

SOP of 2 inch Phosphorus Diffusion, oxidation Furnace

3 Stack Furnace

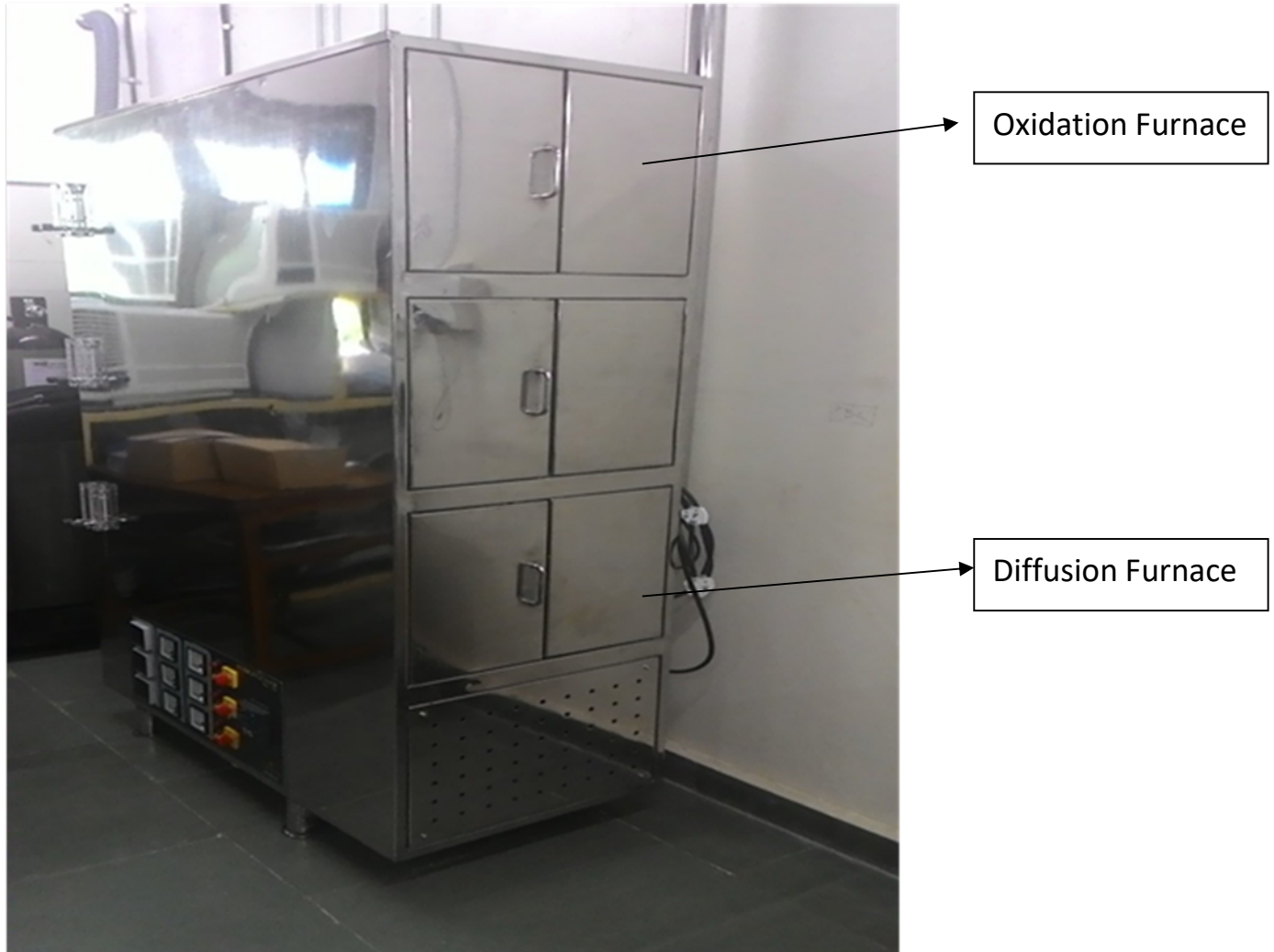


Fig 1

Fig 1 shows the 3 Stack furnace in this
The Upper tube is used for Diffusion Process
Middle tube is spare.

