Oxford PECVD
User Manual

Manufacturer: Oxford Instruments

Instrument: PECVD

Location: 2F Cleanroom, CVD Bay, Complex for Research Excellence

Contact: 02-3366-5064; nems@mail.nems.ntu.edu.tw

Author: Yu-Ta Chen / Jheng-Ru Wu

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1 Usage Restrictions

- Only trained and certified users allowed
- Prohibited materials include PI (polyimide) tape, photoresist
- No exposed metals allowed
- Sample size is 8" and below including wafer fragments
- Deposition allowed for amorphous-silicon, SiO_y, and SiN_y

2 Pre-Use Inspection Checklist

☐ Process cooling water pressure > 2 kg/cm^2

After check-in, as shown in Figure 1,

☐ Check the status indicators all green

☐ Check the load lock indicator and pressure < 7 x 10^{-2} Torr

☐ Check the process chamber indicators and pressure approximately at 1 mTorr

☐ Check the position of the carrier in the load lock

Note: Notify the staff immediately if any of the check items fail to meet the initial status!
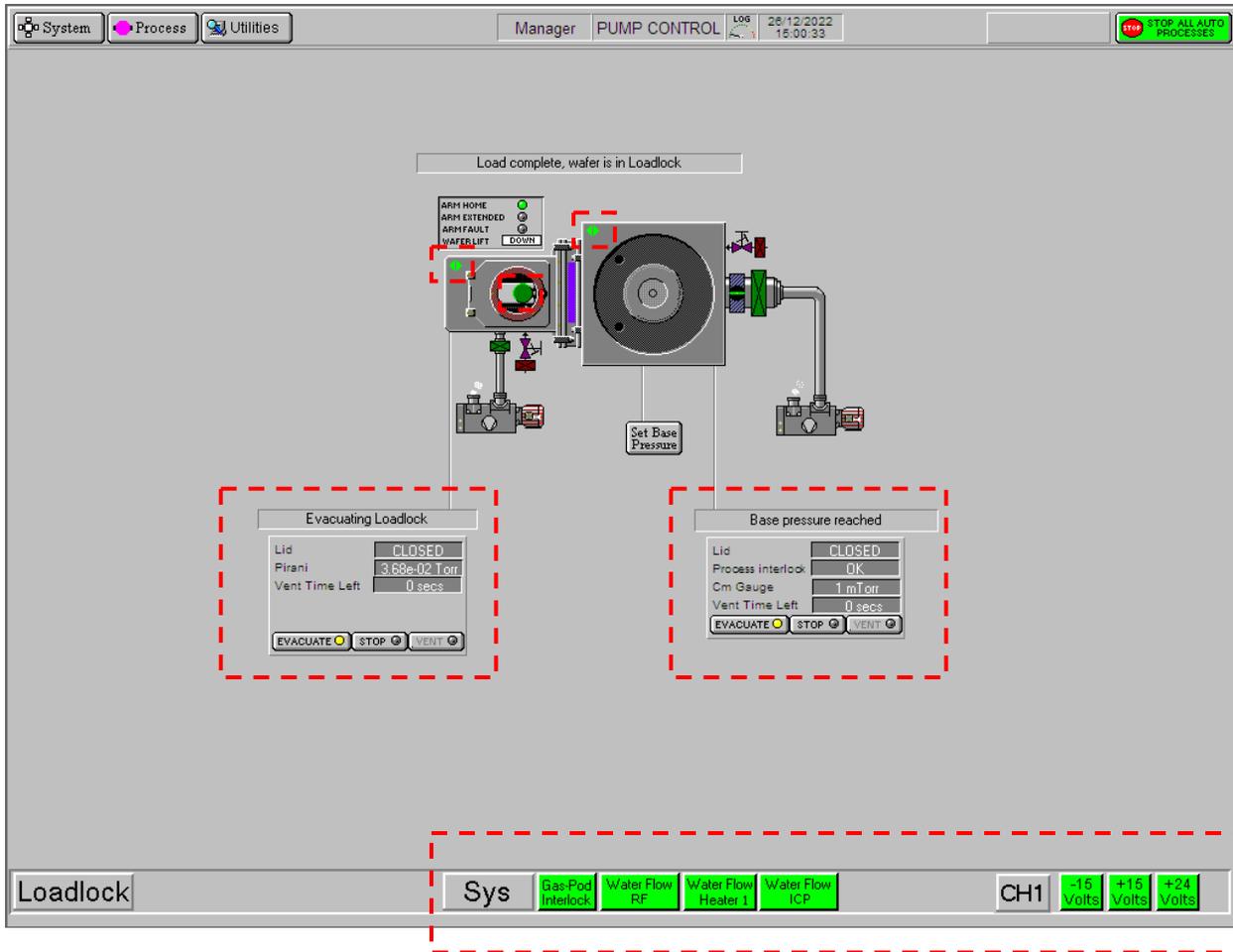
Figure 1 Instrument Control Interface

