Standard Operating Manual

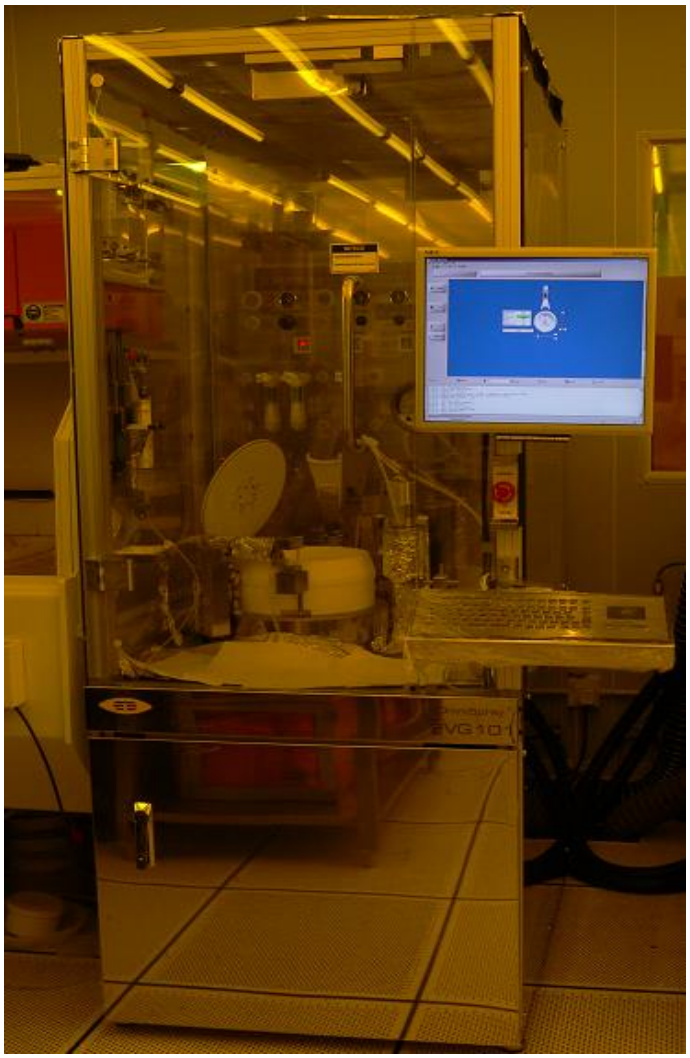
EVG 101 Spray Coater

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EVG 101 Spray Coater

1. Picture and Location



This tool is located at NFF Phase II Cleanroom Class 100.

2. Process Capabilities

2.1	Cleanliness Standard:	all level (different chucks)
2.2	Substrate Size:	fragments to 6”
2.3	Spin speed:	<2000rpm
2.4	Spin ramp up speed:	<40000rpm/sec

3. Contact List and How to Become a Qualified User

3.1 Emergency Response and Communications

1. Security Control Center: 2358-8999 (24hr) & 2358-6565 (24hr)
2. Safety Officer: Mr. Wing Leong CHUNG 2358-7211 & 64406238
3. Deputy Safety Officer: Mr. Man Wai LEE 2358-7900 & 9621-7708
4. NFF Senior Technician: Mr. Henry YEUNG 2358-7896

3.2 Training to Become a Qualified User

Please follow the procedure below to become a qualified user.

