1. Using the Photoresist Spinner

The photoresist spinner is used to produce uniform coatings of photoresist on various substrates. The instrument within the CMU cleanroom is intended for use SOLELY with photoresist. If you need to coat with other materials, contact a cleanroom staff person.

1.1. CAUTIONS

1.1.1. Improper Process Containment

During any spinning operation, the lid of the spinner must be in place. This prevents unwanted chemical splattering and, more importantly, contains projectile substrates. Periodically, substrates fail to remain secured to the chuck during spinning and fly off at high speeds. The lid, when used properly, prevents operator injury during such an event.

1.1.2. Improper Chemical Hygiene

Photoresists are viscous, sticky liquids that adhere to surfaces and can stain. Proper handling of these materials prevents unwanted drips, dribbles, and general messiness of the spinning area. All such contamination can produce particles that will eventually manifest themselves as device failures, due to lithography errors.

All operators MUST clean up ALL photoresist residue from all surfaces other than the interior of the spinning containment chamber when finished with the spinner.

1.2. Powering Up

1.2.1. Turn on nitrogen and vacuum valves

1.2.1.1. Valves are located behind the spinner and attached to the wall

1.2.1.2. The ON position is the handle in the vertical position

1.2.2. Turn on machine power

1.2.2.1. Power button is on the front console of the control box

1.2.3. Lift the lid and prop it up behind spinner temporarily

1.3. Mounting Chuck

1.3.1. Select the proper chuck (chuck of choice)

1.3.1.1. Make sure it will be completely covered by the wafer

1.3.1.2. Make it as large as possible, with the constraint that it will satisfy the above

1.3.2. Remove mounted chuck (if necessary)

1.3.2.1. Pull up on the mounted chuck with a smooth, firm pressure, and set aside.

1.3.3. Remove any residue or debris from chuck of choice

1.3.3.1. Use acetone, swabs, and wipes to remove any debris or residue from all sealing surfaces of chuck

1.3.4. Mount the new chuck

1.3.4.1. Center the chuck on the shaft

1.3.4.2. Align transverse pin in chuck shaft with relieved area in underside of chuck

1.3.4.3. Push down on chuck with a firm smooth pressure

1.3.4.4. Do not pound or use excessive force

1.4. Mounting Sample

1.4.1. Position sample

1.4.1.1. Center sample on chuck, using tools as necessary

1.4.2. Remove all positioning tools

1.4.2.1. All tools must be removed before initiating vacuum to avoid breaking the wafer

1.4.3. Activate vacuum

1.4.3.1. Ensure positioning tools are removed

1.4.3.2. Push the vacuum activation switch (white) on the control box console

1.4.4. Check vacuum seal

1.4.4.1. Make sure the vacuum light (red indicator on box console) is OFF

1.4.4.2. If light remains on, then vacuum seal is being interrupted, and you should proceed to 1.5. Otherwise lower lid and continue with next step

1.4.5. Clean sealing surfaces (if necessary)

1.4.5.1. Remove the chuck and re-check all sealing surfaces (including the top of the chuck shaft and the interior of the chuck.

1.4.5.2. Clean as necessary (see 1.3.3)

1.4.5.3. Check back of wafer for photoresist residue

1.4.5.4. Remove with a swab and acetone as needed

1.4.6. Re-activate vacuum and check (if necessary)

1.4.6.1. Repeat 1.4.1-1.4.5 up to five times.

1.4.6.2. If the vacuum still will not seal, try another wafer or seek help from the cleanroom staff.

1.4.6.3. If the vacuum seals, lower lid and proceed

1.5. Selecting spinning conditions

1.5.1. Set spread switch

1.5.1.1. Push in to include the spread step

1.5.1.2. Leave pushed out to omit the spread step

1.5.2. Set spread time

1.5.2.1. Set the spin time using the small time adjustment wheels. It is necessary to flip out the small tabs marked (+) and (-) and push these tabs into the console to shift the wheels by one position

1.5.3. Set nominal spread speed

1.5.3.1. Adjust the spread dial to read the percentage of 600 RPM which is desired. 100 gives 600 RPM.

1.5.4. Set spin time

1.5.4.1. Adjust the spin time wheels as in 1.5.2

1.5.5. Set nominal spin speed

1.5.5.1. Adjust the spin speed dial to read the nominal spin speed in KRPM

1.5.6. Run test spin and readjust

1.5.6.1. Make sure lid is lowered and in place

1.5.6.2. Push run, and observe the ACTUAL speed in KRPM on the console LED display.

1.5.6.3. Adjust the spread and spin speeds while the chuck is spinning to give exactly the desired speeds.

1.5.6.4. Repeat test spins until satisfied with spinning sequence.

1.5.6.5. Open lid

1.6. Coating with HMDS

1.6.1. Prepare surface

1.6.1.1. Place 2-3 wipes and a rubber glove on the table in front of the box console as a working surface to catch drips.

