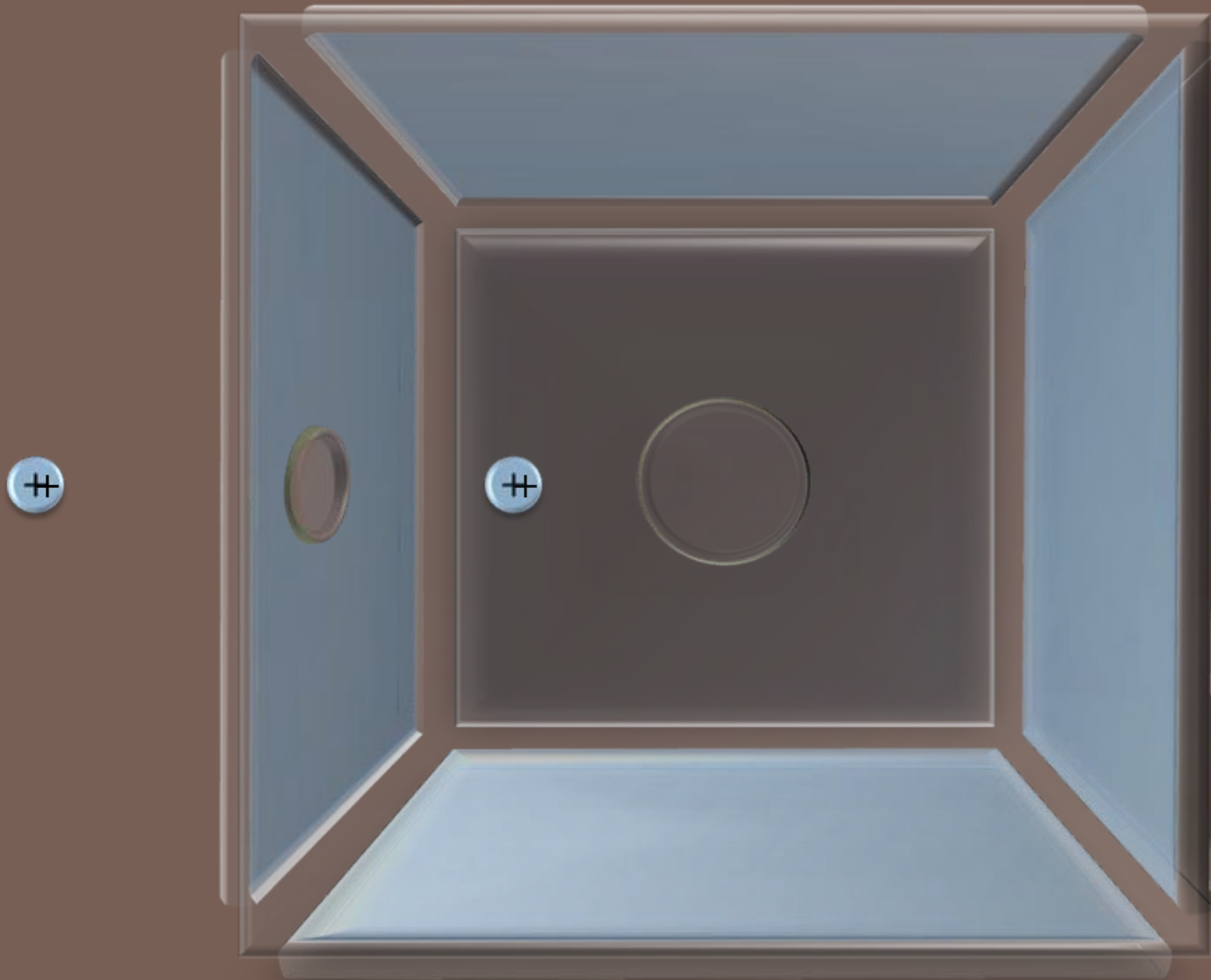
- Metal:Sulfur
- All Sizes
- Field Sampling