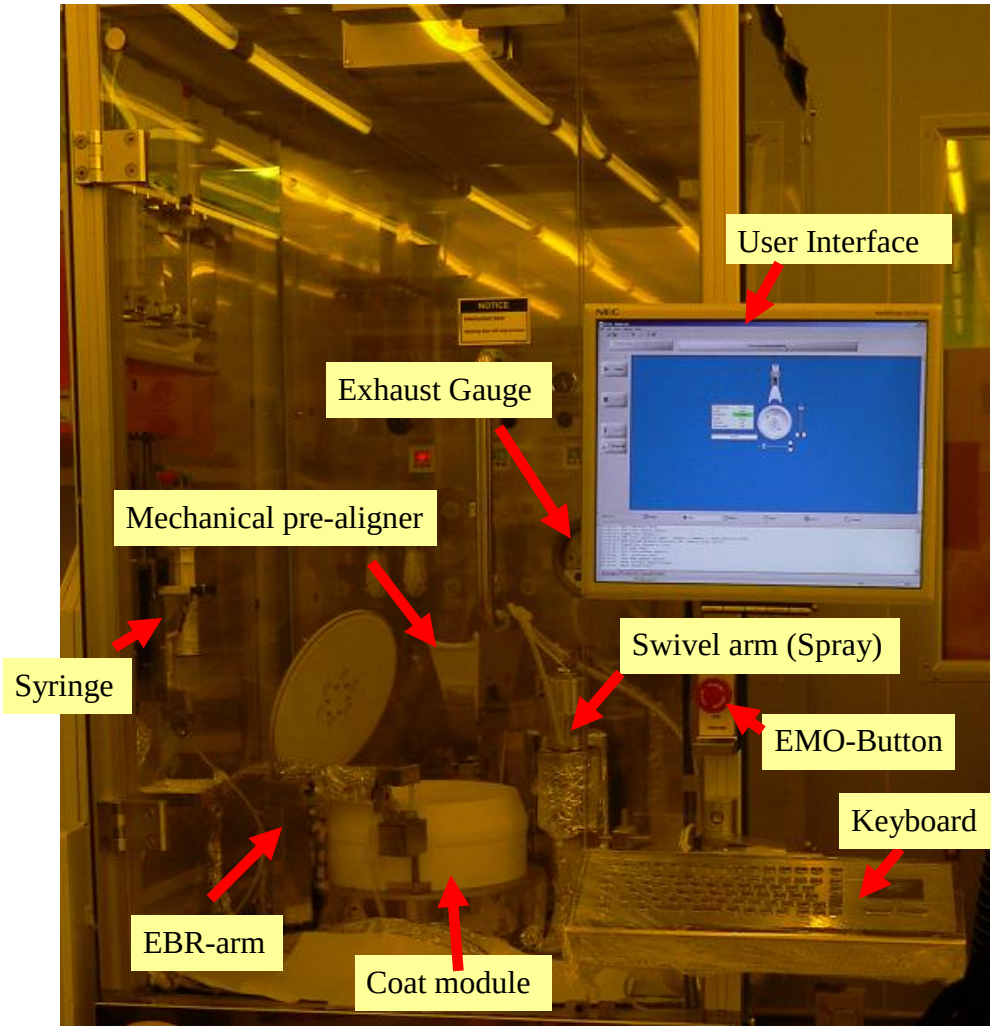
1. Read through the on-line equipment operating manual of the equipment;

   http://www.nff.ust.hk/equipment-and-process/equipment-operation-manual.html
2. Attend the equipment hand-on operation training either by peer or NFF staff.
3. If training is provided by NFF staff, user must log in NFF equipment reservation system, and register these trainings.
4. Send an e-mail to Mr. Henry YEUNG requesting EVG 101 Spray Coater qualified exam.
5. Pass the examination for the equipment operation and security.

4. Operating Procedures

4.1 System Description

The EVG®101 Advanced Resist Processing System is designed for single wafer processing in R&D and small scale production. Conformal layers of photoresist are achieved on 3D structured wafers for interconnection techniques with EVG's advanced OmniSpray® coating technology. This ensures low material consumption of precious high-viscosity photoresists while improving uniformity and resist spreading options.



4.2 Safety Warning

1. Follow NFF Health and Safety Manual.
2. Never operate the system with door opened.

3. Never operate system without trained and approved by NFF staff.
4. Never operate the system without exhaust.
5. Do not open the electronics cabinets.
6. Covers and process cups may only be removed by authorized personnel!
7. The User should be aware at all times of the moving components associated with this tool. The spin chamber door must be closed at all times while processing your sample. The spin chamber door is interlocked and tool will not operate with the door open.
8. Check drip pans and leakage sensor daily for correct function.
9. Resists may have irritating effects to eye, skin and mucous membranes! Observe and obey Material Safety Data Sheet (MSDS) of the corresponding materials used in the system!
10. Make sure the entire vacuum surface is easily covered by your sample. This will cause the resist to be sucked into the vacuum port on the spindle and damage the spin motor.
11. If an error or problem occurs, stop all work immediately. Leave notice that the machine is not to be used and contact NFF staff. Do not attempt to fix the problem.
12. If using heated chuck, don't touch the chuck and uninstall after cool down only.
13. The Emergency Off – Button (EMO Button) shuts down the machine immediately. Only use the EMO in emergency situations. Emergency situations are where injury of personnel or serious damages of the system impends immediately.
14. According to the general fire emergency procedure of HKUST, please report the accident to the Security Control Center first. The nature of other emergencies will determine whether you will call police, staff, or both. If someone is injured, the