1.6.2. Open bottle and position

1.6.2.1. Remove HMDS bottle cap, being careful not to spill or get residue on bottle lip

1.6.2.2. Hold bottle over edge of photoresist catch basin to reduce stray drips

1.6.3. Insert dropper and extract HMDS

1.6.3.1. Exhaust dropper BEFORE inserting it in the photoresist bottle to avoid depositing particles in the bottle

1.6.3.2. Submerge the dropper tip the minimum distance into the HMDS to capture a steady stream of fluid with no bubbles

1.6.3.3. Maintain steady pressure on the dropper ball when removing the dropper from the bottle to avoid sucking up air into the dropper or

prematurely exhausting the droppers contents

1.6.4. Deposit onto wafer surface

1.6.4.1. Position the dropper over the center of the wafer

1.6.4.2. Exhaust its contents in a steady single stream, generating as few bubbles as possible

1.6.5. Dispose of excess

1.6.5.1. After ONE complete exhaust stroke, position the dropper over the catch basin , and exhaust several times to prevent drips on the table

1.6.6. Store dropper and close bottle

1.6.6.1. Store the HMDS dropper for reuse. Do NOT do this with photoresist droppers. They must be held for disposal after a single use.

1.6.6.2. Close bottle and position away from front of box console.

1.6.7. Spin

1.6.7.1. Close lid

1.6.7.2. Activate spin and wait for cycle to complete

1.6.7.3. Open lid

1.7. Coating with Photoresist

1.7.1. Open bottle and position

1.7.1.1. Remove photoresist bottle cap, being careful not to spill or get residue on bottle lip

1.7.1.2. Hold bottle over edge of photoresist catch basin to reduce stray drips

1.7.2. Insert dropper and extract photoresist

1.7.2.1. Exhaust dropper BEFORE inserting it in the photoresist bottle to avoid depositing particles in the bottle

1.7.2.2. Submerge the dropper tip the minimum distance into the photoresist to capture a steady stream of fluid with no bubbles

1.7.2.3. Maintain steady pressure on the dropper ball when removing the dropper from the bottle to avoid sucking up air into the dropper or prematurely exhausting the droppers contents

1.7.3. Deposit onto wafer surface

1.7.3.1. Position the dropper over the center of the wafer

1.7.3.2. Exhaust its contents in a steady single stream, generating as few bubbles as possible

1.7.3.3. Pool the photoresist in the center of the wafer in an amount sufficient to just cover the wafer after the spinning operation is complete. (This may take some trial and error).

1.7.4. Dispose of excess

1.7.4.1. After ONE complete exhaust stroke, position the dropper over the catch basin , and exhaust several times to prevent drips on the table

1.7.5. Remove bubbles

1.7.5.1. Use the empty dropper to remove any bubbles (even very fine ones) by sucking them up into the dropper

1.7.6. Store dropper

1.7.6.1. Set dropper aside for disposal after ONE use.

1.7.6.2. Make sure there are no drips on the bottle lip

1.7.6.3. Close bottle and position away from front of box console.

1.7.7. Spin

1.7.7.1. Close lid

1.7.7.2. Activate spin and wait for cycle to complete

1.7.7.3. Open lid

1.8. Cleaning wafer edges (as necessary)

1.8.1. Assess edges

1.8.1.1. Examine wafer edge closely for small hairs sticking out from wafer

1.8.2. Clean with swab (before unmounting)

1.8.2.1. If hairs are present, remove with acetone soaked swab

1.8.2.2. Be sure to use as little acetone as possible

1.8.2.3. Carry the acetone in a small beaker

1.8.2.4. DO NOT bring the acetone spray bottle from the wet bench

1.8.2.5. If hairs are heavy (thick photoresist cases), change swabs frequently

1.9. Removing Sample

1.9.1. Disable vacuum

1.9.1.1. Turn of vacuum by pressing vacuum switch on box console

1.9.2. Remove sample

1.9.2.1. Lift sample gently with tool or tweezers.

1.9.2.2. Deposit in sample box and close

1.10. Shutting down

1.10.1. Complete all sample

1.10.1.1. Repeat the above procedure for as many samples as necessary

1.10.2. Turn off gases

1.10.2.1. Turn off nitrogen and vacuum valves

1.10.3. Turn off box power

1.10.3.1. Turn off power to box console

1.10.4. Restore area cleanliness

1.10.4.1. Replace lid

1.10.4.2. Reposition all tool

1.10.4.3. Clean up an drips or spills, thoroughly