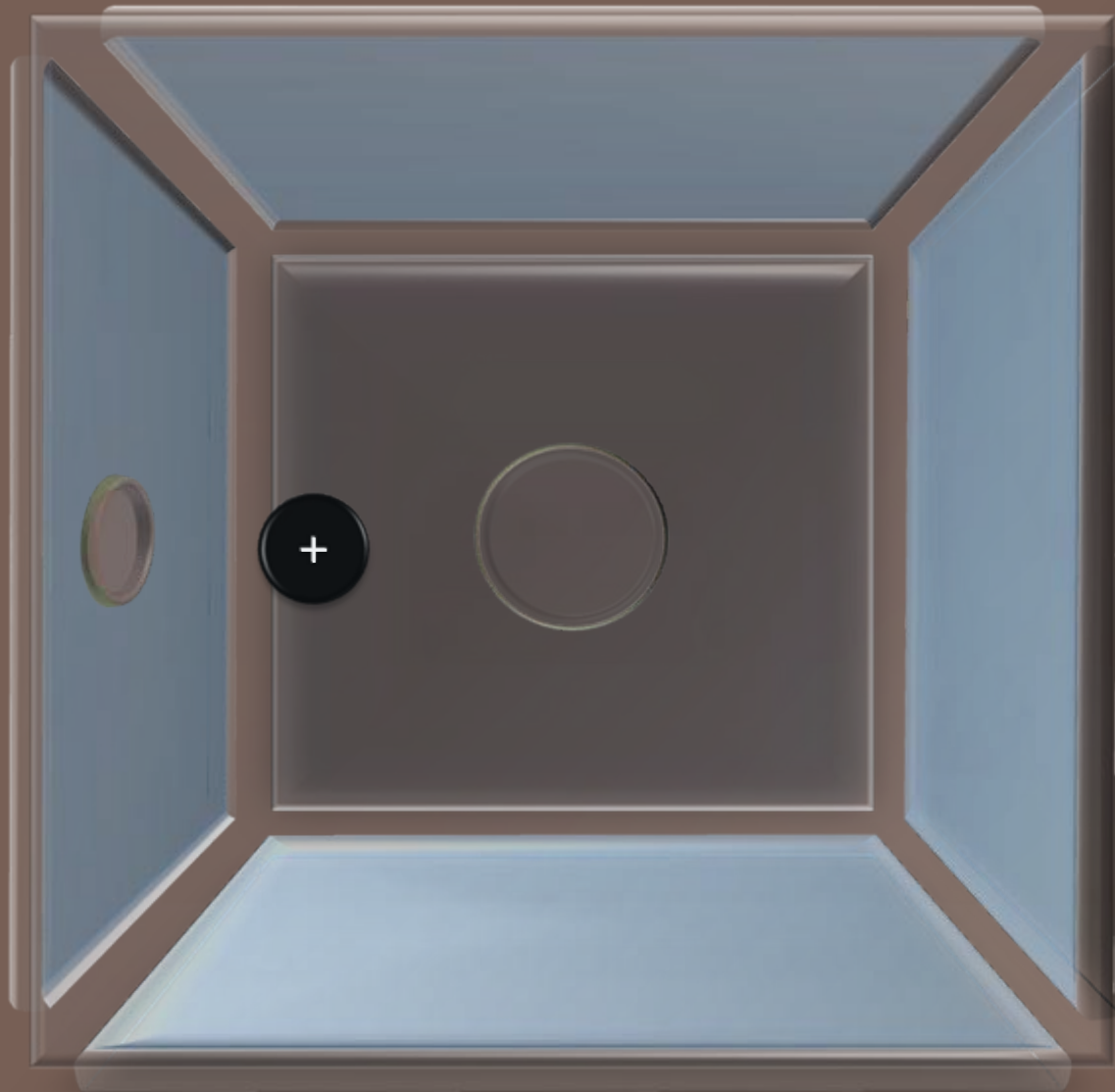
Making Ions

What is Mass Spectrometry?