9-999 emergency number should be called before calling staff. If there is a facilities problem, such as a flood or a utility problem that does not present a danger to lab users but may result in damage to equipment, the staff or EMO need to be called. The 9-999 emergency should not be called for facility or equipment problem. Always call 9-999 when a potentially life threatening situation might exist (injury, fire, gas leak, etc.)

4.3 Operation Precautions and Rules

1. Please reserve the time slot on NFF reservation system.
2. Please check the checklist and fill all the details of the log sheet attached.
3. Never let photoresist dry in the line. If you don't need to use the tool with photoresist in the tube for more than 1 hour, you must clean the line with acetone before you leave. After you complete your process, you must clean out the tube with acetone.
4. Never leave the toll without clean the chuck and bowl with acetone.
5. Clean the chuck in the fume hood after each use. If any user fails to clean the chuck and system properly, you may ban to use the system in future.
6. When cleaning the spin bowl or spin chuck, always cover the vacuum port. If material enters the vacuum port, it can damage the vacuum system.
7. All recipe programming is done by NFF Staff. If you need a special recipe, you may request a new recipe to Staff.

4.4 Initial Status checks

1. Please check the status of shutdown notice posted in the NFF reservation website.
2. Please check the reservation status on the website and reserved this equipment by

you.

3. Please check-in the equipment on your own according to the reserved time slot via card reader or NFF reservation website.
4. Before operate the machine, please make sure you have read the check list, and fill the log sheets.

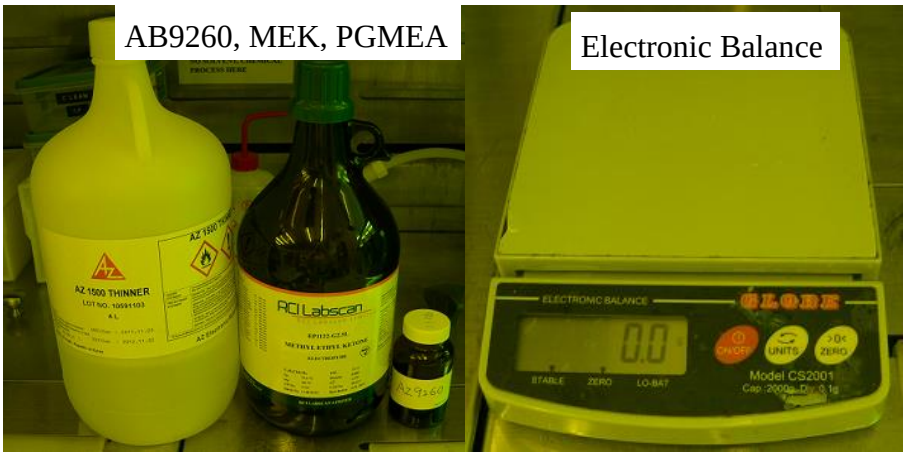
4.5 Initial System Checks

Before starting, verify the machine is in the correct idle state:

1. Verify that exhaust systems are properly connected.
2. Verify that all system utilities (Compressed air, nitrogen and vacuum) are turned on.
3. Ensure that the correct spin chuck is used, depending on substrate form, cleanliness level and substrate size, special chucks are available.
4. Verify that spin chamber door to be closed.
5. Make sure that no objects are blocking the path of the moving parts.
6. If the machine is off, do not reboot. Contact staff on the “contact list”.
7. If no syringes are available, contact staff on the “contact list”.

