



NanoFab

SCS SPINNER STANDARD OPERATION PROCEDURE

Rev B

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1. Purpose / Scope

- 1.1. This document is intended to give the user an understanding of the proper procedure for the use of this tool. Should questions arise that are not covered in the document a NanoFab Staff member should be contacted prior to continuing with any experiments. This is to avoid damage to the tool, illness/ injury to the user, or fouling of the suction line.

2. Reference Documents

- 2.1. Chemical Safety & Hazardous Waste Management Rules & Procedures
- 2.2. NanoFab Safety Handbook

3. Equipment / Supplies / Material

- 3.1. Tweezers
- 3.2. Pipettes
- 3.3. Photoresist bottle(s)
- 3.4. Cleanroom wipes
- 3.5. Spinner lid as needed
- 3.6. Timing device
- 3.7. HMDS
- 3.8. Blue tape as needed
- 3.9. Sample(s)/ wafer(s)
- 3.10. Chuck(s)

4. Safety

- 4.1. Follow all safety procedures outlined in the NanoFab Safety Handbook
- 4.2. Ensure that the sample is well balanced on the chuck BEFORE spinning at full speed to avoid throwing your sample
- 4.3. Follow all Chemical Safety & Hazardous Waste Management Rules & Procedures. There are several health hazards associated with exposure to photoresists and other chemicals used with this tool. Tightly close your bottles when not in immediate use and keep all bottles inside the spinner box if they are not closed. When the small chemical bottles are no longer required, they shall be stored in the dry boxes (≤ 4 oz. bottles only) whose doors shall be closed immediately after storing or removing any chemical.
- 4.4. Know what to do when there is a spill and be prepared to take action if needed. Your safety and the safety of those around you depends on you.
- 4.5. Ensure that there is adequate suction on the box via the hose in the back by placing your gloved hand near the opening of the hose. Our hand blocking the hose should cause a short, sharp movement of the hose due to sudden pressure drop.
- 4.6. Quickly clean up any chemical drops or stains on or near the equipment with the appropriate solvent and a cleanroom wipe. Promptly discard any pipettes contaminated with chemicals in the proper waste bin. This is as much a biosafety issue as it is a cleanliness issue.

5. Setup Procedures

NOTE: The spinner can hold 3 recipes in memory. Recipe #1 is NOT to be changed! Recipe #1 is pre-programmed for a standard spin cycle at 5000rpm for 30sec. Use spin curves or resist datasheet to determine RPM's for your specific processing needs. If your process requires a different recipe creation, Recipes #2 and #3 can be changed within allowed limits.

Recipe guidelines:

- RPM1 can be from 100-2000rpm
- RPM2 cannot be less than RPM1 and no greater than 4000rpm
- RPM3 cannot be less than RPM2 and no greater than 6000rpm
- Ramp and Time cannot be less than 1 second
- Ramp4 must never be less than 3 seconds

All recipes have 3 cycles. The first 2 cycles are spread cycles and the third determines the resist thickness. The lines for Solvent, N2 and Coating should all be 0 (zeroes). These are for optional auto-dispense features which these tools do not have.

- 5.1. Gather your materials as needed including your samples, a test wafer, pipette(s), photoresist/chemical bottles, cleanroom wipes, spinner lid and so on...
- 5.2. Check box vacuum by placing your hand against the opening of the hose at the back. The body of the hose should drop slightly and sharply due to the drop in pressure. If no suction is noticed, do not use the tool. Inform NanoFab staff of the issue. If suction is noticed, proceed to step
- 5.3. Determine the appropriate recipe to use via the spin curves (located on top of the tool).
 - 5.3.1. Creating a recipe: (Please note there is a delay between pressing the key and the display response)
 - 5.3.1.1. To access the recipe, press "CHG PRE". This changes the display to program mode.
 - 5.3.1.2. Press "ENT". Cursor will move to right column and allow you to change the recipe #.
 - 5.3.1.3. Press the "+" or "-" buttons to change the recipe # up or down in value to desired recipe.
 - 5.3.1.4. Press "ENT" to accept the value and return to the left column.
 - 5.3.1.5. Scroll down within the recipe by pressing the "+" button. You can only do this from the left column. This allows you to select the step you want to change.
 - 5.3.1.6. Press "ENT" when a recipe step needs to be changed.
 - 5.3.1.7. Use the "←" or "→" buttons to move digits and "+" and "-" buttons to change value up or down.
 - 5.3.1.8. Press "ENT" to accept the new value and return to the left column.
 - 5.3.1.9. Continue this until all settings have been changed to meet your recipe requirements.
 - 5.3.1.10. To go back to the top of the recipe and verify your settings, press "CHG PRE".
 - 5.3.1.11. When all changes are made, press "MSG". This will take you to the main screen.