3   Standard Operating Procedures

3.1   Introduction to User Interface

Users mainly access the System → Pumping function to monitor the PECVD system, sample carrier position, and pump actions. Entered into other sections shown in Figure 2 is prohibited. If accidentally entered into Service or other sections, please notify the staff immediately.
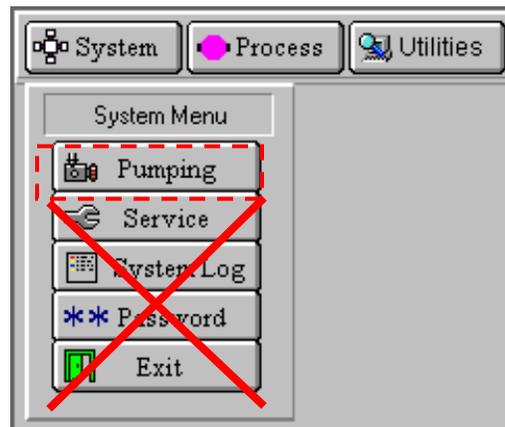
Figure 2 System Menu
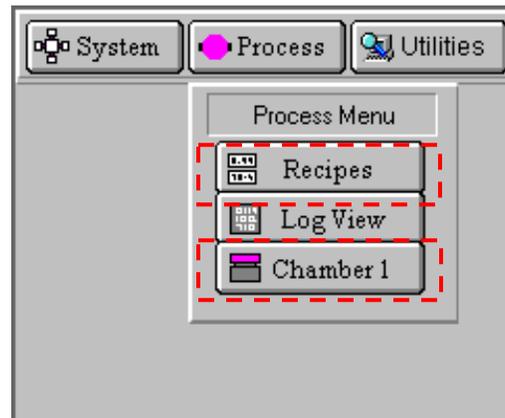
Figure 3 Process Menu

Under Process, users will primarily use two functions: Recipes and Chamber 1, as illustrated in Figure 3. Each function explains as follows:

Recipes: edit, load, and run processes
Chamber 1: chamber status, process control, and carrier temperature adjustment

3.2 Vacuum Venting

STOP → Wafer has finished processing →√OK → VENT. The system will introduce nitrogen, purge the entire load lock chamber, then close the mechanical pump valve while maintaining nitrogen flow through the vent valve to conduct a vacuum venting. The total time required is approximately 200s. Counting down to 120s and achieving stable pressure allows the chamber door to be opened (for the initial venting process only; if it's the second process, it's advisable to complete the required venting time).
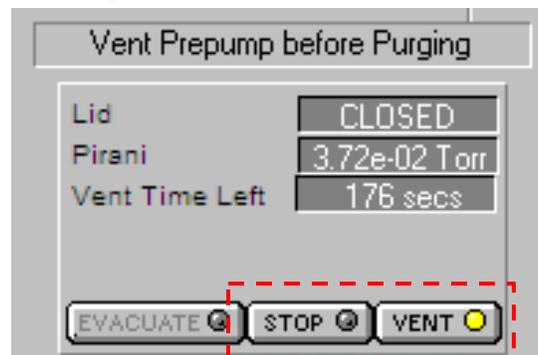
Figure 4 Loadlock Status Diagram

3.3 Sample Loading

Open the chamber, being cautious of the high temperature of the carrier. Check the carrier position, align it properly with the alignment pin. The maximum size is an 8-inch wafer. PI tape and photoresist are strictly prohibited.

