Spin on Dopant SOP

Dopant: Filmtronics B153

Wafer: N-type

SET UP:

1. Sputter Coater
    a. Ensure that both the pump and coater are plugged in and switches are turned on
    b. Turn valve that connects Nitrogen to coater OFF
    c. Turn ON Nitrogen adjust psi to 35 (don't want too much pressure)
    d. Turn valve to ON position
    e. Turn ON coater, then adjust psi until it turns on (normally ~40 psi)
    f. Settings:
        i. Acceleration time: 12 sec
        ii. Speed time: 20 sec
        iii. Spin speed: 3000 RPM
        iv. Decel Time: 0.5s
2. hot plate
    a. Want at 200°C spin 175
    b. 12 min

PROCEDURE:

1. Place clean N-type wafer on chuck
2. Use black alignment tool to center wafer
3. Do a practice run, wafer should have minimal "wobble".
4. Get dopant ready
    a. Fill vial as much as possible
    b. Will dispense full dropper
5. Dispense dopant in center of wafer and IMMEDIATELY close door and start spinning.
    a. If the dopant sits on wafer it will create a line after the soft bake
6. After spin is complete, transfer wafer to hot plate
    a. ~200° for 12min (10-15min is recommended)

DRIVE-IN PROCEDURE:

Tube furnace: Ramp up and down same as Oxidation settings, just have to change the soak temperature and the running time from preceding/following temperatures. I've highlighted in blue what changed from oxidation.

N_2 80 sccm @ 850°C

1. Plug into 220 VAC.
2. Turn the "Main Power" switch to the **ON** position.
3. Enter the desired heating curve. An example of a heating curve is shown on the next page.
    a. Press 
    b. **C01** will be displayed on the red PV screen.
        i. Use the  buttons and set the starting temperature to 0.*
        ii. Press return,  , to set the time, **t01**.**
            1. Use the  to adjust the time.
            2. To change to a higher value, press the  until the correct place value is selected.
            3. The dot is NOT a decimal, it's the place value selected.
            4. Use the  buttons to enter the desired values.
        iii. Press return,  , to change **C02**.
            1. Use the  to adjust the time.
        iv. Press return,  , to set **t02**.
            1. Use the  to enter the desired time.
        v. Repeat all steps to enter the rest of the heating curve.
        vi. The last step is the kill code, -121 on **t0x.**

c. To start the program, press the green button, 

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d. Now press the  for 2 seconds to run the heating curve.

*The starting temperature is always 0.

**THE MAXIMUM TEMPERATURE INCREASE RATE IS 10 °C/MIN.

Heating Curve

C01	0	Initial Temperature, always start at 0.
T01	20	Running time from C01 to C02 at 10 °C/min max.
C02	200	Target temperature
T02	20	Running time from C02 to C03, maintain 200 °C for 20 minutes.
C03	200	Target temperature
T03	40	Running time from C03 to C04 at 10 °C/min.
C04	600	Target temperature
T04	20	Running time from C04 to C05, maintain 600 °C for 20 minutes.
C05	600	Target temperature
T05	55	Running time from C05 to C06 at 10 °C/min.
C06	1150	Target temperature
T06	45	Running time from C06 to C07. See below.
C07	1150	Target temperature
T07	190	Running time from C07 to C08 at 5 °C/min cool down.
C08	200	Target temperature
T08	-121	Kill code. Furnace will stop and cool down naturally.

1. Load the wafer(s) into the center of the quartz wafer boat and insert them into the tube furnace with the polished side toward the gas flow. Center the wafer boat as much as possible.

2. Insert the 2 thermal blocks (blocks should be aligned with inside not outside) and close the door. Secure the door by hand tightening the screws.
3. Turn the tube furnace on per the **Tube Furnace Operation** and enter the heating curve, if necessary.
4. Turn on the N_2 gas. Make sure its on outside.
    a. On the left, rotate the valve labeled “Nitrogen” counterclockwise 3 full turns.
    b. On the right, turn the valve also labeled “Nitrogen” to the ON position.
    c. Set the flow rate on the ALICAT N2 to 80 SCCM (standard cubic centimeters per minute).
    d. Allow the N_2 gas to flow during the pre-heat process.
5. Allow the tube furnace to cool down to at least 400 °C before turning it completely off. This may also take a couple of hours.
6. Remove the wafers and put them each in a wafer carrier labeled with the date and position in the wafer boat.