Polyimide/SU8 Spinner and Hotplate Hood

1. Introduction

The spinners and hotplates in Polyimide/SU8 hood are used for spin-coating and baking polyimide and SU8 resists on wafers as well as on small chips. There are 2 spinners and 3 hotplates in the hood. The spinners allow for the spin speed, ramp rate and time to be adjusted. One of the spinners is equipped with an automatic dispenser which is loaded with polyimide (PI).

2. Features and Specifications

2.1. Spin Coater

Max Spin Speed	6,000	RPM
Max Ramp	Depends on the substrate size	
Speed Accuracy	<1	%
Max Substrate size	150	mm
Min Substrate size	3	mm
Recipe Storage	30	

2.2. Hotplates

Min Temperature	50	C
Max Temperature	300	C
Temperature Accuracy	±1	C
Hotplate dimensions	7 × 7	sq in

3. Safety and Precautions

- The spinner spins at very high speeds, DO NOT attempt to operate with the lid open!

- During the spinning procedure, ensure the fume hood sash is down, and the spinner is covered to avoid splashing of chemicals.
- Do not try to open dispense cartridges, they are pressurized.
- Do not smell or inhale photoresists or other coating materials, those might be toxic.
- Refer to MSDS of the material that is to be spun before spin-coating process.
- Hotplates can cause burns, do not touch the top surface when Hot Top indicator is on.

4. PPE (Personal Protective Equipment) Required

Safety glasses or goggles are required to use this equipment.

5. Operating Procedure for Spinners

Do NOT touch the dispense cartridges. If PI cartridge is empty, alert NUFAB staff to get it refilled.

Do NOT let PI/SU8 get on your gloves. If it does, do not touch anything and change the gloves immediately.

There are two spinners in the hood. Each one is dedicated for single material coating, PI or SU8. The PI spinner has an automatic dispenser which is loaded with PI2545. SU8 should be dispensed manually.

5.1. Programing the Spinner

There are 30 programmable slots in both spinners. Some of them are pre-programmed by NUFAB staff. (See the appendix at the end for default recipes on the spinners.) The rest is available for users.

You may use default recipes in your processes but you may NOT edit them.

You may create your own recipes using the procedure below however NUFAB is not responsible for maintaining them.

Both spinners are identical except the automatic dispenser. This procedure applies to both spinners.

1. Turn on the spin processor. The 650 will initialize and default to the “Select Process” screen.

2. If editing an existing program, highlight the desired program. If creating a new program highlight the empty line. Press the “Edit Mode” key. If this is a new program a program name will be assigned. The program name will appear on the title line.

3. Use the navigation keys to move from line-to-line or the “Tab<” or “Tab>” key to move to

Figure 1: Spin Coater controller

field-to-field. The “Tab” key enables the field to be editable. Make changes to the field by using the ↑(UP) or ↓(DOWN) arrow keys.

4. Add or delete steps by highlighting the “steps” field with the “Tab” key and increase or decrease the number.

5. Move from step-to-step by using the “FWD” or “REV” key.

6. To change valve events on PI spinner highlight the valve field, press the F1 key and edit the submenu using the “Tab” keys and the ↑ (UP) or ↓ (DOWN) arrow keys. Exit the submenu by pressing the F2 key. There are two valves that control PI dispensing operation. Valve A pressurizes the PI container syringe and Valve B controls the dispensing action. Capital letters in the recipe menu represents valve open, whereas small caps represent valve closed. Example:

AB: both valves open. Container syringe pressurized, dispensing active.

Ab: Valve A open. Container syringe pressurized, not dispensing.

ab: both valves closed. Nothing is happening.

7. When finished press the “Run Mode” key to run the program.

5.1.1. Programming examples

Dynamic Dispense (Dispense while spinning)

Step	Time (mm:ss)	Speed (0-6000 rpm)	Valves (x = ON)		Accel	Comment
			A	B		
1	00:05	500	x		500	Get the chuck to the rotating speed. Pressurize the syringe
2	00:02	500	x	x	500	Spin speed is the same as step 1. Dispense for 2 seconds
3	00:02	2000			1500	Spin off excess material
4	01:30	4000			2000	Dry the film

Static dispense (Dispense while stationary)

Step	Time (mm:ss)	Speed (0-6000 rpm)	Valves (x = ON)		Accel	Comment
			A	B		
1	00:03	0	x		0	Pressurize the syringe
2	00:20	0	x	x	0	Dispense for 20 seconds
3	00:02	2000			1500	Spin off excess material
4	01:30	4000			2000	Dry the film
5	00:10	0			400	Decelerate to stop.

5.2. Removing/changing Chucks

Standard chuck on both spinners can accommodate 2”, 3”, 4” and 5” wafers. For smaller samples and fragments, you can use the fragment adaptors (Figure 2).