Note: After placing the sample, ensure that the ARM HOME indicator is green.
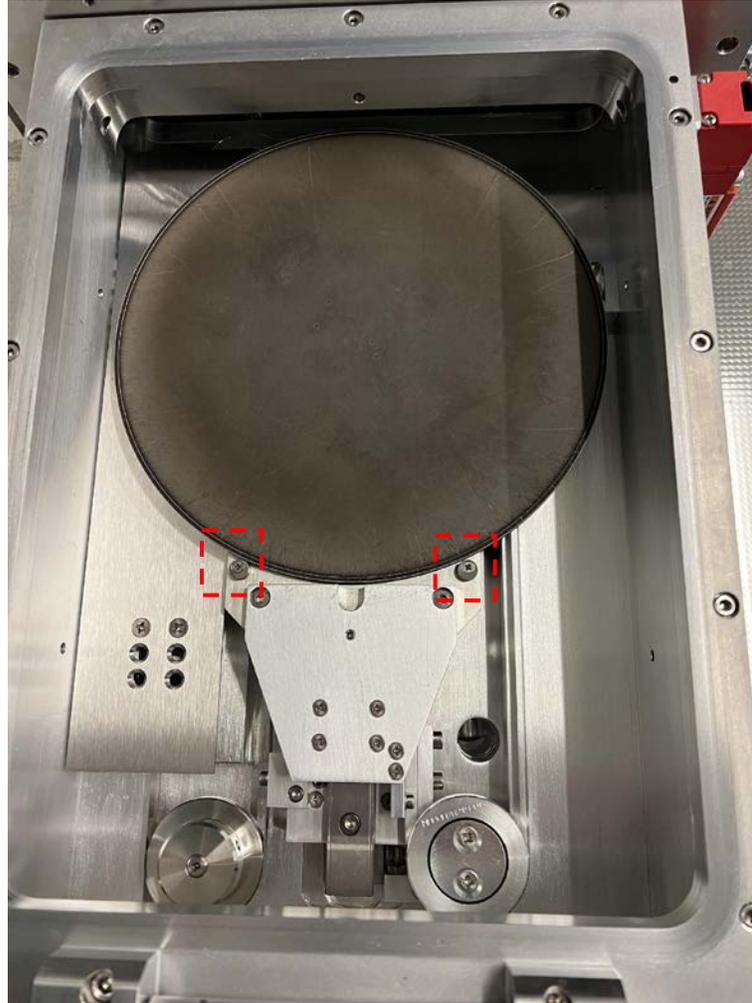
Figure 5 Alignment pin position in the Load lock

3.4 Chamber Evacuating

STOP → EVACUATE ⬜→Enter Wafer Name (OK) → √OK
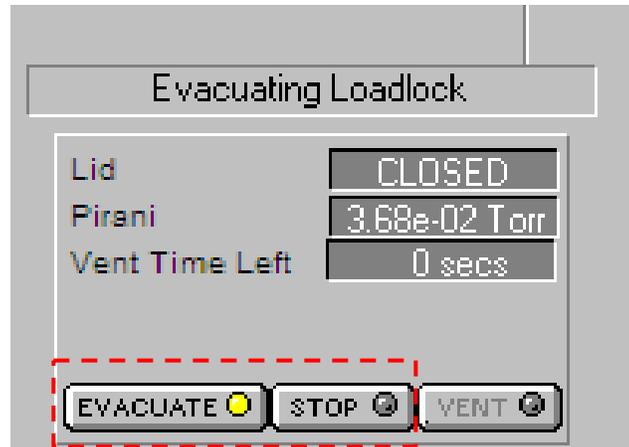
Figure 6 Loadlock Status Diagram

If wafer name is not entered, the system won't display the green carrier position, and automatic process won't be initiated. Pump the vacuum until the pressure reaches less than 7×10^{-2} Torr, and the indicator is on.
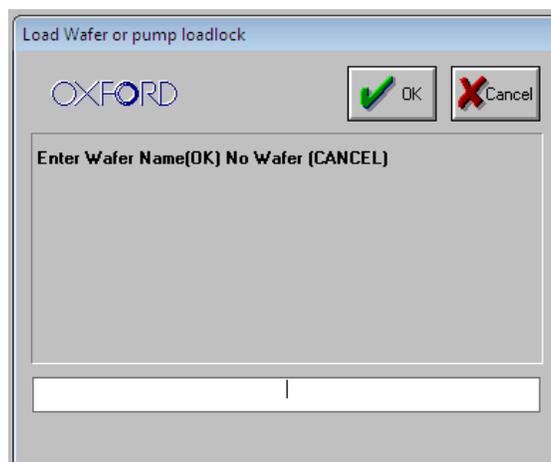
Figure 7 Wafer Naming Window

