

University of Minnesota Nano Center

Standard Operating Procedure

Equipment Name: Spin Coater

Model: Laurell WS-650

Location: PAN 185

Badger Name: Not on Badger

Revision Number: 2

Revisionist: J. Marti

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A. Introduction

- 1. Tool Description.** The Laurell WS-650 is a programmable spin coater that can be used to apply any liquid onto a substrate to form a uniform film. Spin speed, duration, and acceleration rate can be programmed to achieve desired film thickness. The spinner is housed in a fume hood to allow use of volatile solvents and hazardous materials.
- 2. Tool Components.** Figure 1 shows a front view of the spin coater. Key components visible in this view are the lid, the vacuum chuck, and the keypad.
- 3. Safety.** Close the system lid prior to spinning to prevent a broken substrate from causing an injury. After loading the substrate to be coated, test the spin cycle at low speed to ensure that the substrate is centered. Excessive wobbling from an uncentered substrate may result in it flying off the chuck and causing injury.
- 4. Restrictions/requirements**
 - a. Substrates up to 6" in diameter may be used with the spinner. Smaller pieces may be used with one of the piece chucks.
 - b. A wide range of chemicals may be used in the spinner, but obtain permission of the lab manager prior to starting a project with a new material.
- 5. Required Facilities.**
 - a. 120V AC power
 - b. Vacuum. 20 in Hg
 - c. Nitrogen, 45-55 PSI

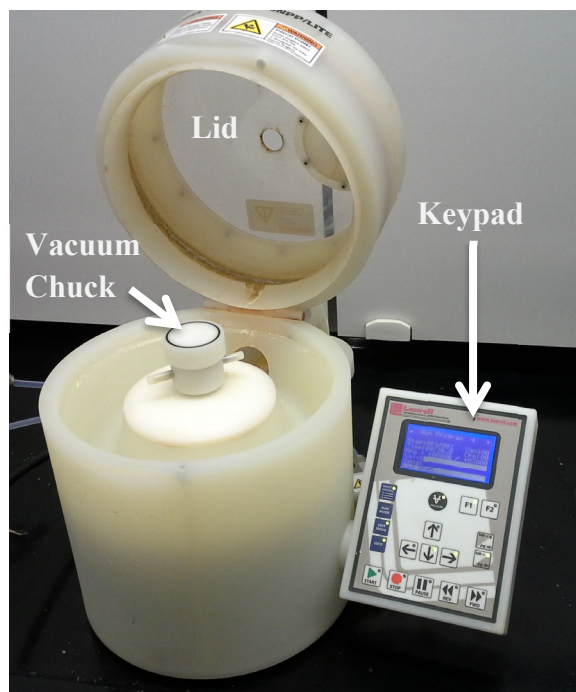


Figure 1. The WS-650 spin coater, shown with lid open.

6. Definitions.

- a. Substrate: the article to be coated, such as a silicon wafer, glass flat, or ceramic plate.

- b. Chuck: the detachable vacuum head on which the substrate is mounted.

B. Using the Spin Coater

1. Equipment Setup

- a. Begin a new entry on the tool log sheet. List your name, the date, the materials you are working with, and any issues you encountered during your run.
- b. Select a vacuum chuck with a stage that is smaller than your substrate, and mount it on the spinner. These Teflon chucks fit onto the rotor by friction.
- c. Open the valves for the house vacuum and nitrogen on the side of the fume hood.

2. Preparing a Run Program

- a. All commands for the spin coater are entered using the membrane switch keypad
- b. Press the Select Process key on the keypad.
- c. Select a spin program from the list. Each program contains instructions for spin speed, acceleration, and run time. The WS-650 can store up to 50 recipes. You may use a preexisting run recipe or create your own.
- d. To alter a program or create your own, select an existing program as a starting point. Then press the Edit Mode key.
- e. Change the values for spin time (seconds), spin speed (RPM), and acceleration rate (RPM/sec) by moving the cursor to the desired field.
 - i. The Up arrow and the Down arrow keys are used to move from line to line
 - ii. The Tab < or Tab > keys are used to switch the highlighted field into an “editable” field. Once highlighted, the value of a selected field is changed using the Up and Down arrow keys.
 - iii. The FWD or REV keys are used to move from step to step within a program.
- f. See the WS-650 manual for more detail on editing and saving a program

3. Operating the Spin Coater

- a. Once spin speed, acceleration, and run time are set, press the Run Mode key.
- b. Place your substrate on the chuck and close the spin coater lid.
- c. Press the Vacuum key to apply a vacuum to the substrate. The display should update from “Need Vacuum” to “Ready.” If not, check that the vacuum valve is open and the substrate is resting on the chuck O-ring with no obstructions.
- d. Center your substrate by briefly spinning it at low speed.
 - i. Press the Start key, spin for 1-2 seconds, observe how the well the substrate is centered, then hit the Stop key.
 - ii. If necessary, release the vacuum and reposition your substrate to get it as close to the rotation center as possible.
 - iii. Repeat as needed until the substrate is centered with little or no wobble.
- e. Apply your coating liquid to the center of the substrate.
- f. Press Start to execute your spin program. The spinner will stop automatically.
- g. Press the Vacuum key to release the substrate.
- h. Raise the spinner lid and remove your substrate for inspection.

4. Problems/Troubleshooting

- a. Poor vacuum
 - i. The substrate is not placed properly on the chuck--re-position and re-spin wafer.

- ii. Vacuum line not open—check valve on left side of fume hood..
- iii. Lack of house vacuum--Notify maintenance personnel.
- b. Poor film coating
 - i. Your substrate is not entirely clean and free of dust, oils, fingerprints, etc.—reclean with appropriate solvents and lint-free wipes.
 - ii. Adjust spin speed, duration, and/or acceleration to ensure smooth coating. It is especially important with viscous coating liquids to achieve the correct ramp-up speed.

C. Tool Shutdown

When your work is complete:

1. Clean the spinner bowl by adding solvent to a lab wipe and wiping the bowl walls to remove all coating materials. Use a solvent appropriate to the material to be removed.
2. DO NOT add bulk liquid solvent to the bowl, as this will attack bearing seals. Always wet a wipe with solvent and use this to clean the surfaces.
3. Leave solvent wipes in the fume hood to dry out.
4. Lower the fume hood sash to its lower standby position.
5. Close the vacuum and nitrogen valves.
6. Update your entry into the tool user log.