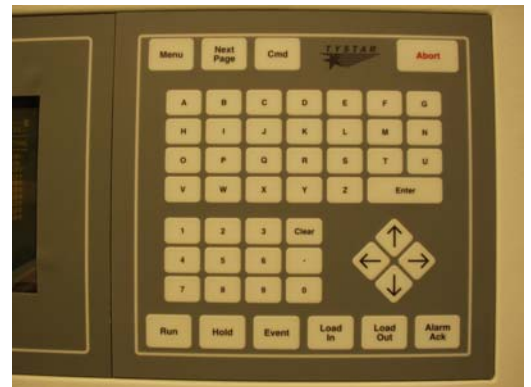


Tystar Tube 4 LPCVD Low Temperature Oxidation Tube Operating Procedure

Revised 6/21/2005

General Information

- 1) The LPCVD LTO tube is the 4th tube from the top of the Tystar furnace
- 2) The tube computer is the white flat screen instrument on the left of the furnace as shown.
- 3) On the right side of the tube computer there are various buttons that you will need to use:
 - a. Abort
 - b. Menu
 - c. Enter
 - d. Alarm Ack
 - e. Event
 - f. Run



During furnace operation the tube computer will have a display that looks like:

- g. Please note the location of the following information on this screen:
 - i. Recipe name
 - ii. Step name
 - iii. Time left in this step
 - iv. Overall time left in this recipe
- 4) If at any time you see that your recipe is in step **SHLD**, contact staff. This is a special hold and requires a staff person to step out of the program.

Please note the **ABORT** button, which you can press if you believe the furnace is acting incorrectly.

Login in to CRESS

- 1) Go to the CRESS computer and log into the **Tystar LTO** system

Check the tube status on the Tube computer

- 1) Press **MENU**
- 2) On the alpha keypad press: **D -- S**
- 3) Press: **ENTER**
- 4) You will now see the status of the system. Look at the Step Name. It should be **IDLE**. If it is not **IDLE** see a staff person. If it is **IDLE** you may continue.
- 5) Check the tube temperature. **ACTUAL** temperature should equal **SETPT** temperature. If not, see staff.

Load your recipe

- 1) Press **MENU**
- 2) On the alpha keypad press: **R -- L**
- 3) Press: **ENTER**
- 4) The display will now have a list of recipes available.
- 5) Use the arrow keys to highlight the **>** in front of the recipe that you desire.
- 6) Press: **ENTER**
- 7) Press: **ENTER** (*yes, you do it twice*) **PAUSE**
- 8) The screen will now display the name of the nitride deposition step and a time next to it.
 - a. Using the number pad and the decimal (.) key. Type in the deposition time that you want.
 - b. The deposition time should look like **12.34.56** which means 12 hours, 34 minutes, and 56 seconds (note the decimal point between units, NOT a colon)
 - c. Press **ENTER** to load the time.
- 9) The display will now read "recipe load complete"

List of Recipes:

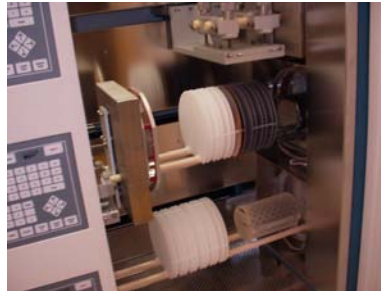
DOPELTO.004
VENT.004 (staff only)
GATEOFF.004 (staff only)
STDLTO.004

Running the recipe

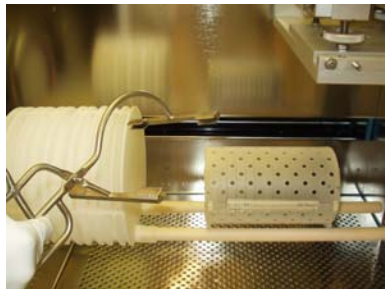
- 1) Press: **MENU**
- 2) On the alpha keypad press: **D -- S**
- 3) Check that the recipe name on the screen is the one that you want
- 4) Press: **RUN**
- 5) The recipe will now start running and the display will now have the step name **STRT**.
- 6) If the system remains in step **STRT**, you did not log into CRESS. Once you log into CRESS, the recipe will proceed.

Loading the wafers

- 1) Once the recipe has started the system will vent the tube and then pull the boat out of the tube.
- 2) Wait until you hear the *SONIC* alarm telling you that the boat is fully out of the tube.
- 3) The tube computer should tell you that the system is in step **LDWF**.
- 4) Press **ALARM ACK** to turn off the sonic.



- 5) Allow the caged boat to cool 5 minutes.
- 6) Ensure that the wafer-loading table is clear.
- 7) Using the boat pick-up tool, pick up the boat lid and place it on the wafer-loading table.



- 8) Load your wafers into the boat; **front of wafer towards door – left of tube.**



- 9) Pick up the boat lid with the pickup tool and carefully replace it on the boat on the cantilever.
- 10) Press **EVENT**.
- 11) The boat will now go into the tube and the deposition will occur.

- 12) Note the amount of recipe time remaining; the system will be ready for you to unload your wafers when there is about 79 minutes left in the recipe.
- 13) You may leave the lab until the wafers are ready to be unloaded.

Unloading the wafers

- 1) Check that the *SONIC* is making a noise and the tube computer says that it is step **HLD1**.
- 2) Press **ALARM ACK** to turn off the sonic.
- 3) Press **EVENT**
- 4) The system will vent the tube and then pull the boat out of the tube.
- 5) Wait until you hear the *SONIC* alarm telling you that the boat is fully out of the tube.
- 6) Let the boat cool 5 minutes.
- 7) Ensure that the wafer-loading table is clear.
- 8) Using the boat pick-up tool, pick up the boat lid and place it on the wafer-loading table.
- 9) Unload your wafers from the caged boat on the cantilever.
- 10) Pick up the boat lid with the pick-up tool and replace it on the boat on the cantilever.
- 11) Press **EVENT**
- 12) The boat will be pushed back into the tube.