3.5 Setting up Automatic Process

Process → Recipes → Automatic → Load → Select process → Edit step time → √OK → Run

If selecting another process, the system will be prompt to Overwrite the current recipe. Please click √Yes
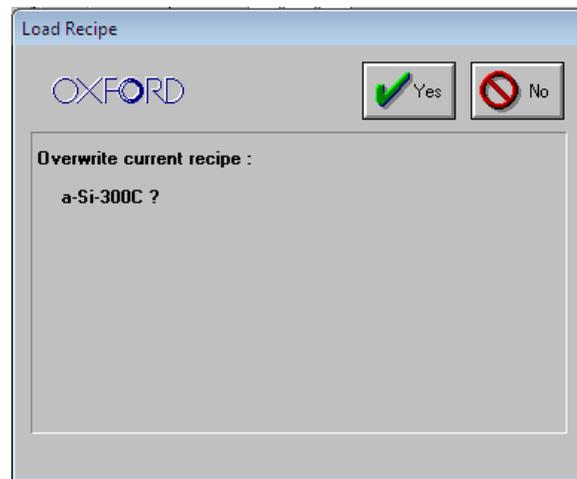
Figure 8 Recipe Overwrite Window

The process options window will appear. Select the desired process and press √OK to view the complete steps for that process. When selecting steps with the same process name, access the Process Step Editor to edit and modify the required process time (STEP TIME). Process time is determined by the required film thickness (nm) and the deposition rate of the material (Å/s). Table 1 provides the deposition rates of common coating materials.

Note: Users can only modify the process time (STEP TIME), refrain from altering other parameters.
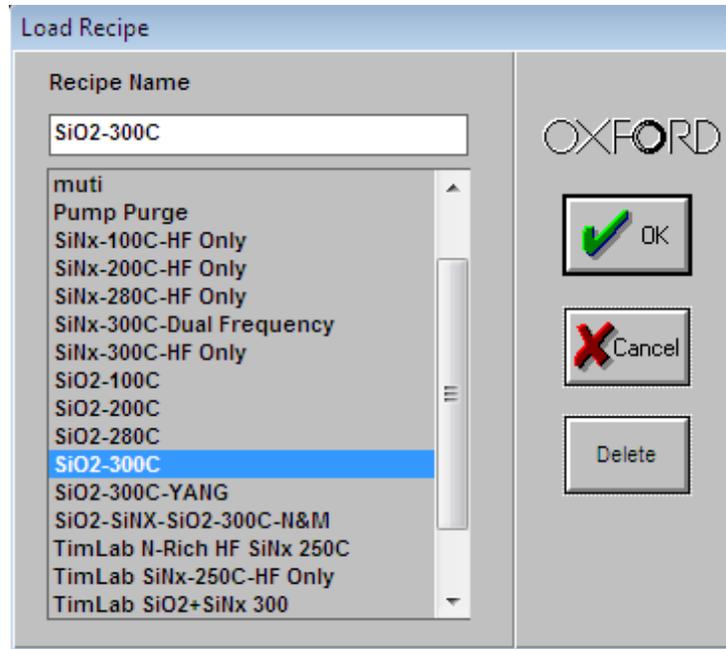
Figure 9 List of Recipes
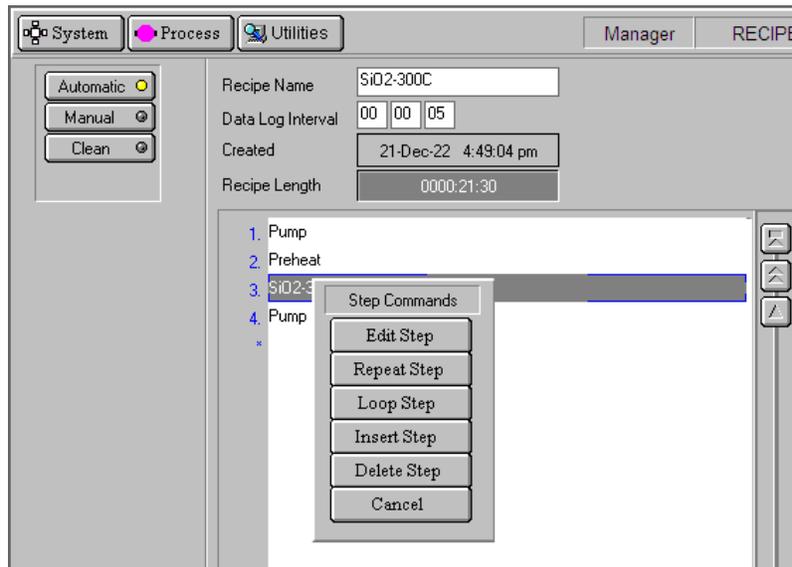
Figure 10 Edit Step