5.4. Check chuck vacuum

- 5.4.1. Select the appropriate chuck size for your substrate. All chucks must have an o-ring in order to achieve proper vacuum. This o-ring is located on the underside of the chuck in the recessed area where it mates with the spindle.
- 5.4.2. Place the chuck on the spindle and make sure that the flat side of the spindle mates with the flat recess in the chuck. Failure to do this can damage the tool, the chuck, the sample and possibly injure the user as well.
- 5.4.3. Substrates must cover 100% of the vacuum area on the chuck and, if so, continue to step 5.4.4. If vacuum area is not completely covered, use blue tape
 - 5.4.3.1. Place the sample onto the adhesive side of a section of blue tape large enough to cover the vacuum area. Place the non-adhesive side of the blue tape on top of the chuck) and center it.
- 5.4.4. Test the position/ centering of the sample on the chuck by pressing START on the tool. Observe the sample and chuck for a few seconds and press STOP on the tool. Any wobble indicates improper position of the chuck on the spindle and/ or an off-center sample on the chuck. If a wobble is observed, adjust the chuck or sample as necessary and repeat the test. If no wobble is observed. Proceed to Section 6. Operation Procedures.

6. Operation Procedures

- 6.1. In the center of the sample, dispense a small amount (the size of a US quarter for a 4" wafer) of HMDS adhesion promoter. Then press START on the tool and wait for the spin process to complete and the GREEN LIGHT to shut off.
- 6.2. Bake the HMDS coated sample for 60 seconds at $\geq 120\text{C}$.
- 6.3. Once the wafer is cooled, place sample back onto chuck. In the center of the sample, dispense photoresist with a pipette. The amount will vary depending on the photoresist and sample size. If you are uncertain about the amount required, ask NanoFab staff for assistance.

NOTE: Photoresist is quite expensive. Take care not to waste it by using more than you need.

- 6.4. Once photoresist is dispensed, PLACE THE SPINNER LID ON THE BOWL and press START. Allow recipe to complete as indicated when the GREEN LIGHT turns off.
- 6.5. Remove the sample from the spinner and use the hot plate or oven to "soft bake" according to photoresist instructions.
- 6.6. Clean the spinner bowl, chuck and any other surface contaminated with photoresist with ACETONE ONLY. No water shall be used on the spinner bowls/ lids. No spinner waste shall be poured down a drain. Use the waste bottle with the "Acetone" tag.

NOTE: The waste bottle cap shall be removed immediately before pouring waste into the bottle. The cap shall be replaced immediately after pouring. This prevents photoresist and other chemicals from "gassing out". Breathing in these fumes is hazardous to the health of the user and all users in the area. Replace your caps promptly.

- 6.7. Ensure that the tool and the area is clean. Make sure your bottles are closed and place them back into the dry box before leaving.

7. Standard for Recipe 1

Recipe 1:

RPM 1 = 500 RPM

Ramp 1 = 1 sec

Time 1 = 5 sec

RPM 2 = 500 RPM

Ramp 2 = 1 sec

Time 2 = 5 sec

RPM 3 = 5,000 RPM

Ramp 3 = 3 sec

Time 3 = 30 sec

RPM 4 = 3 sec

8. Revision History

Effective Date	Originator	DESCRIPTION OF REVISION	Issue
5/5/17	Patrick Sochor	Initial Release	A
7/1/19	KJN	Updated	B
			C
			D
			E
			F
			G
			H