System Idle

- 1) Wait until the boat is completely back into the tube.
- 2) The tube computer should display that the status of the system is in idle. Look at the Step Name. It should be **IDLE**.
- 3) After the step name is idle, you may go to CRESS and logout of the **Tystar LTO** system.

Recipe Lists

Recipe = STDLTO.004		
<u>STEP</u>	<u>COMMENT</u>	<u>TIME</u>
STRT	1 st Step	00.00.10
CRSS	CRESS login Check	00.00.20
VNT1	Soft Vent 1	00.00.30
VNT2	Soft Vent 2	00.00.30
VNT3	Soft Vent 3	00.00.30
VNT4	Soft Vent 4	00.00.30
VNT5	Vent	00.07.00
BTOT	Boat OUT	00.10.00
LDWF	Hold for load	00.00.00
BTIN	Boat IN	00.10.00
STB1	TEMP=550	00.02.00
VACC	Vacuum Check	00.01.00
TEMP	TEMP to setpoint	00.02.00
PMP2	Vac Pump 2	00.02.00
PUR2	Pump & Purge 2	00.02.00
PMP3	Vac Pump 3	00.05.00
LKCK	Vac Leak Check	00.02.00
VACP	Vac Pump Last	00.02.00
STBT	Stabilize Temp	00.01.00
STBP	Pressure	00.02.00
PNH3	Pre NH3	00.05.00
PDCS	Stabilize DCS	00.01.00
DEPO	Deposition	Your Time
DCSO	NH3 Purge	00.05.00
PMPP	Pump Out Gases	00.03.00
PMP5	Vac Pump 5	00.05.00
PUR5	Pump & Purge 5	00.02.00
PMP6	Vac Pump 6	00.05.00
STB2	Pre VENT Purge	00.01.00
HLD1	Hold for VENT	HOLD
ATM1	Soft Vent 1	00.00.30
ATM2	Soft Vent 2	00.00.30
ATM3	Soft Vent 3	00.00.30
ATM4	Soft Vent 4	00.00.30
ATM5	Vent	00.07.00
BOUT	Boat OUT	00.10.00
ULWF	Hold for unload	00.00.00
CLOS	Close Door	00.10.00
PMP9	Vac Pump 9	00.05.00
ENDP	End Process	00.00.30

Recipe = DOPELTO.004		
STEP	COMMENT	TIME
STRT	1 ST Step	00.00.10
CRSS	CRESS login Check	00.00.20
VNT1	Soft Vent 1	00.00.30
VNT2	Soft Vent 2	00.00.30
VNT3	Soft Vent 3	00.00.30
VNT4	Soft Vent 4	00.00.30
VNT5	Vent	00.07.00
BTOT	Boat OUT	00.10.00
LDWF	Hold for load	00.00.05.00
BTIN	Boat IN	00.10.00
STB1	TEMP=550	00.02.00
VACC	Vacuum Check	00.01.00
TEMP	TEMP to setpoint	00.02.00
PMP2	Vac Pump 2	00.02.00
PUR2	Pump & Purge 2	00.02.00
PMP3	Vac Pump 3	00.05.00
LKCK	Vac Leak Check	00.02.00
VACP	Vac Pump Last	00.02.00
STBT	Stabilize Temp	00.01.00
STBP	Pressure	00.02.00
PNH3	Pre NH3	00.05.00
PDCS	Stabilize DCS	00.01.00
DEPO	Deposition	Your Time
DCSO	NH3 Purge	00.05.00
PMPP	Pump Out Gases	00.03.00
PMP5	Vac Pump 5	00.05.00
PUR5	Pump & Purge 5	00.02.00
PMP6	Vac Pump 6	00.05.00
STB2	Pre VENT Purge	00.01.00
HLD1	Hold for VENT	HOLD
ATM1	Soft Vent 1	00.00.30
ATM2	Soft Vent 2	00.00.30
ATM3	Soft Vent 3	00.00.30
ATM4	Soft Vent 4	00.00.30
ATM5	Vent	00.07.00
BOUT	Boat OUT	00.10.00
ULWF	Hold for unload	00.00.00
CLOS	Close Door	00.10.00
PMP9	Vac Pump 9	00.05.00
ENDP	End Process	00.00.30

Recipe = VENT.004		
<u>STEP</u>	<u>COMMENT</u>	<u>TIME</u>
STRT	1 st Step	00.00.10
CRSS	CRESS login Check	00.00.20
VNT1	Soft Vent 1	00.00.30
VNT2	Soft Vent 2	00.00.30
VNT3	Soft Vent 3	00.00.30
VNT4	Soft Vent 4	00.00.30
VNT5	Vent	00.07.00
BTOT	Boat OUT	00.10.00
LDWF	Load Wafers	00.45.00
BTIN	Boat IN	00.10.00
PMP9	Vac Pump 9	00.05.00
ENDP	End Process	00.00.30

Recipe = GATEOFF.004		
<u>STEP</u>	<u>COMMENT</u>	<u>TIME</u>
STRT	1 st Step	00.00.10
GVOF	Close Gate Vlv	00.00.20
HLD1	Hold gate OFF	HOLD
PMP9	Pump Down	00.04.00
ENDP	End Process	00.00.30

Standard LTO deposition rate is approximately 233 Å/min

Doped LTO rate unavailable