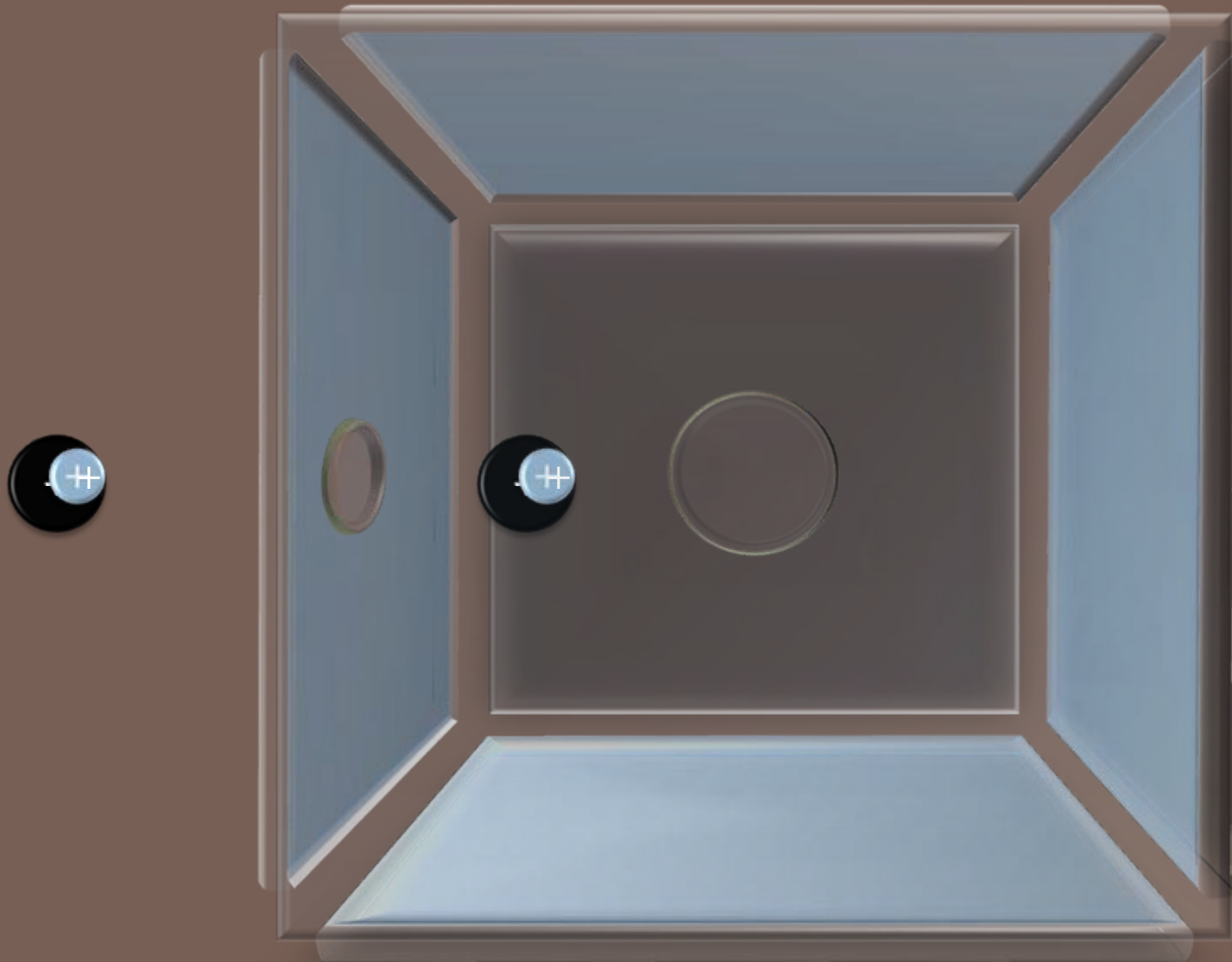
FT-ICR MS

What is Mass Spectrometry?



FT-ICR MS

What is Mass Spectrometry?