And the lower tube is used for Oxidation Process.

Operating Steps :

A. Tube Warm up run.

Before doing Oxidation or Diffusion Run Tube warm up run should be performed.

1. Open the N2 Cylinder.
2. Wear the Mask, hand gloves, and Eyewear before starting the process.
3. Switch ON the Mains switch & Exhaust of furnace.
4. Check exhaust is working.
5. Turn on the N2 flow of Furnace and Set Rota meter to 1slpm.
6. Take out previously loaded samples from the respective quartz tube
7. Put back quartz boat as per recent temperature profile distance.
8. Switch ON the Furnace Power
9. Set the furnace temperature .as follows
10. 25 - to 1100°C Time 3 hrs
11. 1100°C for 1 hrs
12. 1100°C to 400°C for 4 hrs

B. Oxidation Furnace :

(Choose Lower furnace for oxidation)

- **Follow Step 1 to 10 for Tube warm up run**
- Load the wafers in the Oxidation quartz boat after attaining temperature 400°C.

- Push the boat inside the furnace with Push-Pull rod on the exact mark which has done on the rod.
- Close the end cap and OFF N2 flow and ON O2 flow with 1 slpm.
- Set the furnace temperature for Oxidation (20nm) run as follows
- 400°C - to 700°C Time 1hrs 30min
- 700°C for 2hrs
- After oxidation OFF O2 flow and ON N2 flow with 1 slpm.
- Ramp down the furnace 700°C - to 400°C Time 2hrs
- 400°C to 50°C. Time 2 hrs.
- Oxidized wafers can be unloaded @ temp below 400°C.
- Once temp is below 150°C, Switch off N2 flow and Furnace can be switched off.

C. Diffusion Furnace :



Quartz Difusion boat with sources



Wafer Loading

(Choose Upper furnace for oxidation)

- **Follow Step 1 to 10 for Tube warm up run**
- Load the phosphorous solid sources for the activation in the diffusion quartz boat.
 - Set the furnace temperature for source activation run as follows
 - 400°C - to 925°C time 2hrs 30min
 - 925°C - time 8 hrs
 - 925°C - to 400°C time 3hrs.

- After attaining temperature 400°C.load the actual samples in the boat.
- Push the boat inside the furnace with Push-Pull rod as per the recent temperature profile of the tube.

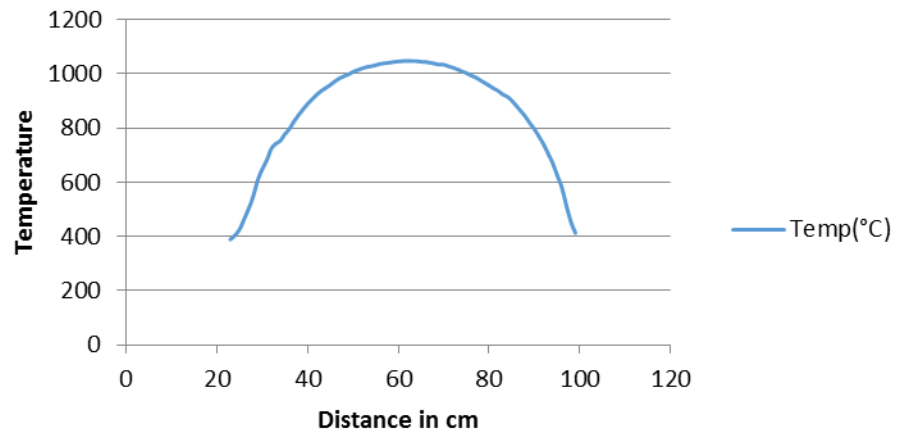
The length of Push rod is 110cm.

Ensure that the portion (Side) of the sample which is to be diffused should be kept facing to the sources.

