Kurt J Lesker Nano-36 Thermal Evaporator Standard Operating Procedure (SOP)

Kurt J. Lesker Nano-36 Thermal Evaporation System

Contents

Kurt J. Lesker Nano-36 Thermal Evaporation System

1. Description

The Kurt J. Lesker Nano-36 is a 150 W three-source thermal evaporation system. This type of system is typically used to evaporate metals with a melting point < 800°C, although materials with higher melting points can be evaporated by reconfiguration of the boat which holds the evaporation material. The system achieves high vacuum via a turbo pump, which is backed by an oil-based roughing pump, and is capable of achieving vacuum of in the ~ 10^{-6} Torr range. The loading and unloading of samples is achieved through a set of manual operations, while deposition of material can either be performed automatically or manually. The system is equipped with 2 graphical user interfaces (GUIs) for this purpose. The system is capable of deposition on substrates of many sizes, from small pieces up to a 6" substrate.

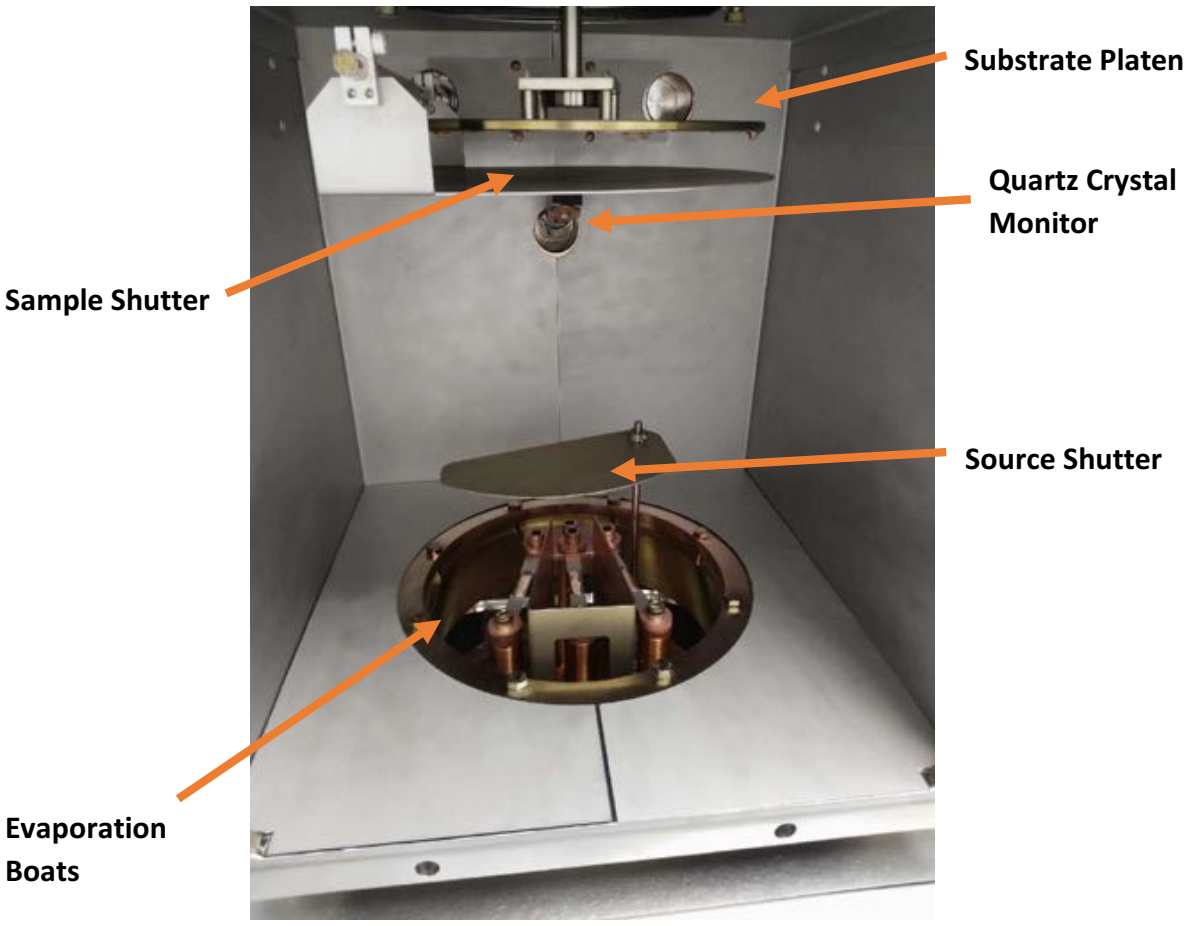

Figure 1: Nano-36 Chamber

Kurt J. Lesker Nano-36 Thermal Evaporation System

Figure 2: Recipe Screen

Substrate Shutter Button

Figure 3: Substrate Screen

2. Operation

a. Load/Unload

i. Venting the System (See Fig. 2)

1. Press “Recipe” button on the display
2. Vent the system by pressing the “Vent” button
3. The turbo pump will decelerate
4. The Vacuum chamber will vent with Nitrogen (N_2)
5. When the chamber vent is complete, a green prompt will appear reading “Done” on the upper right hand corner
6. Press “Done” Button

ii. Loading a Sample

1. Open chamber
2. Press “Substrate” button
3. Press Substrate shutter button on bottom left of the “Substrate” screen
4. Substrate shutter will lower to allow removal of substrate platen
5. Remove substrate platen in order to attach substrate
6. Secure the substrate with clips

7. Loosen clips on substrate holder slightly if necessary whilst exercising caution to avoid dropping clips or screws
8. Reattach substrate holder to shaft
9. Press the “Substrate shutter” button to close shutter
10. Check the thermal evaporation boat to ensure that the source material is at a proper level for the amount of deposition required
11. Close and lock the Nano-36 chamber door

