

STANDARD OPERATING PROCEDURE

SOP_RTP

- Heatpulse 410 Rapid Thermal Annealing (HP410)
- Maximum heat condition: 1150C-300sec
- Maximum heating rate: 200°C/sec

NOTE:

- Heatpulse410 is used for Si-based material only. Other material system requires another set of quartzware (tube and tray)
- Prior to RTP anneal, wafers must be solvent cleaned

SAFETY:

Toxic vapour (e.g., arsenic in case of GaAs) may be generated during the anneal. Make sure your sample does not contain any potential toxic component.

PROCEDURE:

1. STARTUP

- a. Turn on the cooling water by setting the Dom_cold water valve to "RTA" position (now it's always on)
- b. Confirm Low-Pressure N2 supply is ON, O2 supply is ON, valves for LP_N2 and O2 going into CR_module4 (furnace room) be turned ON
- c. Inside the CR_Module4, open **N2**/O2 valves (attached on the wall) for lamp cooling and process gas supply
- d. Set the process N2/O2 flow to 20~35 sccm, using the external flowmeter and purge flowmeter (@20)
- e. Set Meter Select switch on the heating chamber control panel to "TEMP" position.

- f. Set Emissivity at 50(0.5)
- g. Set Lamp Control switch to "AUTO" position
- h. "POWER" switch should be OFF.

NOTE: If the heating chamber POWER switch is ON when the computer is turned on, the lamps on the heating chamber may come on.

- i. Open the oven door (if a wafer is present, remove it.) Completely close the oven door. An interlock switch will prevent the lamps from firing if the door is not completely closed.
- j. Turn on the computer after its display has turned on. Type "**cd AG + ENTER**", then run program "**PCAT + ENTER**" and P-CAT logo will appear on display. After all, press any key to go the MAIN menu

NOTE: Be sure the "POWER" switch on HP410 is off when you turn on the computer.

- k. Turn on the "**POWER**" switch on the heating chamber control panel. You will hear a strong clunk-like noise, as the contactor is engaged.

The HP410 is now ready for operation.

2. SET THE OPERATING PARAMETERS

- a. From **MAIN** menu of **PCAT** software/DOS, choose the desired recipe. The program maintains only one recipe in its memory at a time; it is called "Current Recipe"
- b. Load the recipe by selecting the "Read recipe from..." line from **MAIN** menu, using arrow keys or type **R** and press **ENTER**. Select the recipe from the list of recipes on the screen using the arrow keys. This will be the Current Recipe. Check if this is the process which you want to run, by reading the Steady State(**SS**), Ramp and Delay(**Dly**) step's parameters. The recipe name is listed at the bottom of Process Cycle Display screen.

++++++ **Password: vrg** ++++++

**** Always start with the dummy wafers to stabilize the heating condition ****

3. PLACE THE WAFER IN THE PROCESSING CHAMBER

a. Open the door, gently pull the loading chuck out and stop pulling until full support wafer is out. Place the samples face down/up on the silicon support wafer, and slowly close the door.
No impact please!

b. Purge the chamber/wafer with **N2** for at least **3** minutes. *Oxygen from the atmosphere could de-calibrate and shorten the K-type thermocouple's life(If a thermocouple is installed).*

4. RUN THE PROCESS

a. From "Process Cycle Display" screen, press **F10** key to go back to **MAIN** menu.

To execute the Loaded recipe, select "Execute recipe" line from MAIN menu, or type **E**. The system will display the Process Cycle Display screen. Press **F1** (Run) to run the selected recipe. Run could be monitored on the computer.

b. At the end of process, wait until the temperature reaches **100C**, on the heating chamber control panel display, before opening the chamber door.

**** The temperature displayed on the computer screen is valid only as long as the recipe is running.*

**** During the cool down step, the reactor should be purged with nitrogen, so any possible toxic gas accumulation should have evacuated prior to opening the chamber.*

c. With the door fully open, wait until the temperature is below 70C, before unloading the sample(s). *<No touch on any part of quartzware, it's hot! Touching causes contamination!>*

d. Press **F10**, return to the **MAIN** menu after you are done.

5. SHUTDOWN

a. Wait until the chamber temperature is lower than 150C.

b. Turn off the controller "POWER" switch.

c. Turn off the computer and the display.

e. Turn off the heating lamps cooling nitrogen.

f. Flow process N2 through the chamber.

g. End the operation and sign on the RTA log-sheet.

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