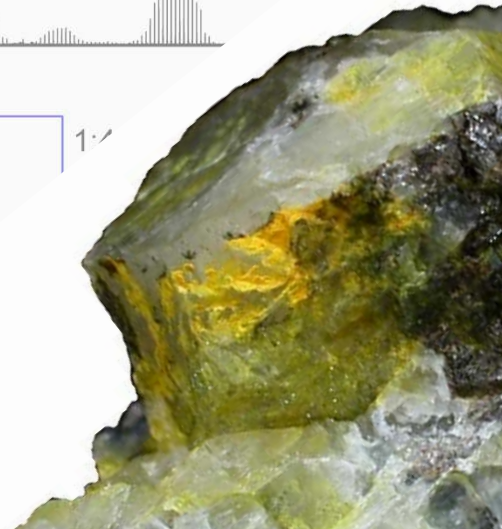
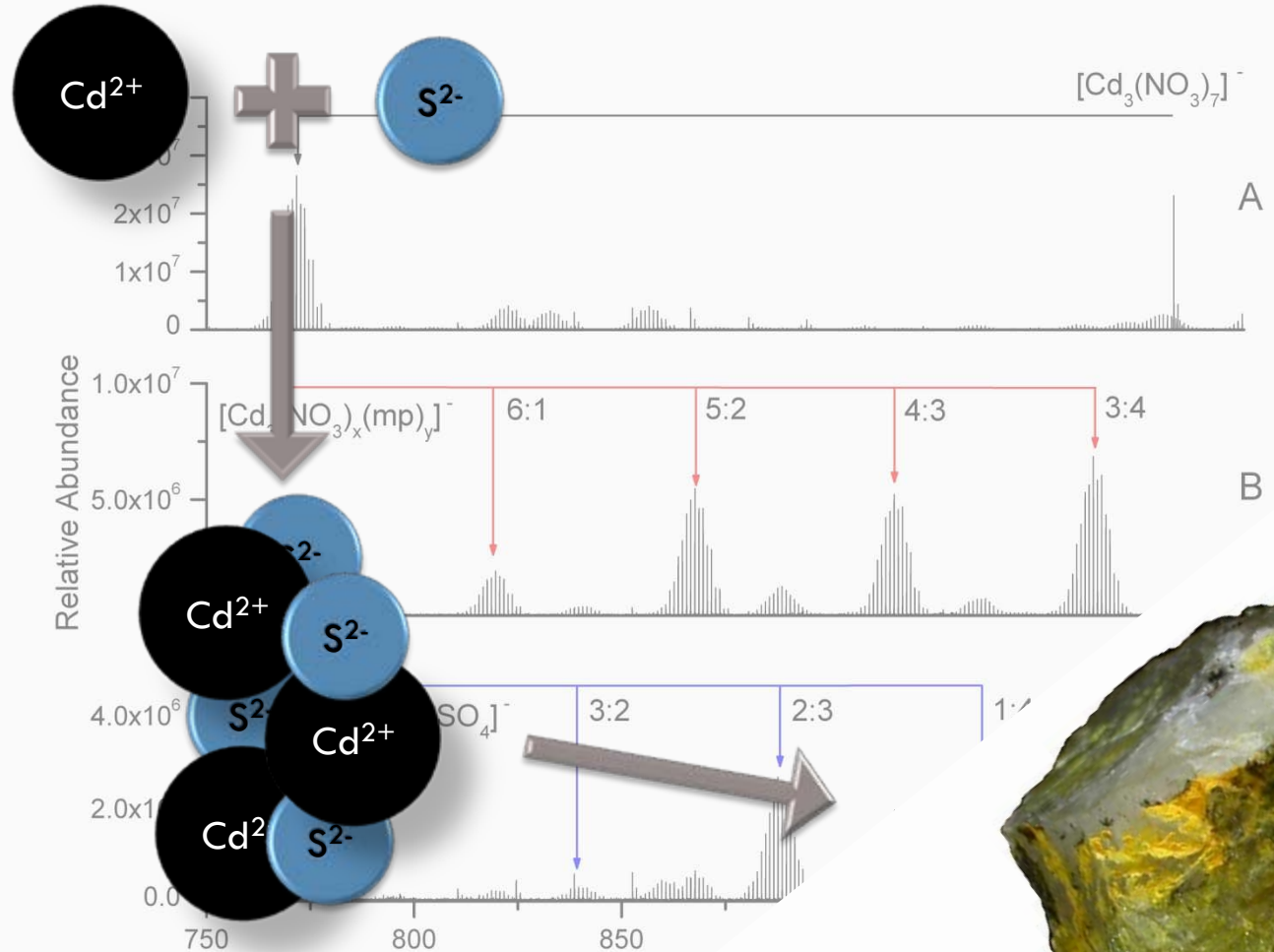
FT-ICR MS

What is Mass Spectrometry?



