

Controlling the Sample Temperature in a Vacuum Thin Film Deposition Chamber.

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and

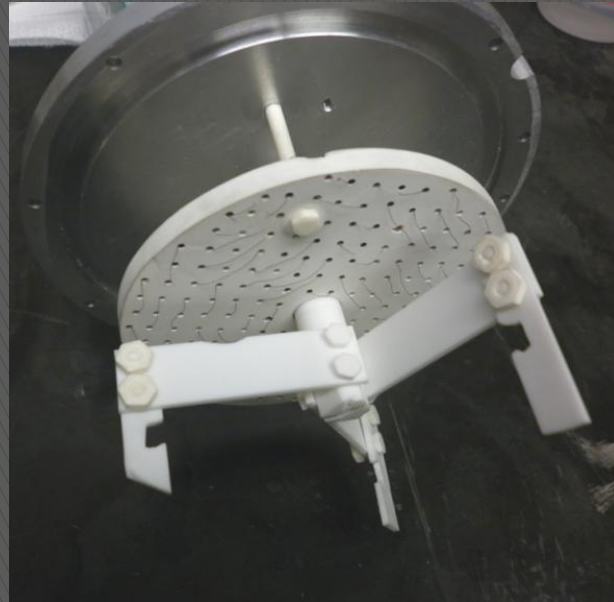
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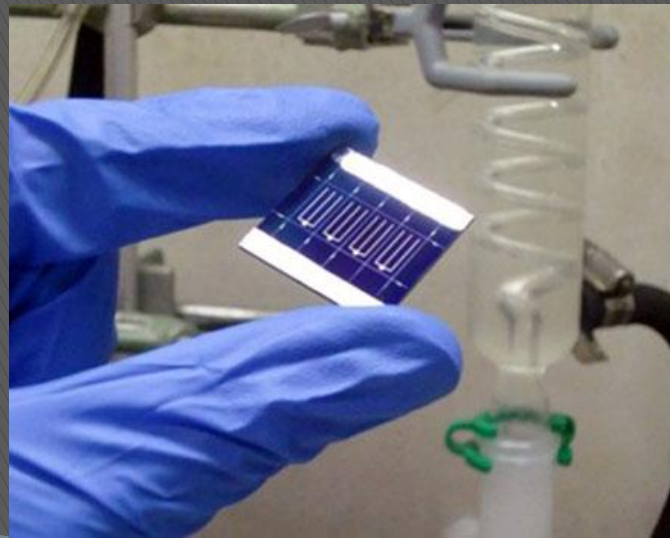
Outline

- ▶ Thin Films Research
- ▶ Houghton Deposition Chamber
- ▶ Heater Apparatus
- ▶ Future Experiments

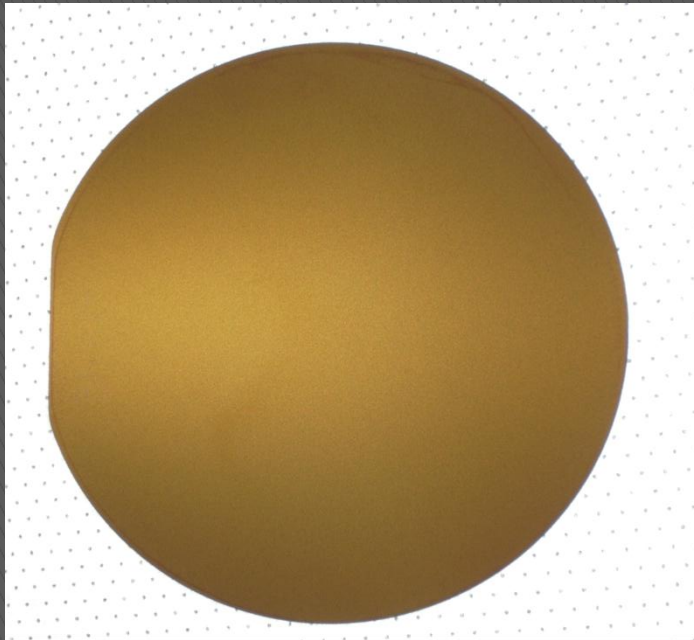
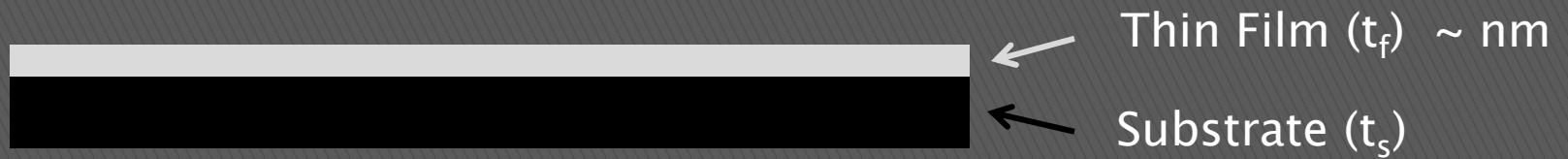


Applications of Thin Films

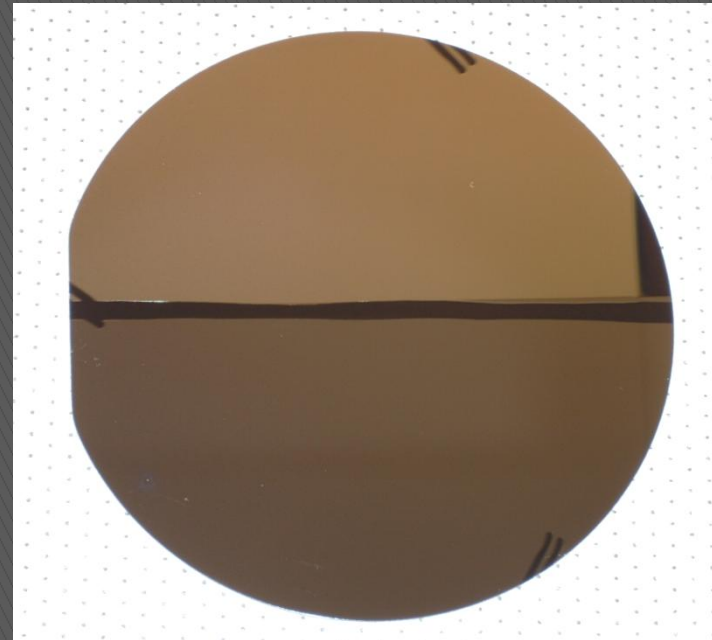
- ▶ Electronics
- ▶ Optics
- ▶ Decoration



