Top Level Functional Requirements for Lithium Thin Film System

- **Enable thin film R&D with various fluids:**
  - **Lithium**
  - **Water**
  - **Possibly others:**
    - **Ga**
    - **FC3283**

- **Argon pressure driven flow to:**
  - **Handle all above fluids**
  - **Eliminate need for pump**

- **Test loop physical parameters**
  - **Maximum vertical space = 96”**
  - **Maximum footprint = 30” X 30”**
  - **Select radiant heaters to melt Li**
    - **Maximum 30 amp zones available = 6**
    - **Maximum available power to a single zone = 30 amps at 208 volts**
    - **Maximum 50 amp zones available = 2**
    - **Maximum available power to a single zone = 50 amps at 208 volts**
  - **Design exterior thermal shield to enclose the entire test loop**
    - **Thermal shield box must encompass all heaters but allow openings for view and beam ports**
    - **Thermal shield box must allow openings for pneumatic and manual valve actuator access outside of the thermal shield**
    - **Thermal shield box must allow openings for power leads and TC cables**
    - **All pressure sensors and transducers to be located outside of Thermal shield box**
  - **Main vacuum connection to pumping system to be a QF 50 connection**
    - **Vacuum lines inside thermal shield must be Cajon or Conflat type for high temperature**

- **Nozzle assembly:**
  - **Nozzle easily removable (only performed at room temperature)**
    - **Maximum weight of removable components = 20 lb**

- **Minimize quantity of Li requiring disposal as part of nozzle change out**
    - **Minimize Li wetted surface area exposed to air during nozzle change operation**
    - **Maximum cleanable component footprint = 18” X 10”**
    - **Maximum cleanable component height = 15”**
- **Allow course adjustment of impingement angle wrt plate +- TBD^{o}**
- **At operating temperature:**
    - **Allow easy fine adjustment of impingement angle wrt plate +- 5^{o}**
    - **Allow easy adjustment of distance between nozzle exit & impingement plate**

- **Allow visual observation of film**
    - **Digital still & video cameras**
    - **Maximum view port height = 66”**
    - **Minimum view port height = 46”**

- **Instrumentation:**
    - **TCs**
    - **Sight glass for ΔP vs flow calibration (not used with Li)**
    - **Ruler or other measurement markings for film width determination**
    - **Gas pressure transducer**
    - **Vacuum gauges**
    - **Electron gun film thickness system (developmental)**

- **Allow testing of rotating disk as a possible means of**
    - **Increasing and controlling film speed**
    - **Controlling film thickness**

- **Li purification**
    - **Replace impure Li inventory with fresh Li**
    - **Install replaceable large surface area, 10 μm SS filter in pressure line**