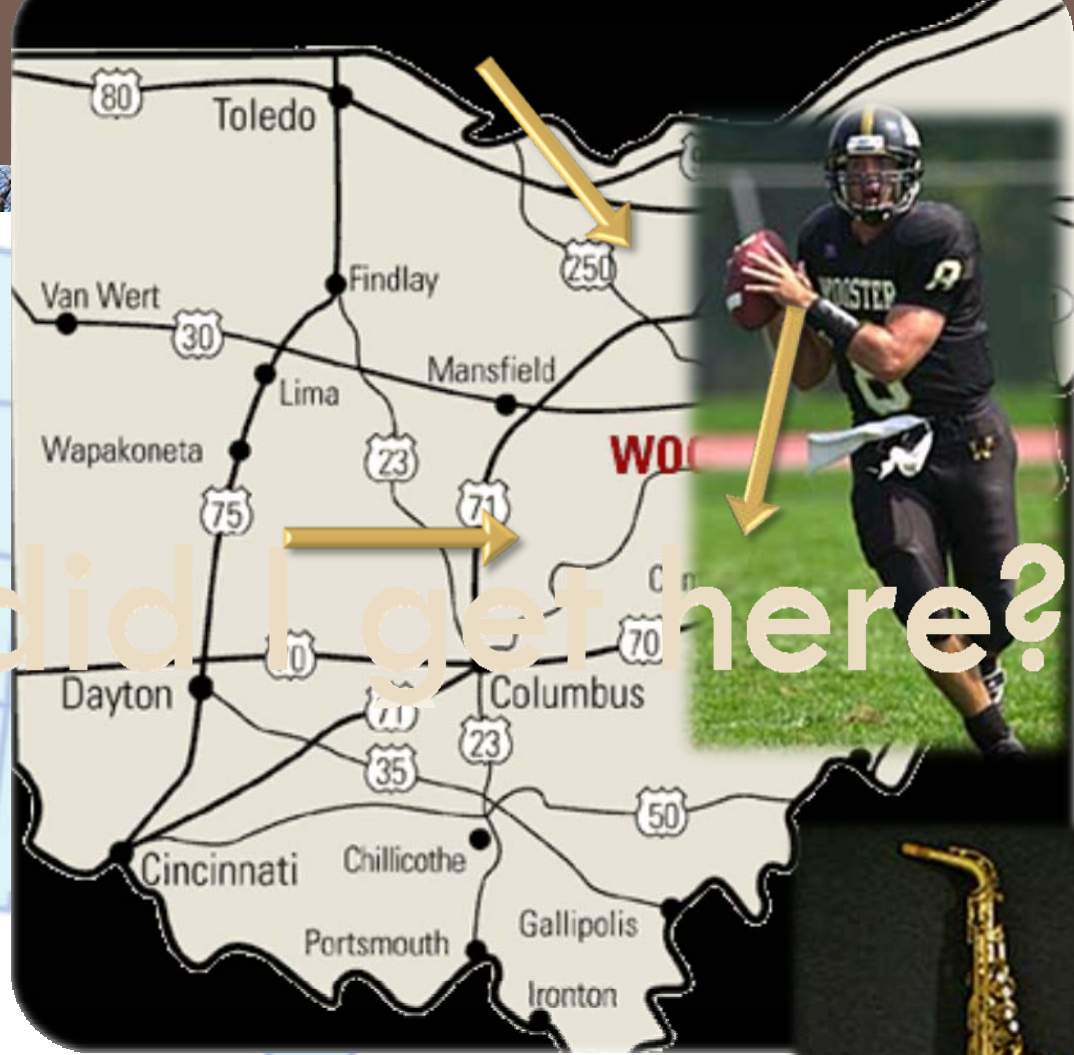
# Making Minerals (Greenocite)

Getting at  
the  
Answer.....



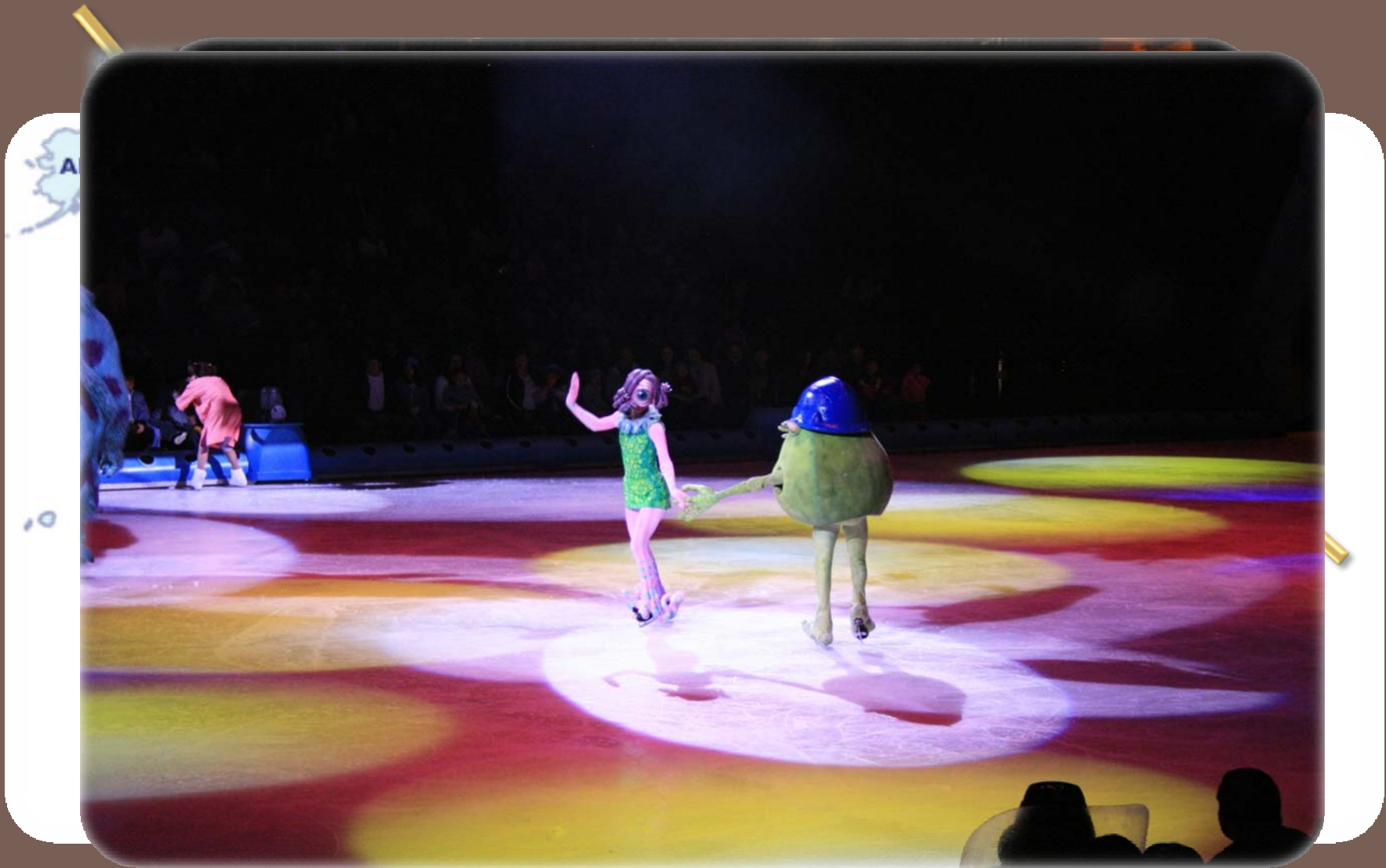
Any Questions?