Thin Film Introduction

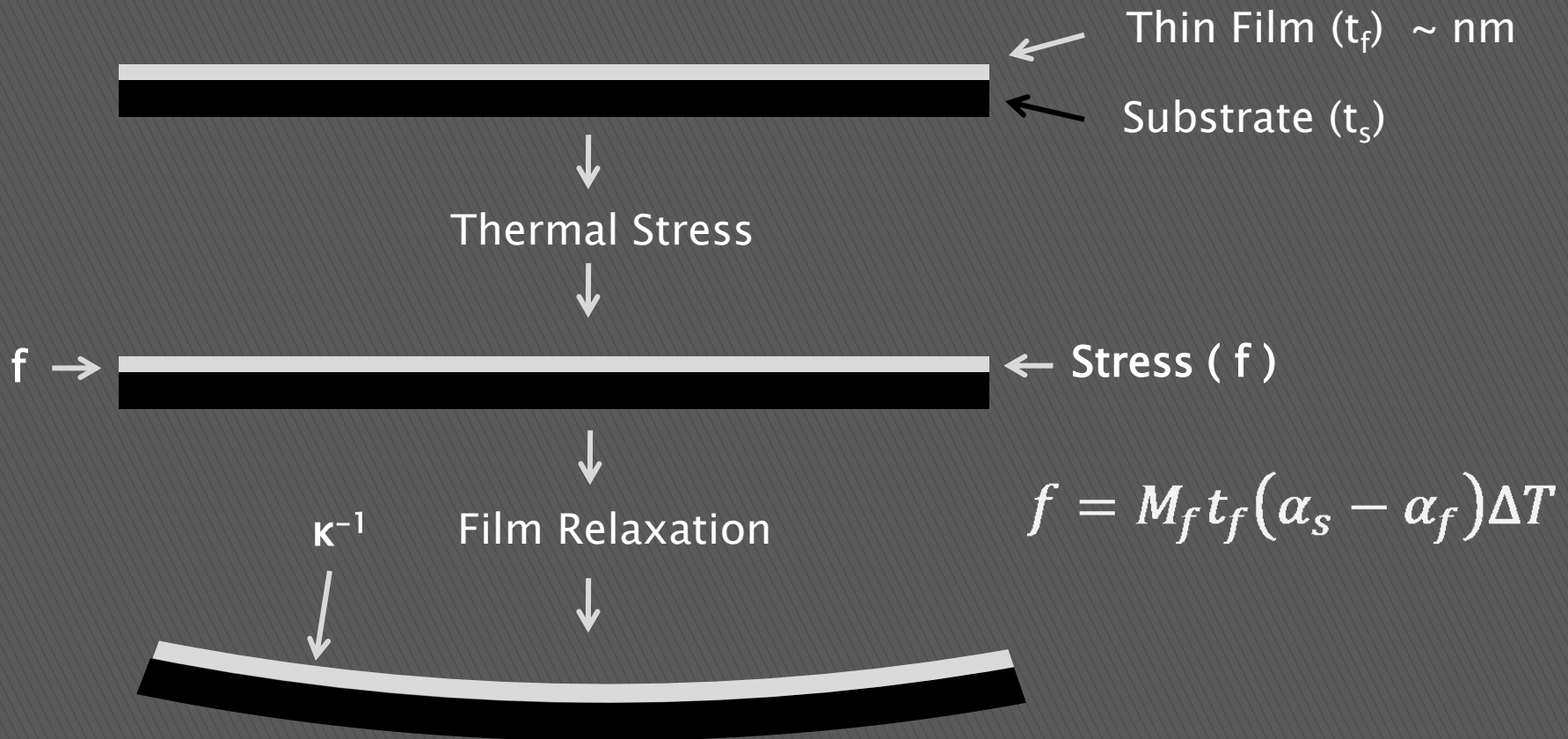


Silicon Substrate



Silicon Substrate with
thin film layers

Thin Film Curvature due to Thermal Stress



Stoney Formula:

$$\kappa = \frac{6f}{M_s t_s^2}$$

Deposition Chamber



Turbo Pump

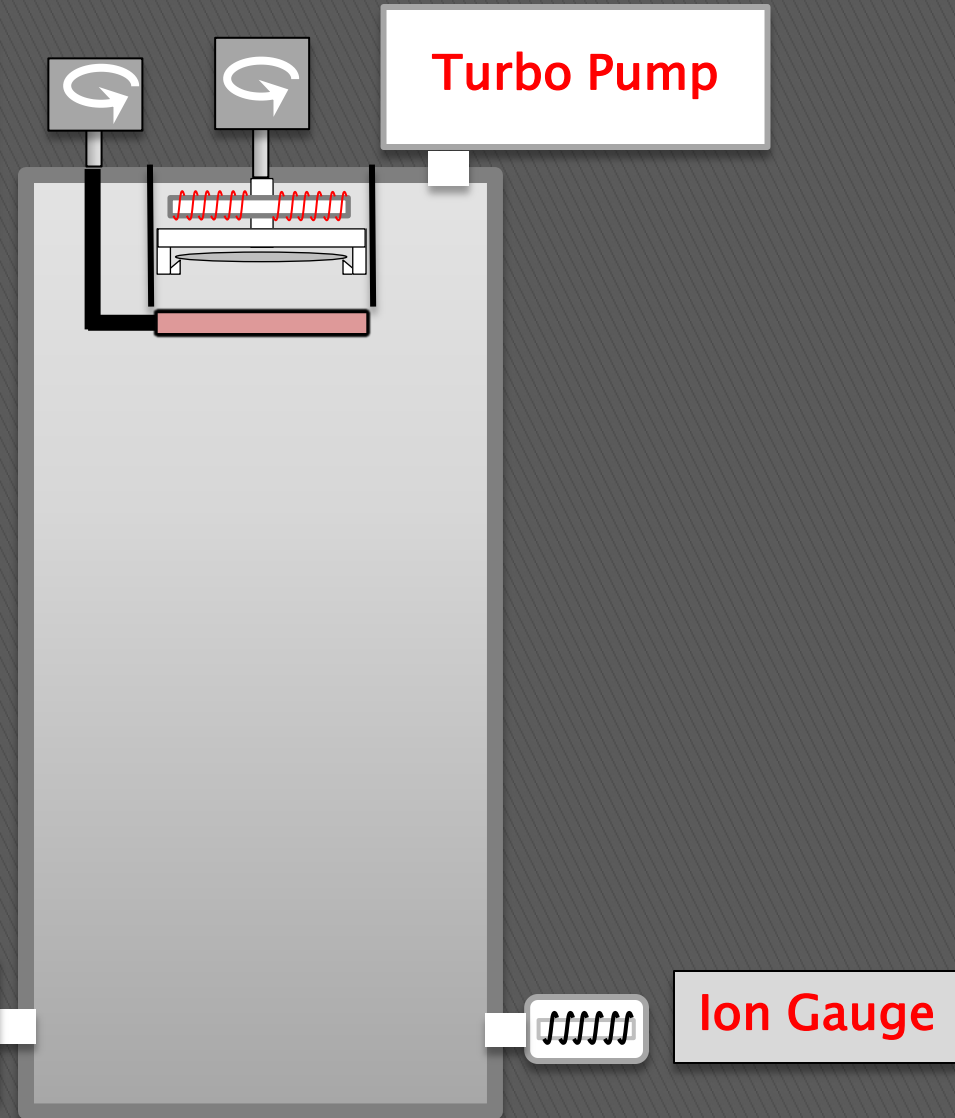
Ion Pump

Ion Gauge

Deposition Chamber



Sample Holder/
Heater



Deposition Chamber



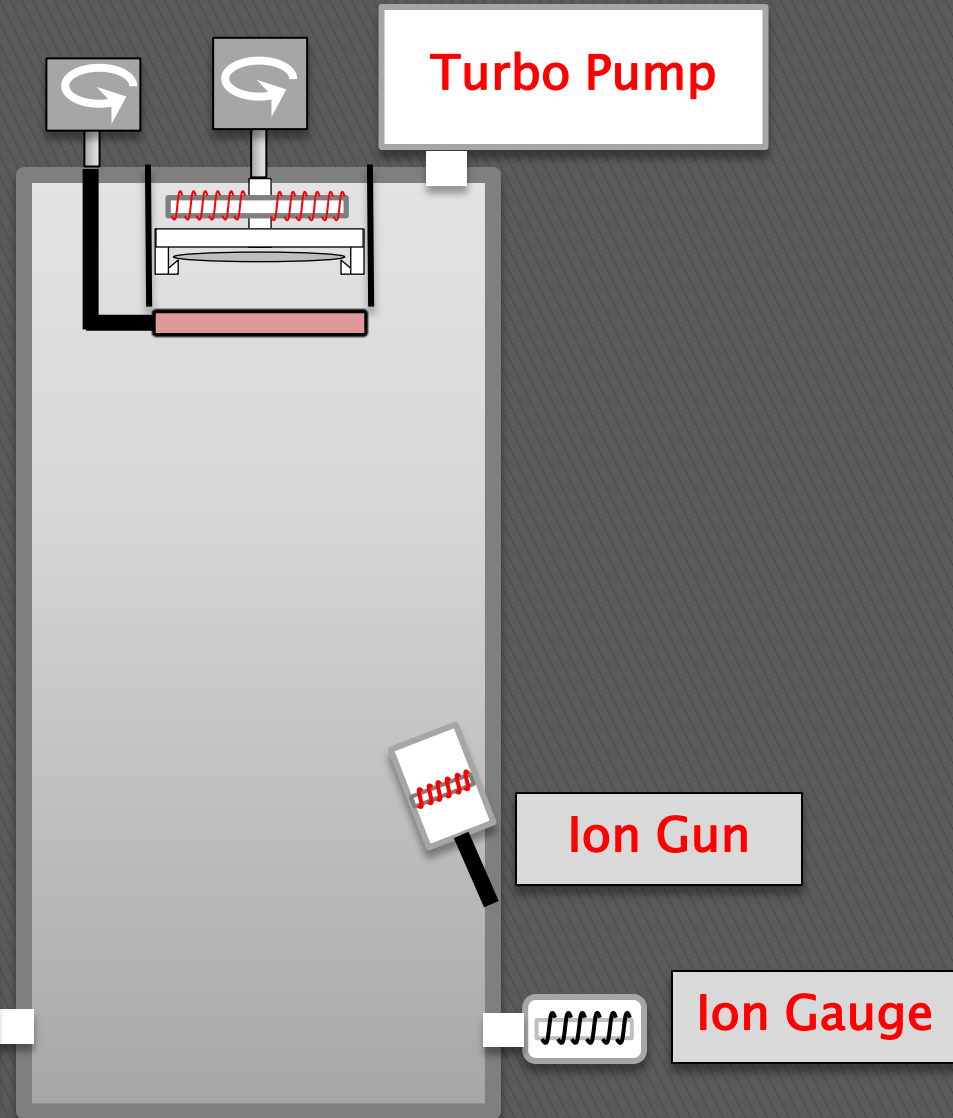
