Kurt J. Lesker Nano-36 Thermal Evaporation System

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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

Figure 3: Substrate Screen

Substrate Shutter Button
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 (N₂)
         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
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. Input the set point by pressing the values underneath the “SETPT” box; once values are input, press enter
4. Set Ramp speed by pressing values underneath the “RAMP” box; once values are input, press enter
5. Press “SUBST” button on bottom of screen
6. Press values beneath “speed” box to input the speed of rotation in “%/s” for uniform deposition, then press enter (See Fig. 3)
7. Press “Motor Rotate” button to start rotation
8. Press “DEP” button at the bottom of the screen, then turn power on by pressing “power” button (PWS1)
9. Allow thermal evaporation boat to reach the set point, ramp and power settings
10. Press “Substrate Boat” button to open boat shutter, which will allow deposition to occur
11. 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)
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Figure 5: Film Thickness Controller (FTC) Screen

Figure 6: FTC Process and Film select Screen
ii. Automatic Mode

1. Press “SUBST” button on bottom of screen
2. Press values beneath “speed” box to input the speed of rotation in “%/s” for uniform deposition, then press enter
3. Press “Motor Rotate” button to start rotation
4. Press “DEP” button (See Fig. 4)
5. Press the “FTC (Film thickness controller)” button to turn on, it will turn green when on
6. Turn on power on the deposition screen by clicking the “Power” button (PWS1)
7. Now all controls will be on the FTC screen
8. 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)
9. 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)

10. Once all parameters are set, click “Start” on the bottom left corner of the FTC screen

11. Press “Zero” button on FTC screen to reset the crystal monitor

12. FTC will control the deposition parameters as well as open/close the substrate and source shutters
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