Figure 11 Edit Step Time

Reference Information：

	Deposition Rate（Å/s）
Amorphous Silicon (a-Si) @300 °C	30
Silicon Oxide 300 °C	14.6
Silicon Nitride 300 °C	4.6

Table 1 Deposition Rates of Common Materials

3.6 Adjusting table Temperature

Follow the steps in Figure 12~13 to raise the table temperature. If a lower temperature process is required (below 300°C), please inform the staff in advance before the appointment, as the temperature takes longer to decrease. The procedure for changing the carrier temperature is shown below:

SET TABLE HEATER DegC → START → Table temperature not in tolerance → Stop

→YELLOW ALERT →Accept
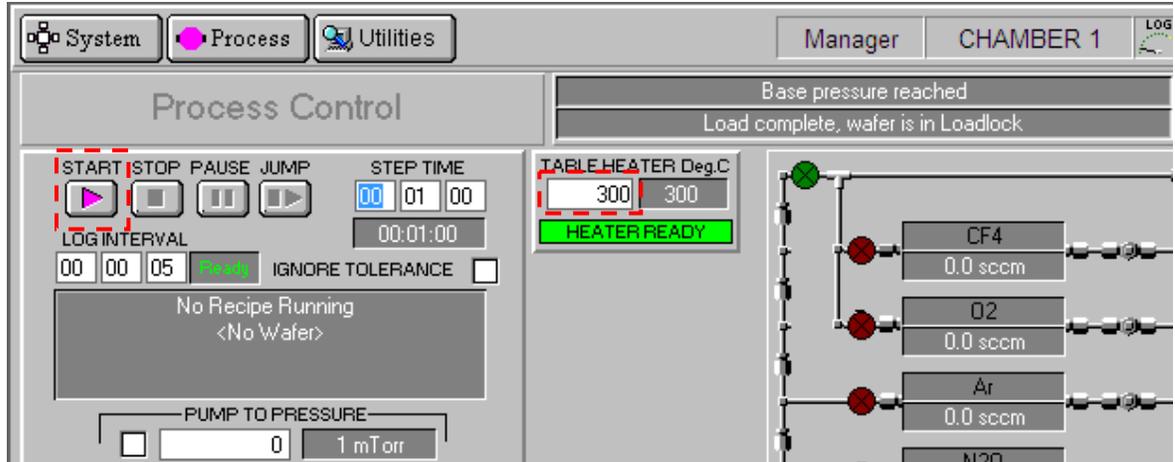
Figure 12 Enter desired temperature and begin temperature adjustment