Sample Holder/
Heater

Turbo Pump

Ion Pump

Ion Gun

Ion Gauge



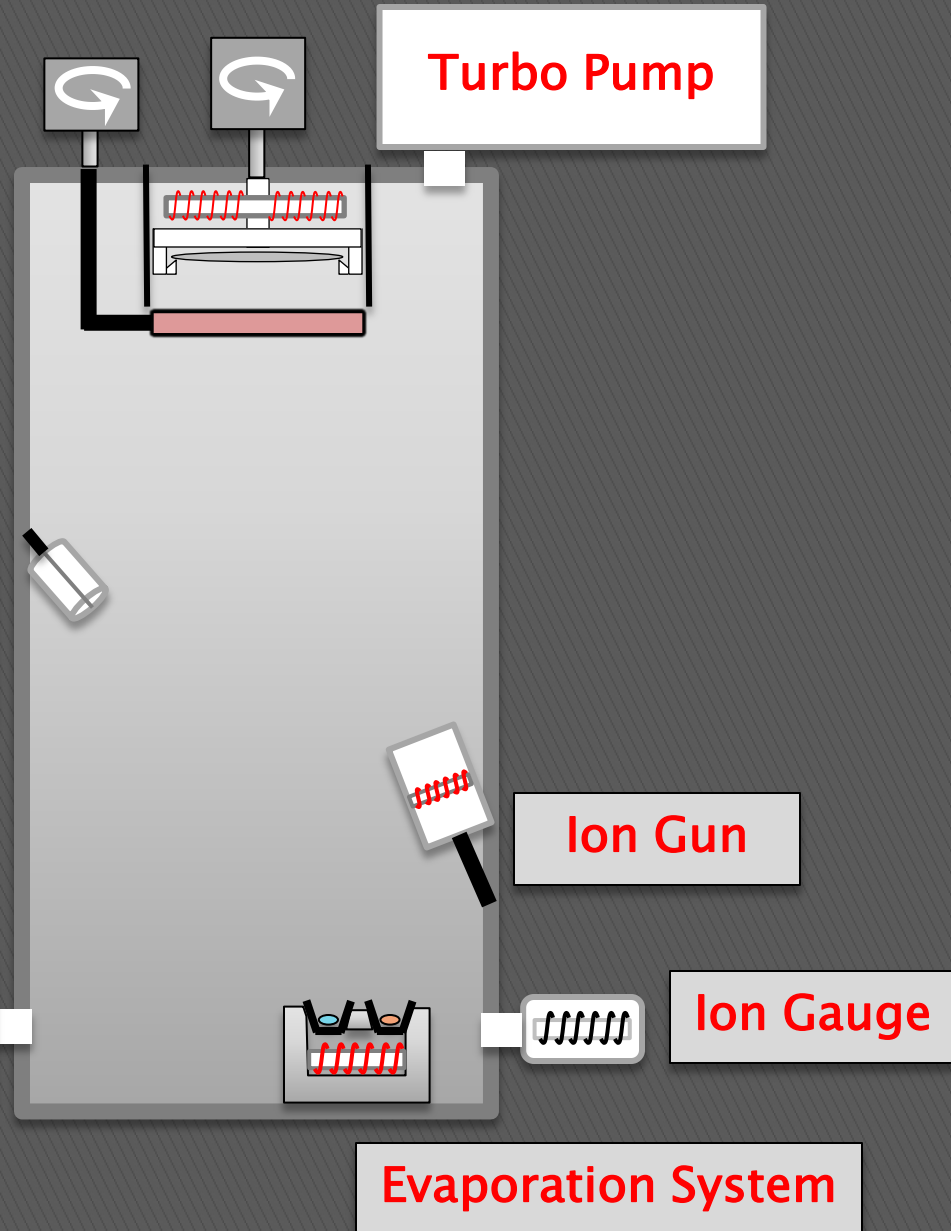
Deposition Chamber



Sample Holder/
Heater

Deposition
Rate
Monitor

Ion Pump



Turbo Pump

Ion Gun