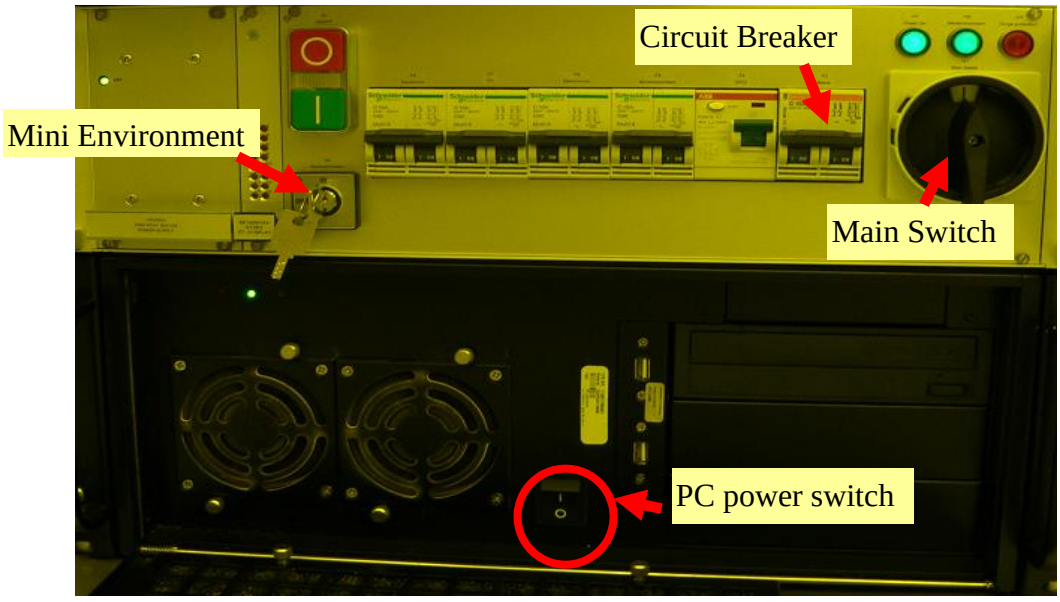
4.6 Prepare Photoresist Mixture

1. Mix your desired photoresist mixture in the wet bench.
2. Standard mixture used includes a combination AZ9260, MEK, and PGMEA (1:8:1 by weight). The mixture ratio is recommended to do by weight. The Electronic Balance can be borrowed from Wet Station F.
3. Let mixture 24 hours to sit before use to insure uniform mixture.



4.7 System Startup (For Staff ONLY!)

1. Turn the main switch fully counter-clockwise (locate the Main Witch Rack)
2. Press the green “ON” button
3. Check if all circuit breaker are on.
4. Turn the mini environment key switch to “ON”.
5. PC has booted the EVG Explorer will be started automatically



Main Switch Rack

4.8 EVG Explorer

1. After the boot procedure, windows will load the EVG Explorer automatically.

2. Click EVG Machine Software to open it.

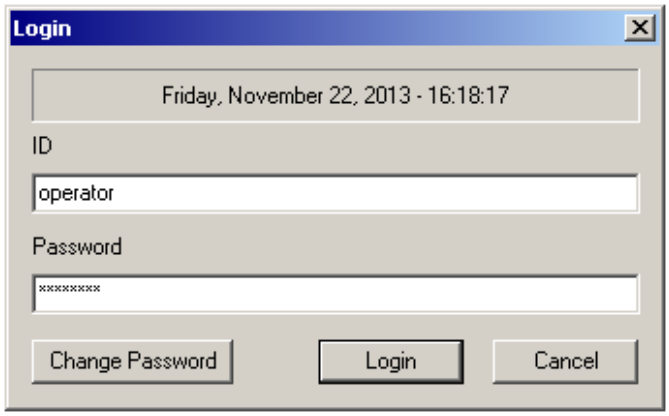


4.9 Login to EVG software

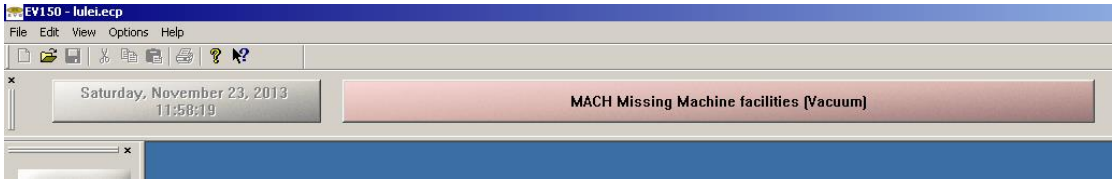
1. To login click on the Login-Button. Then following dialog box appears:

   In “ID” enter the username and in “Password” the concluding password.