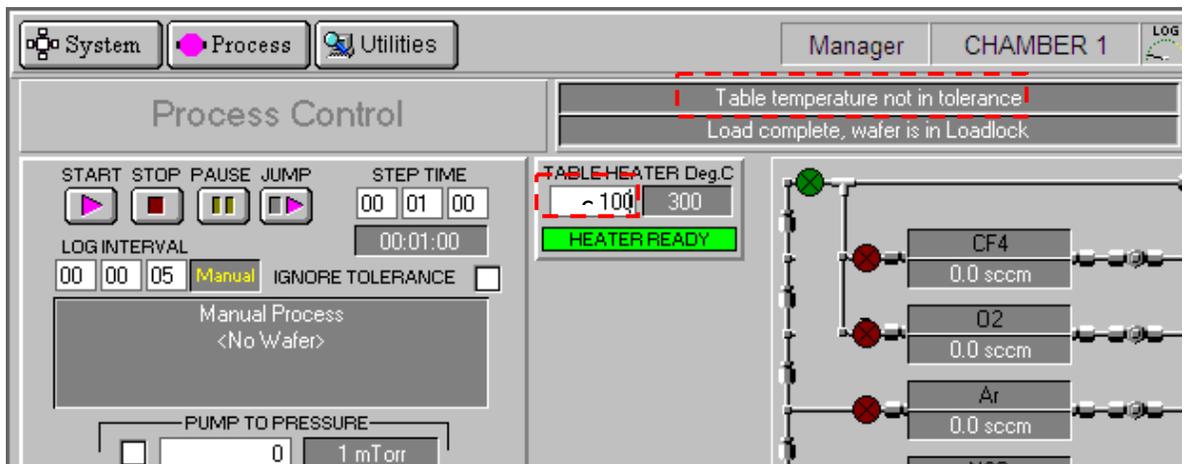
Figure 13 Adjustment begins, msg box shows temperature not in tolerance
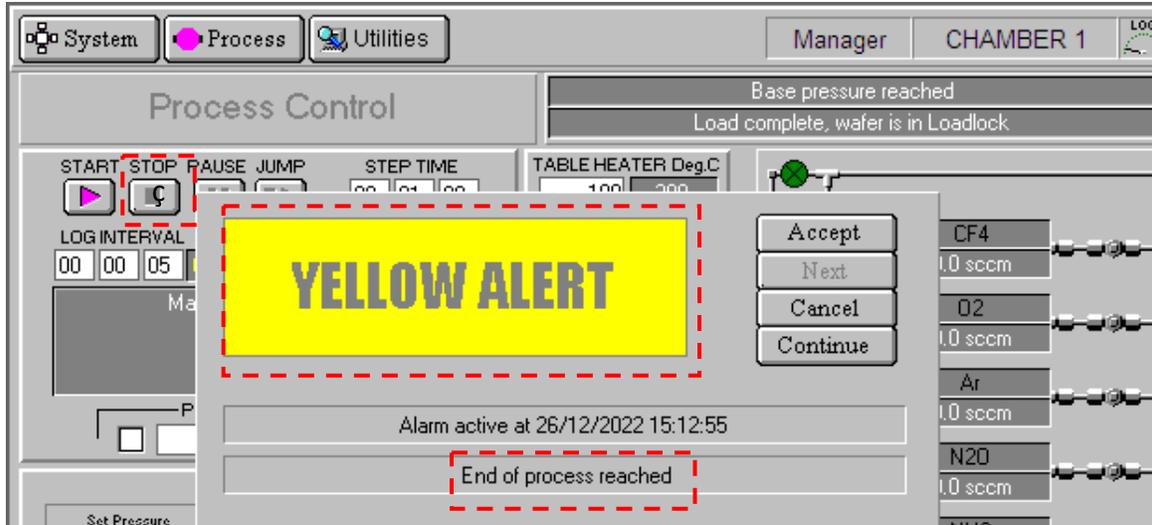
Figure 14 End of process window

3.7 Setting up Chamber Cleaning Process

Before setting the cleaning process, manually move the tray to the process chamber. Click on the green tray in the load lock; a yellow arrow pointing right and a blue path will appear. Click on the end of the path indicating the process chamber, then the tray will start moving towards the process chamber.
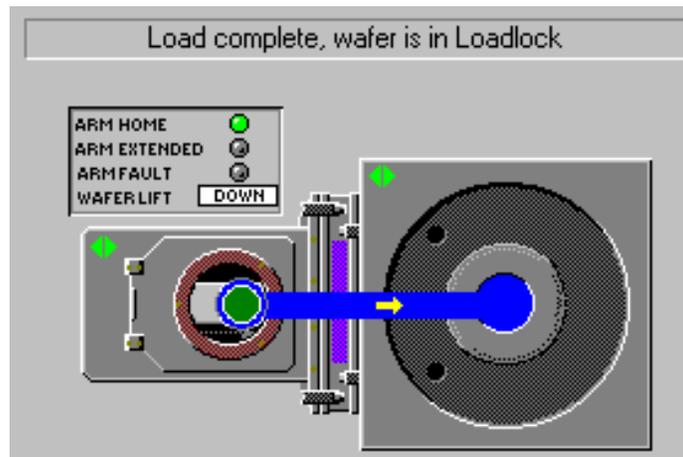
Figure 15 Click on the green tray showing the path to process chamber

Once the transfer is completed, the green tray will be shown in process chamber in Figure 16.