1. Press the appropriate adaptor on to the existing chuck firmly.
2. Place your sample on the adaptor
3. Activate the vacuum
4. Make sure the vacuum on the controller reads >15

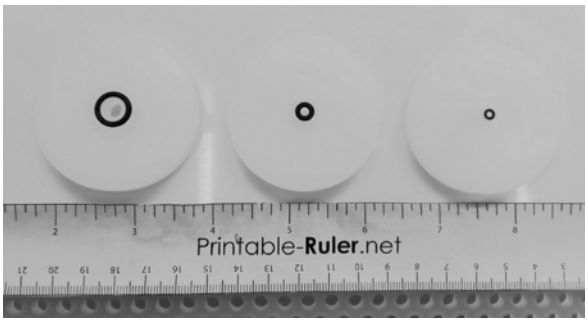

Figure 2: Small Fragment adaptors

5.3. Running a recipe

1. Select the program to be run using the “Select Process” key. Press the “Run Mode” key. The program name will appear on the Title line

Figure 3: Wafer alignment tool

2. Open the lid; place and align a substrate on the chuck. For regular round wafers use the wafer alignment tool for centering (Figure 3). Press the “Vacuum” key to activate the vacuum valve if vacuum is required. Sufficient vacuum to hold the substrate is required to start the motor. If using a non-vacuum chuck the vacuum requirement can be disabled in the edit mode.

3. Close lid.

4. Press “Start” key to start a program. The program will not start until the vacuum hold down requirement is met (vacuum chucks only), the seal purge requirement is satisfied, exhaust flow is correct if needed and the lid is closed. The program will stop automatically if the lid is opened, or the N2 motor seal purge is not satisfied (<60 PSI), or exhaust drops or increases beyond the set point or the vacuum requirement for hold down is not maintained. The remaining process time will be maintained.

5. “Done” will be displayed when the process is completed and the lid has not yet been opened for wafer removal. Restarting the same sequence on the same wafer is not allowed until the lid is opened or the “Edit “key is pressed then the “Run” key.

5.4. Cleaning after you are done

After completing the spinning process;

1. Remove the fragment adaptor if used
2. Clean the fragment adaptor with corresponding solvent and dry it. (1165 => PI and SU8 developer => SU8)
3. Remove the main chuck by pulling it up
4. Clean the main chuck with an appropriate solvent and dry it.
5. Replace the main chuck, making sure you align the chuck to the alignment pins. Don't put the fragment adapter on.

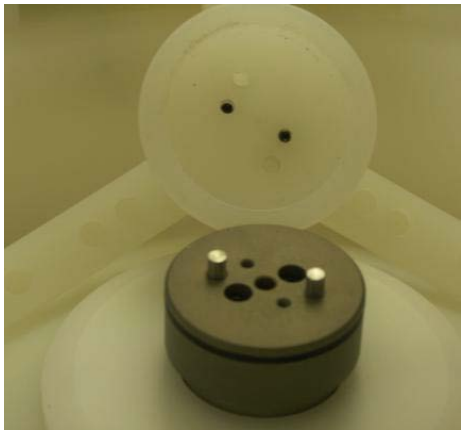

Figure 4: Main Chuck and the alignment points

6. Operating Procedures for the Hot Plates

There are three identical hot plates in the hood. Temperature is set by turning the knob. Screen will show the set temperature for a brief moment. Then, it will show the actual temperature.

Plate Hot sign will light on when the temperature is above 50 C.

When your process is complete, turn the dial to off position. Screen will show 'OFF' briefly.

Figure 5: Hot Plate Control

Appendix – Default Spin Recipes

Polyimide spinner has both Auto-dispense and Spin recipes.

SU8 Spinner only has Spin recipes.

Autodispense Recipes

	Step	Duration MM:SS.T	Speed RPM	Accel RPM/s	Pressurize	Dispense
Dispense						
	1	00:05.0	0	2	On	Off
	2	00:03.0	0	2	On	On
Dispense2K	1	00:05.0	0	2	On	Off
	2	00:20.0	0	2	On	On
	3	00:05.0	500	250	Off	Off
	4	00:40.0	2000	1000	Off	Off
	5	00:05.0	0	600	Off	Off
Dispense3K	1	00:05.0	0	2	On	Off
	2	00:20.0	0	2	On	On
	3	00:05.0	500	250	Off	Off
	4	00:40.0	3000	1000	Off	Off
	5	00:05.0	0	600	Off	Off
Dispense4K	1	00:05.0	0	2	On	Off
	2	00:20.0	0	2	On	On
	3	00:05.0	500	250	Off	Off
	4	00:40.0	4000	1000	Off	Off
	5	00:05.0	0	600	Off	Off

Spin Recipes

Step	Duration MM:SS.T	Speed RPM	Accel RPM/s	Pressurize	Dispense
Spin 1K					
1	00:40.0	1000	500	Off	Off
Spin 2K					
1	00:40.0	2000	500	Off	Off
Spin 3K					
1	00:40.0	3000	500	Off	Off
Spin 4K					
1	00:40.0	4000	500	Off	Off
Spin 5K					
1	00:40.0	5000	500	Off	Off
Spin 6K					
1	00:40.0	6000	500	Off	Off