

# Boron Diffusion

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Boron Diffusions: Using PBF 6MK-37

\*Make sure you have an even number of wafers to be diffused

Step 1. Wafers need to be immersed in diluted BOE for .5 min (1/3BOE + 2/3 DI water)

Step 2. Set hotplate to 200 °C

Step 3. (It is important that you wear a respirator while spinning this dopant)When hotplate is up to temperature, spin on the dopant using these spinner settings:  
SPREAD 39 rpm for 2 sec, SPIN 3070rpm for 10sec

Step 4. Leave wafers on the hotplate for 30 minutes

Step 5. While the wafers are on the hotplate we can program the diffusion furnace:

- Open both Nitrogen and Oxygen tanks
- Open green Oxygen and Nitrogen handles (situated on the wall)
- Lift up the Oxygen and Nitrogen handles on the back of the diffusion furnace
- Power on the furnace (main circuit breaker on)
- Press ([ ]) for Alt 1
- Press (“hidden button”) for Clr
- Press and hold run button
- Press (P) to set values: Pr1 (ramp up temp) 20°C/min  
P11 (hold temp) 1100°C  
Pd1 (time) 3hrs  
Pr2 (ramp down temp) 20°C/min  
P12 (final temp) 400°C  
Pd2 (program end) END
- Press RUN

Step6. After the wafers have been 30 minutes on the hot plate, they are put on the furnace boat facing each other (we always need an even number of wafers).

Step7. Wafers are push into the furnace when the furnace reaches ~ 600°C, (you can hold the furnace temperature if your wafers are not ready)

Step 8. Wafers are left into the furnace for 3 hours until the furnace ramps down to the final

## Temperature

Step 9. When the wafers are out of the furnace, fill about ¼ of a beaker with BOE and immerse the diffused wafers BOE solution (one wafer per beaker) leave the wafer in the solution for ~ 15 min.

Step 10. Prepare the oxidation furnace for a short wet oxidation:

- Check bubbler water level (about ½ of the container should be filled with DI water)
- Open Nitrogen and Oxygen tanks
- Open green valves on the wall corresponding to Ni and Oxygen
- Lift up Nitrogen handle on the back of the Oxidation furnace
- Turn Thermolyne control to 4.4
- Turn bubbler control to 2
- Power on furnace #4 (main circuit breaker on)
- Press for Alt 1
- Press for Clr (“hidden button”)
- Hold Run button
- Press (P) button
- Program furnace #4 to these settings: Pr1 20°C/min  
Pl1 850°C  
Pd1 .25 hrs  
Pr2 20°C/min  
Pl2 400°C
- Check for bubbler water temp, if >90°C, turn Thermolyne to 4.2 and bubbler control to 2.0
- When temperature is >800°C close Nitrogen handle on the back of furnace and lift up wet oxygen handle (middle one)
- 5 minutes later load wafers to be oxidized
- When the furnace start cooling down to 800°C you may unload your wafers.

\*\*\*\*NOTE: To see the dwell time left on furnace while running, just press the "RUN/HOLD" button and then the "P" button twice or until you see "time H" and a value "# dwell" show up on the screen. That value is the time left of dwell(hold) time in hours. To continue with your oxidation don't forget to click again the "RUN/HOLD" button until the Hold option disappears, you will see "dwell" on the screen instead.

Step 11. Immerse your wafers in BOE for another 15 minutes or until they become Hydrophobic to remove the unused boron layer, the boron oxide layer and the borosilicate glass layer.