Ion Gauge

Evaporation System

Deposition Chamber



Sample Holder/
Heater

Deposition
Rate
Monitor

Ion Pump

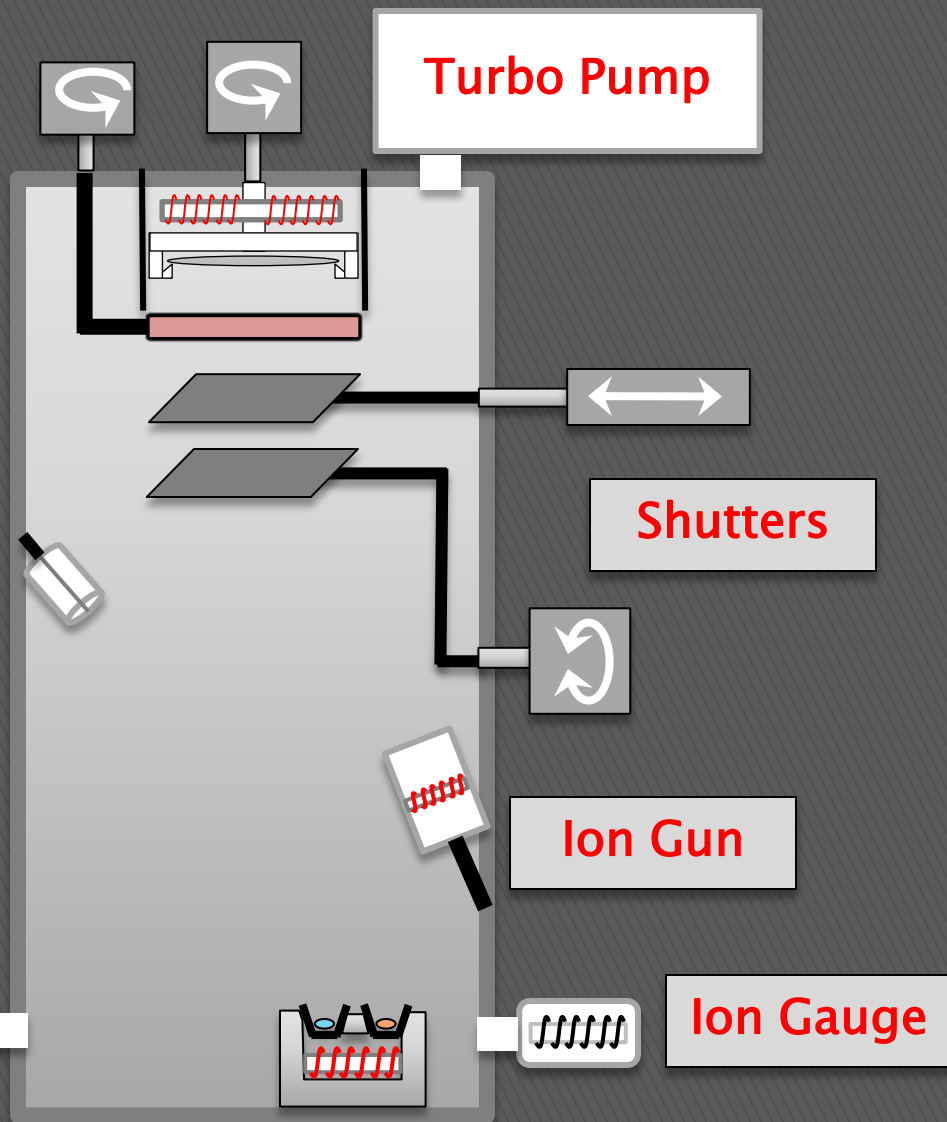
Turbo Pump

Shutters

Ion Gun

Ion Gauge

Evaporation System