Any Questions?



How did I get here?



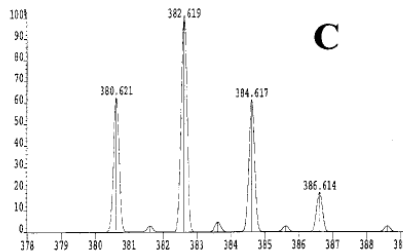
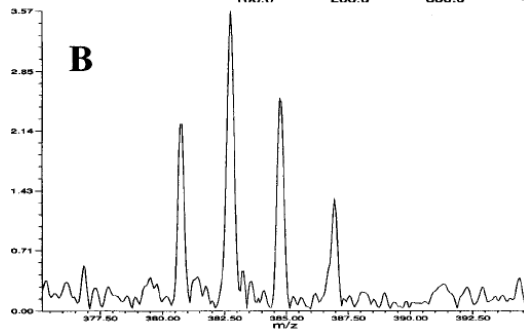
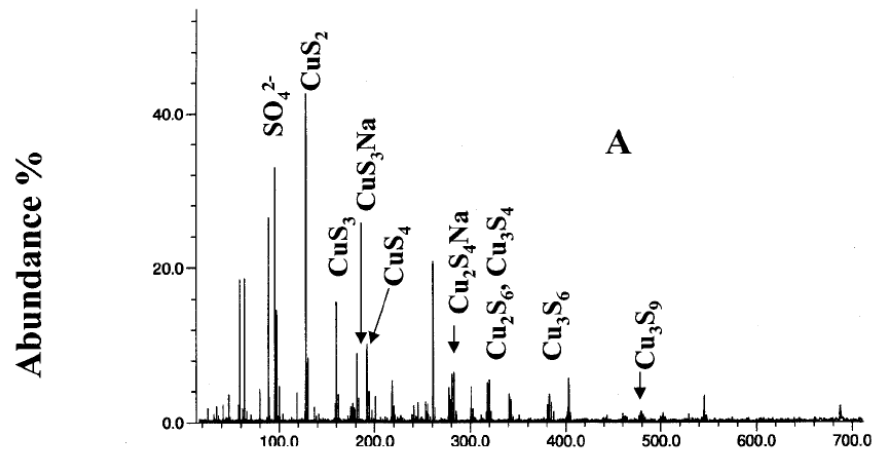


Any Questions?

Any Questions?