Figure 16 Tray moved to the process chamber.

process, proceed to:

Process → Recipes → Clean → Load → Clean-300°C → √OK → Run

Be noticed that the clean process needs to be performed at 300°C. Therefore, if a non-300°C process was run previously, increase the table temperature to 300°C before running the cleaning process.
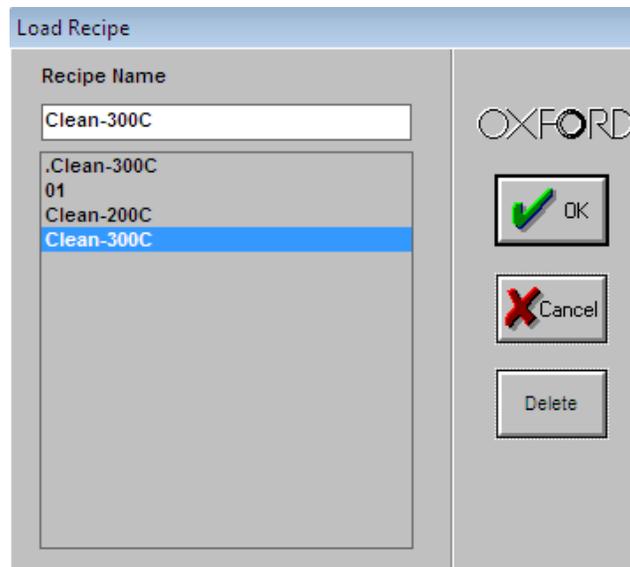
Figure 17 Clean process list

After completing the cleaning process, follow the same steps to manually move the tray back to the load lock.

Note: During cleaning process, do not check out; violators will be fined 10 times the usage fee!
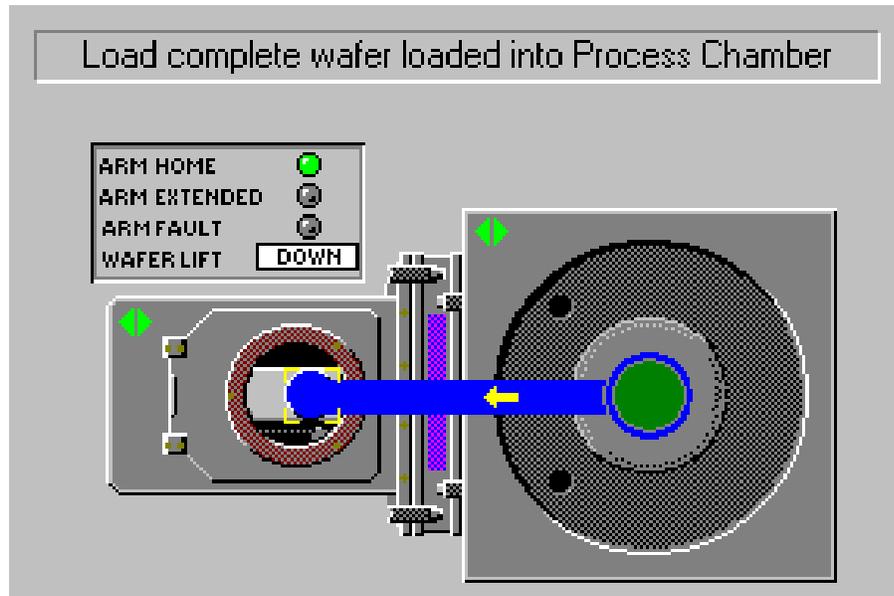
Figure 18 Click the green tray showing the path to the load lock.

4 Post-Use Inspection Checklist

Before check-out, restore to the initial status

☐Check all status indicators are green.

☐Check the load lock indicators and pressure <7 x 10^{-2} Torr.

☐Check the process chamber indicators and pressure around 1 mTorr.

☐Check if the carrier manually returned to the load lock

Once everything is confirmed to be in order, you can check out!

5 Version History

Version	Time	Author	Note
1.0	April, 2023	Yu-Ta Chen / Jheng-Ru Wu	