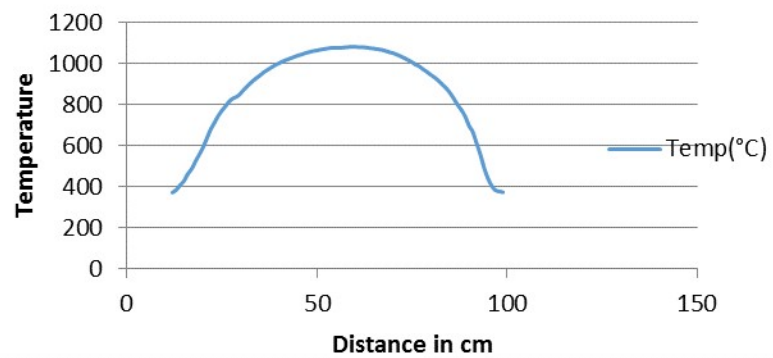
- Set the furnace temperature for diffusion run as follows
- 400°C - to 700°C time 1hrs 30min
- 700°C -time 15 min
- 700°C - to 875°C time 1hrs.
- 875°C -time 15 min
- 875°C- to 400°C time 3hrs.
- Diffused wafers can be unloaded @ temp below 400°C.
- Once temp is below 150°C, switch off N2 flow Exhaust fan and Furnace can be switched off.

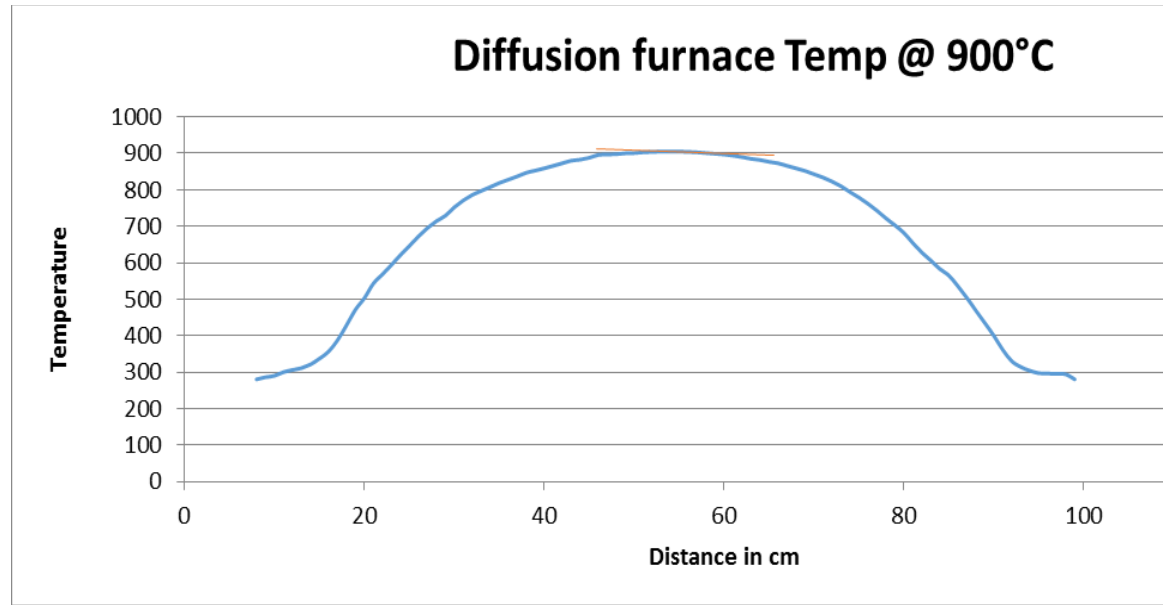
(Temperature Profile of Oxidation and Diffusion furnace)

Oxidation furnace @1025°C



Oxidation furnace @1050°C





Safety Instruction and Precautions:

- Use heat resistive gloves during working with furnace.
- Do not use metal tweezers to handle the solid diffusion sources.
- Use only RCA clean wafers in the furnace.
- Keep the oxidation and diffusion boat separately to avoid contamination.