# Previous Experiments

## LDI FT-ICR MS Results



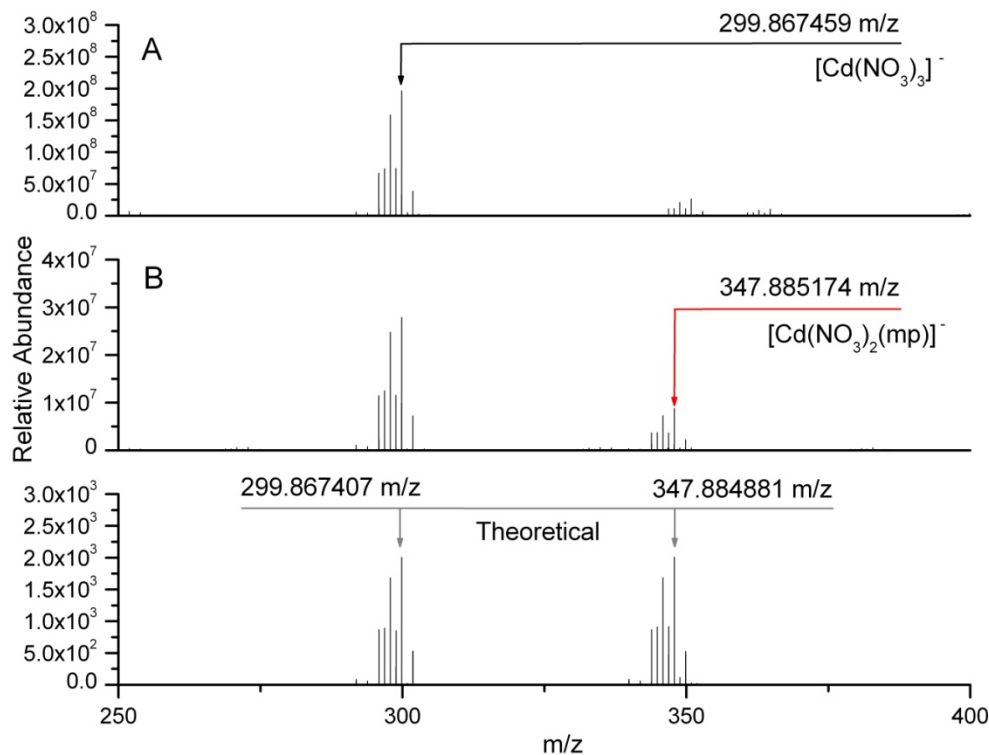
## Experimental Issues

- Laser Desorption Ionization
- Harsh ionization method
- Reproducibility
- MS/MS

# Previous Experiments

## ESI FT-ICR MS

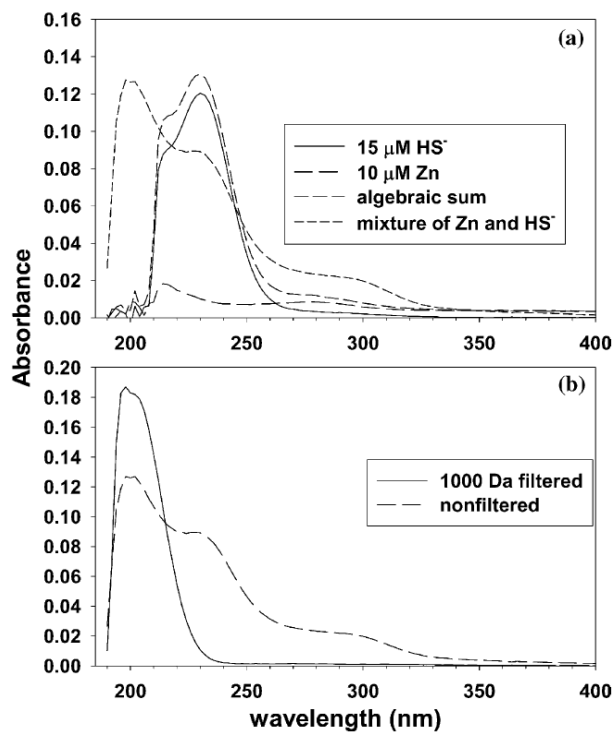
## High Performance MS



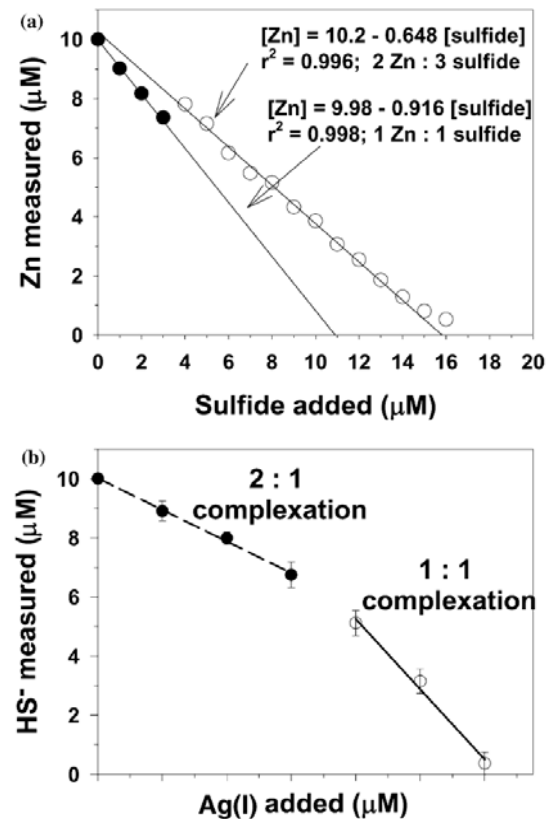
- $< 1$  ppm mass accuracy
- Resolving power approaching 100,000
- High Resolution allows for isotopic distribution comparison