iii. Pump Down

1. Press “Recipe” Button
2. Press “Pump Down” Button
3. Turbo and roughing pump will now pump the chamber

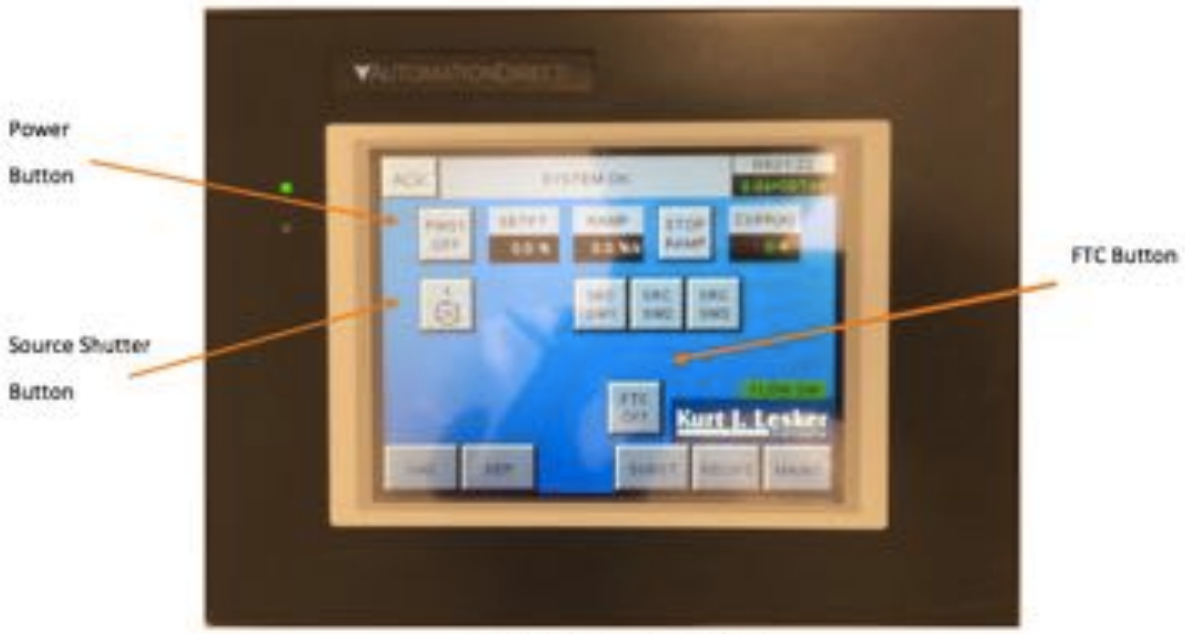

Figure 4: Deposition Screen

b. Deposition

i. Manual Mode

1. Press “Dep” button at the bottom of the screen (See Fig. 4)
2. Select boat source(s) (SRC SW1, SW2, and/or SW3) from which metal will deposit (cannot change sources until process is finished)
3. Press “SUBST” button on bottom of screen and press “Motor Rotate” button
4. Press values beneath “speed” box to input the speed of rotation in “%/s” for uniform deposition, then press enter (See Fig. 3)

5. Press “DEP” button at the bottom of the screen, then turn power on by pressing “power” button (PWS1)
6. Set Ramp speed (0-100) %/s, if necessary, by pressing values underneath the “RAMP” box; the value will be interpreted as “% setpoint per second. Once values are input, press enter.
7. Set the input power set point (0-100) by pressing the values underneath the “SETPT” box; the value is interpreted as % of available power. Once values are input, press enter. (Note: The input power will immediately jump to setpoint if the ramp speed is 0 %/s)
8. Press “Substrate Boat” button to open boat shutter, which will allow deposition to occur
9. Press “SUBST” button at the bottom of the screen and press “Substrate Shutter” button on the bottom left corner to lower the shutter. (See Fig. 3)