Deposition Chamber

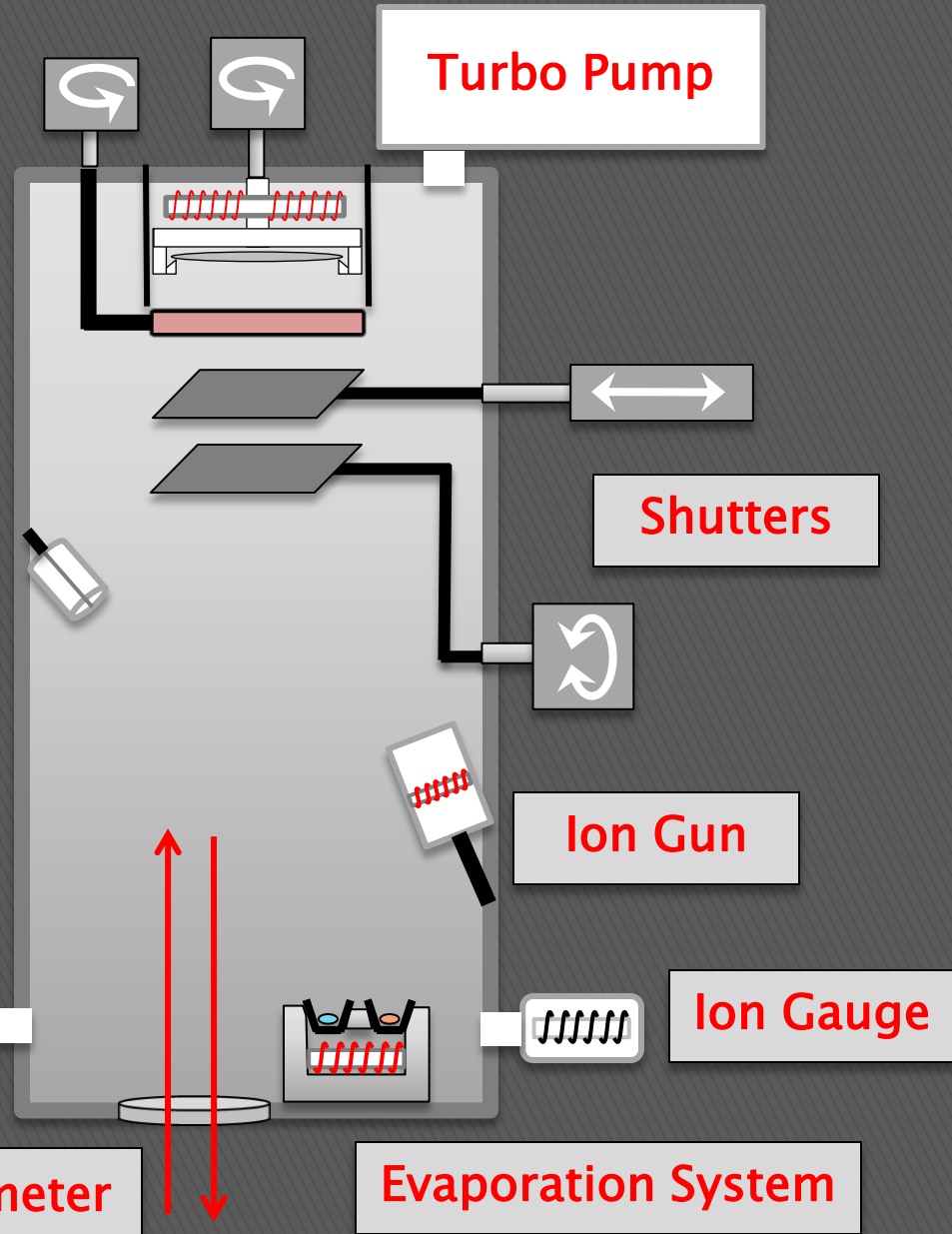


Sample Holder/
Heater

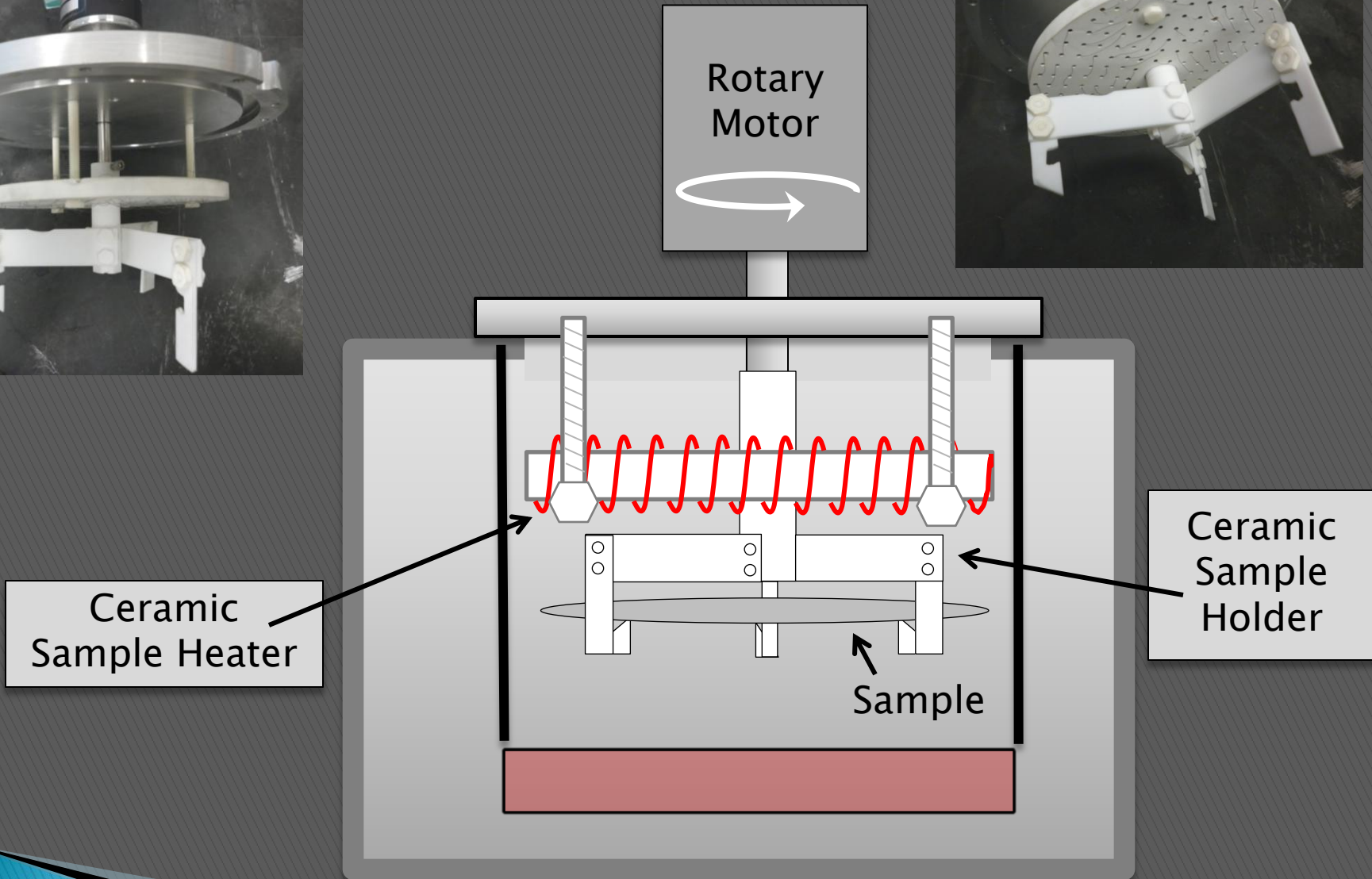
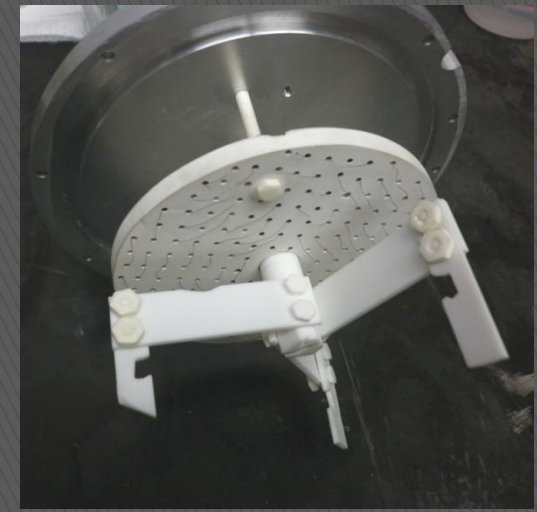
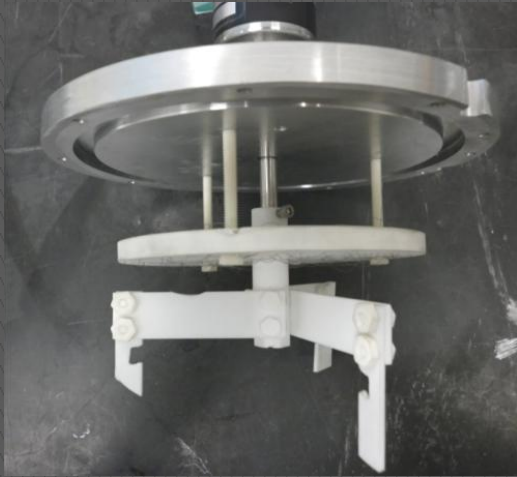
Deposition
Rate
Monitor