# Results

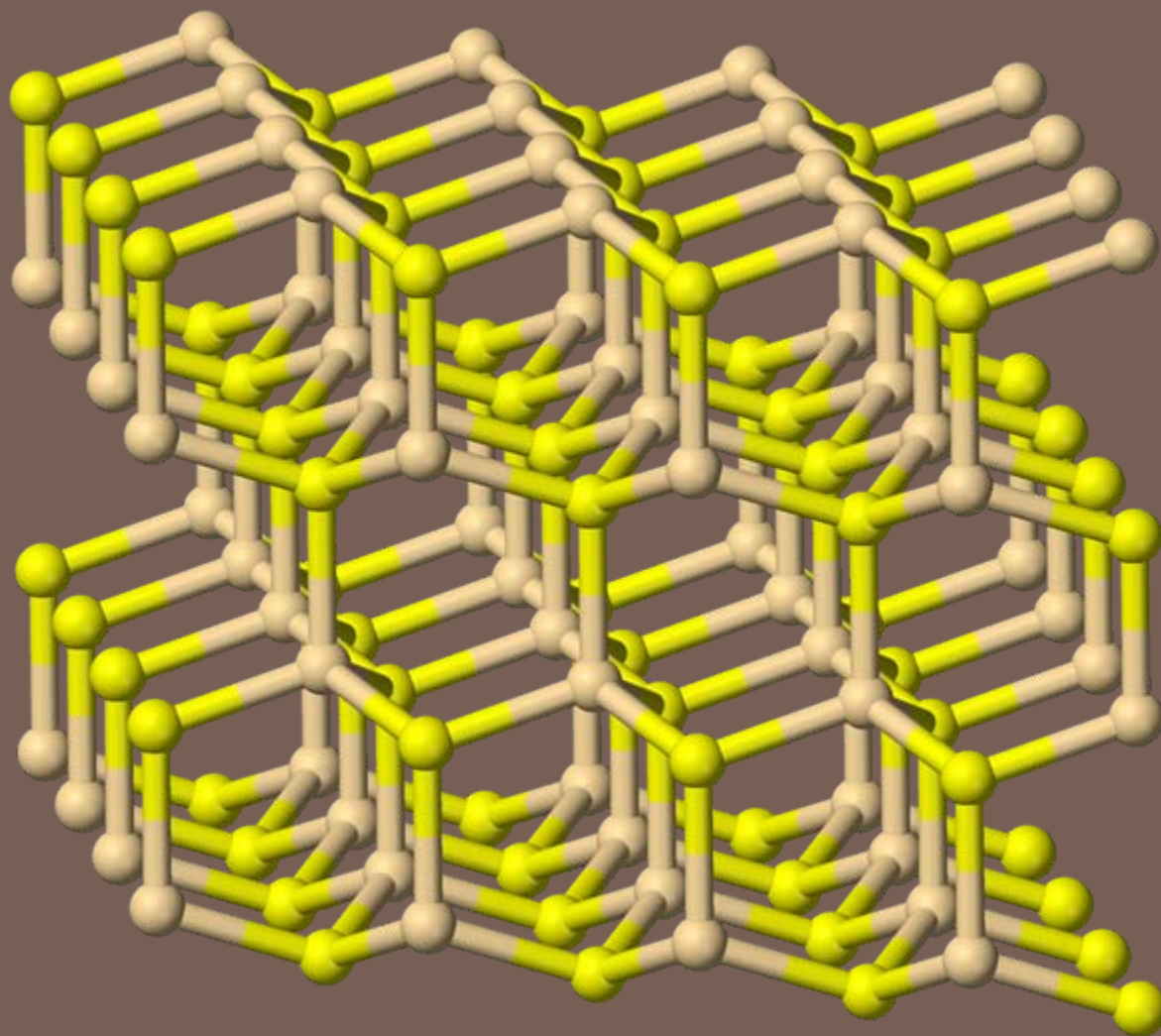
## UV-VIS experiment



## Electrochemical Analysis







Structure of Greenockite