Kurt J. Lesker Nano-36 Thermal Evaporation System

Figure 5: Film Thickness Controller (FTC) Screen

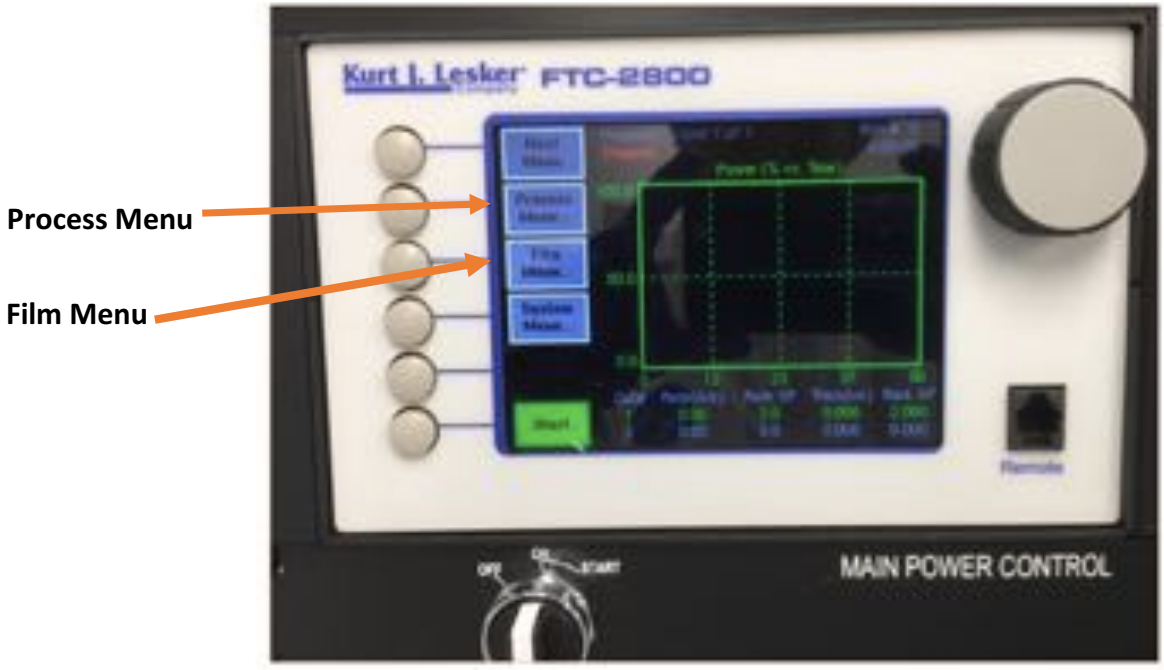

Figure 6: FTC Process and Film select Screen

Figure 7: FTC Process Menu Parameters

Figure 8: FTC Film Menu Parameters

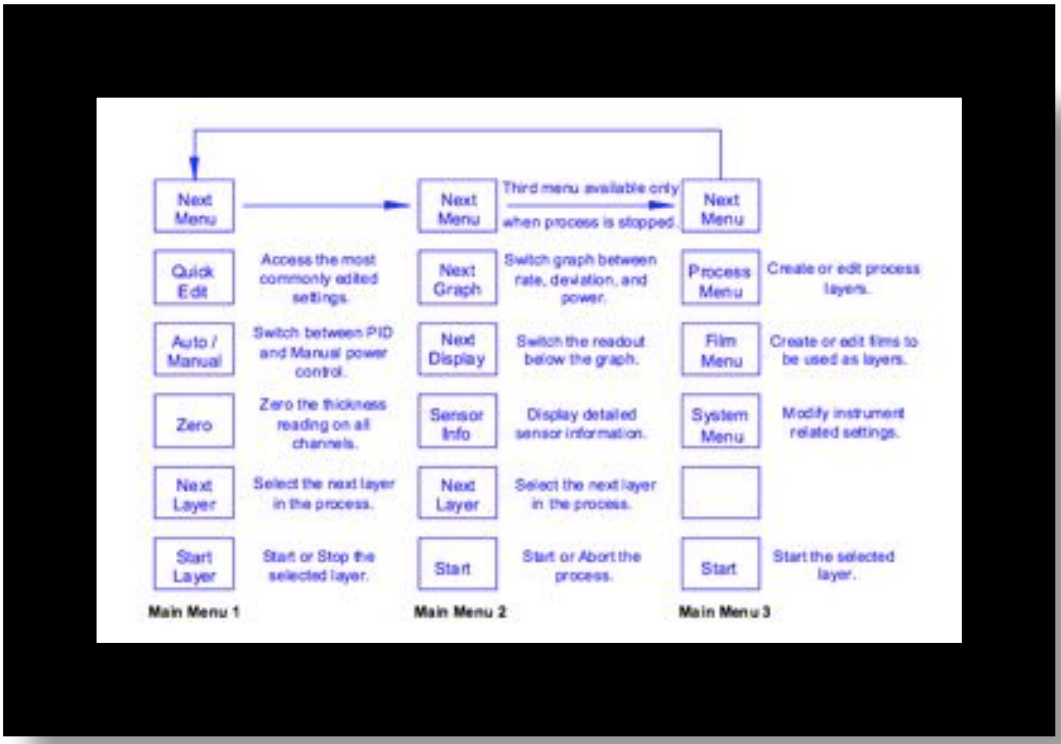

Figure 9: FTC Softkey Legend

Figure 10: FTC Power

ii. Automatic Mode

1. Ensure that the Power on the FTC is on (Fig.10)
2. Press “SUBST” button on bottom of screen
3. Press values beneath “speed” box to input the speed of rotation in “%/s” for uniform deposition, then press enter
4. Press “Motor Rotate” button to start rotation
5. Press “DEP” button (See Fig. 4)
6. Press the “FTC (Film thickness controller)” button to turn on, it will turn green when on
7. Turn on power on the deposition screen by clicking the “Power” button (PWS1)
8. Now all controls will be on the FTC screen (See Fig.9)
9. Select the “Process Menu” on the FTC screen using the soft buttons on the left side and scroll using the “control knob” on the right (See Fig. 6)
    a. Process Menu will give settings for film thickness, deposition rate, ramp rate, etc. (See Fig. 7)

10. Select the “Film Menu” on the FTC screen using the soft buttons on the left side and scroll using the “control knob” on the right
    a. Film Menu will allow input of materials parameters, such as density, z-factor, tooling factor, etc. (See Fig. 8)
11. Once all parameters are set, click “Start” on the bottom left corner of the FTC screen
12. Press “Zero” button on FTC screen to reset the crystal monitor
13. FTC will control the deposition parameters as well as open/close the substrate and source shutters

Kurt J. Lesker Nano-36 Thermal Evaporation System