User Stories

As a user, I want to

1. Have a clear view of the instantaneous deposition rate.
2. See the current accumulated thickness.
3. save a timestamped log of the deposition rate and accumulated thickness to a text file
4. tag the log with the beginning and end of depositions
   1. because there’s a warm up and a cool down period that should be separated from the actual deposition
   2. it should also denote between different layers
5. easily compare the current rate/thickness to the desired rate/thickness.
6. see a graph of the deposition rate over time
   1. only the last, say, five minutes.
7. see an average rate over the last *t* seconds.
   1. user defines *t*
8. be able to easily set/change the desired rate and target thickness
9. monitor co-depositions
10. be able to manipulate the graphs and zoom in or change the bounds.
11. see how close to the target thickness we are
12. see a graph of the hypothetical depth profile of the film
    1. only relevant for multilayer or co-deposition films.
    2. see an ETA for the current layer
13. hide content from the window that I don't need.
    1. e.g. the depth profile should not be shown unless doing a co-dep or multilayer.
14. change the tooling factor
15. monitor depositions with multiple layers
16. monitor current percent power (include in log)

Glossary

**deposition:** the act of collecting condensing material from an evaporation source; i.e. "growing a sample."

**co-deposition:** growing a sample from two sources of material simultaneously.

**deposition rate:** the rate at which the film thickness is changing, given in angstroms per second.

**target thickness/rate:** the current rate or final thickness desired by the user.

**composition:** the chemical makeup of the film, typically expressed as a percentage. Determined from thickness.

**depth profile:** a graph of composition versus thickness/depth/time.

Definition of IC/5 Capabilities

The IC/5 has two inputs that each go to quartz crystal oscillators. The IC/5 vibrates each crystal at it’s resonant frequency. As evaporated material condenses on the crystals, the harmonic frequency of the crystal shifts. This shift is monitored by the IC/5 and, knowing the density of the material and a quantity known as the “Z-factor,” calculates the thickness of the condensing layer. The IC/5 takes a quick derivative, and reports the deposition rate.

The thickness of the material condensing on the crystals is correlated to the thickness of the material condensing on our samples, and thus our film thickness. Because the IC/5 can monitor two crystals, it can simultaneously measure two deposition rates, important for co-depositions. We typically try to maintain consistent rates during a deposition, and for co-deps it is critical to maintain a certain ratio of rates for the entire duration of the deposition.

Typically, deposition rates are 0.1-10 angstroms per second, and total thicknesses are 50-3000 angstroms. The IC/5 can calculate the thickness to an accuracy of 1 angstrom and rates to an accuracy of 0.1 angstrom per second. The update rate on the device is on the order of milliseconds, but there is enough temporal noise in the thickness calculations that typically smoothing is performed over a second.