Ion Pump

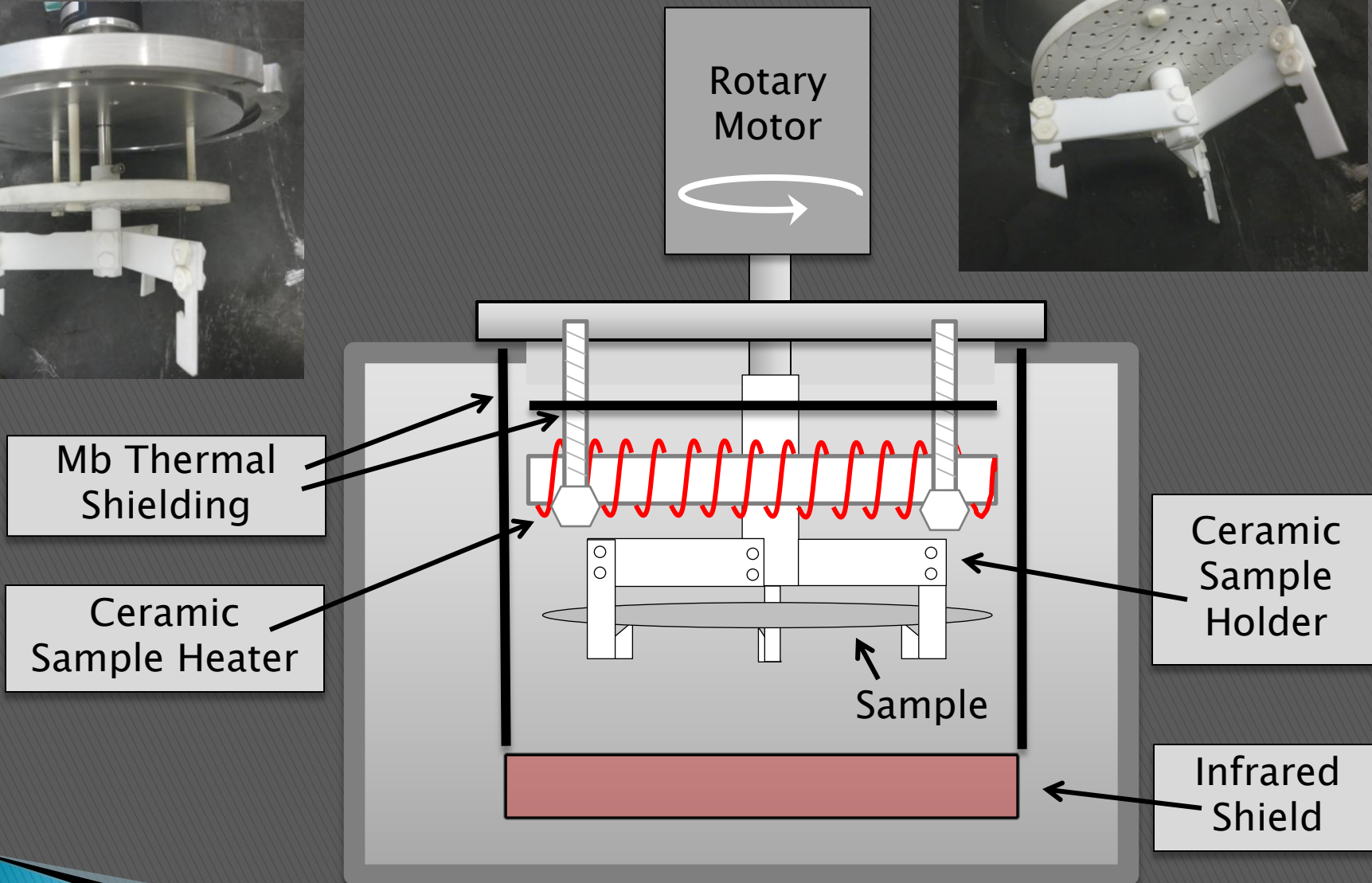
To Interferometer



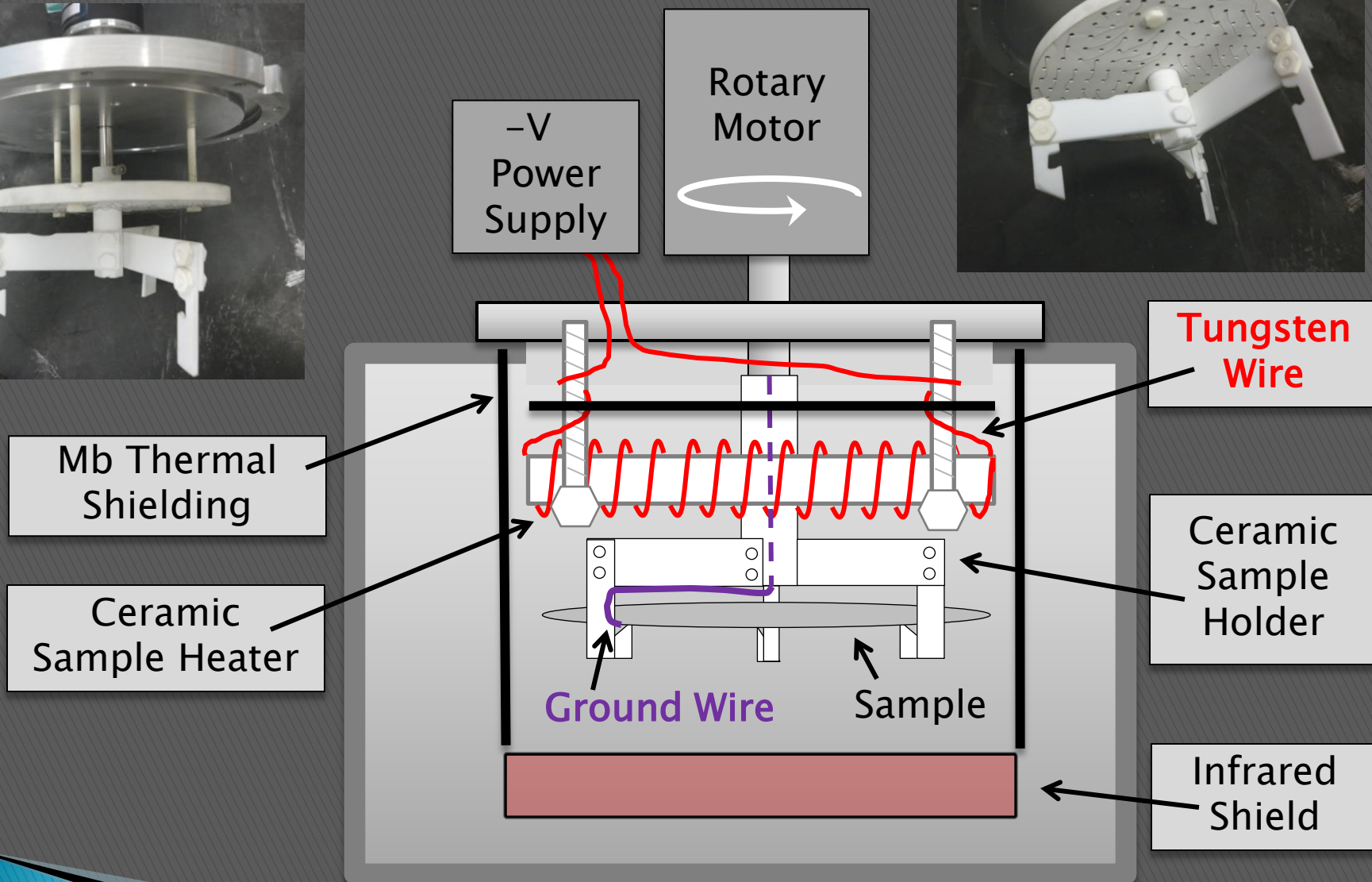
Sample Holder/Heater



Sample Holder/Heater



Sample Holder/Heater

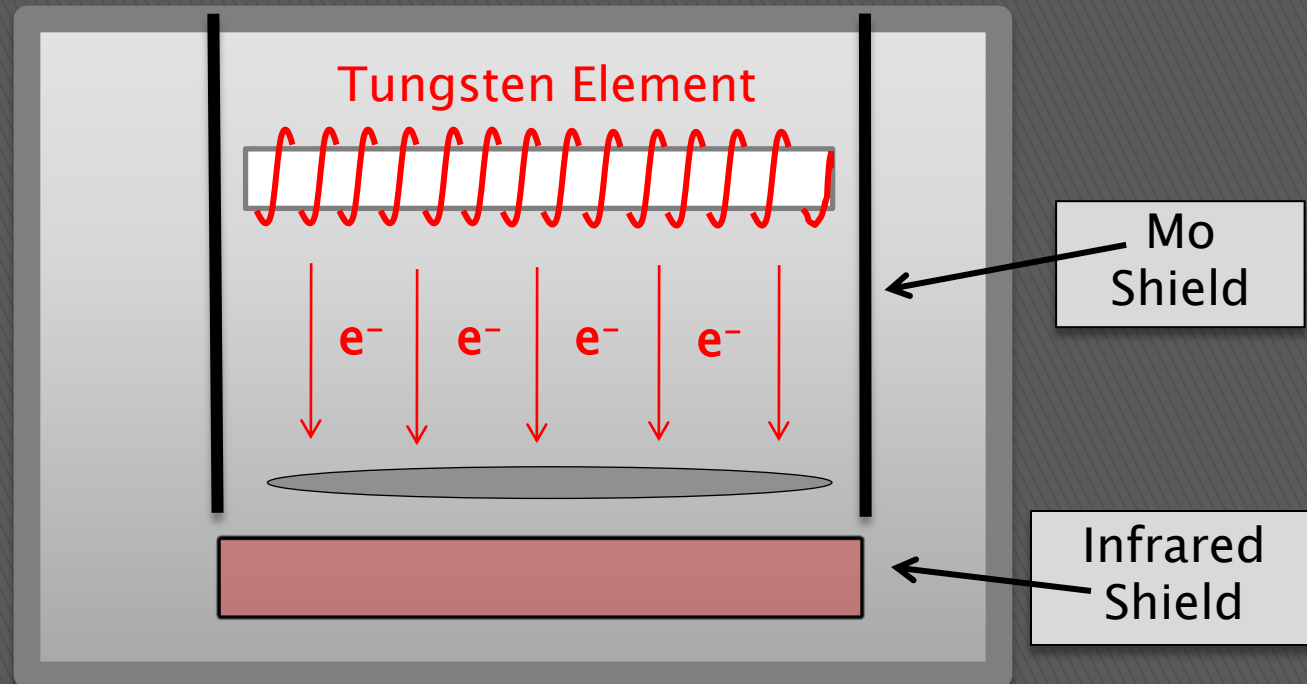


Thermionic Emission

- ▶ Electrons will be emitted from tungsten wire and accelerated towards substrate.
- ▶ Kinetic energy will be absorbed in the form of thermal energy.

Tungsten and Mo
-V Floating

Substrate
0V Ground



Future Experiments

- ▶ Begin calibration testing this summer
- ▶ Perform depositions and experiments from start to finish without removing sample.
- ▶ Measure curvature at varying temperature and thickness of films using interferometer.
- ▶ Investigate concerns with heating and interferometer measurements.

Questions?