2. If you are first one to use the equipment that day, the error message display "MACH Missing Machine facilities (Vacuum)" Please presses it to ignore it.

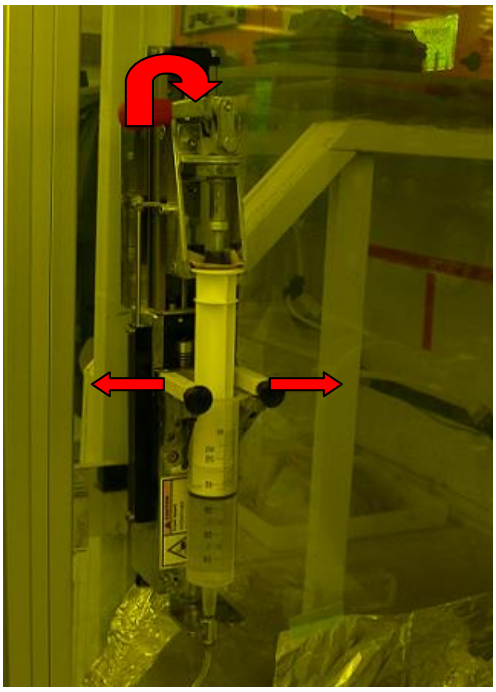


4.10 Dispose Acetone from Syringe

1. Take out the photoresist mixture from Standard Photoresist Storage freezer and let it warm up around 15min.



2. Flip the red lever (plunger clamps) to the right to move up the plunger so that the plunger doesn't push on the top of the syringe.
3. Move outward left and right clamps from the holder unit syringe of park station.



4. Remove the syringe from park station.
5. Keep the syringe in inverted position.
6. Remove push-fit the resist line from the tip of syringe.
7. Dispose the acetone in the syringe to acetone waste bottle at wet station Z.

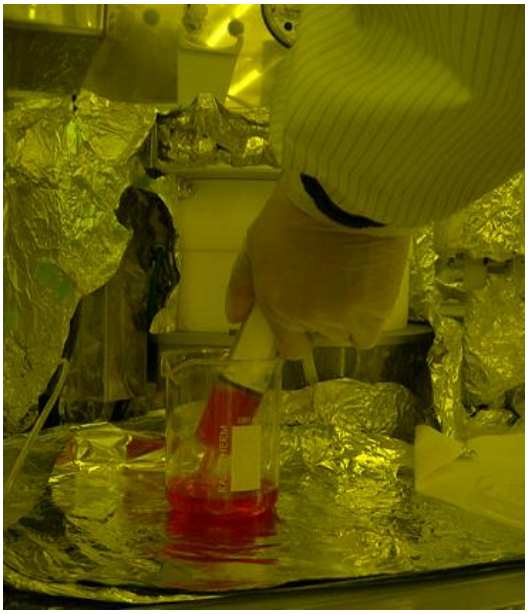
4.11 Load Syringe with photoresist

1. Pour a certain amount of photoresist to clean breaker from resist bottle

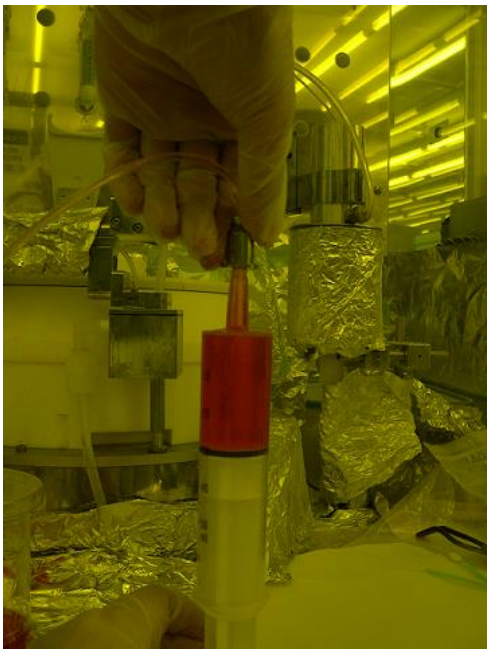


2. Withdraw photoresist into syringe, 30ml or more is recommended and quickly invert. The estimated photoresist volume is equal to number of cycles * 0.8ml

(0.8ml/cycle) + 10ml (for fill the tube and dummy dispense).

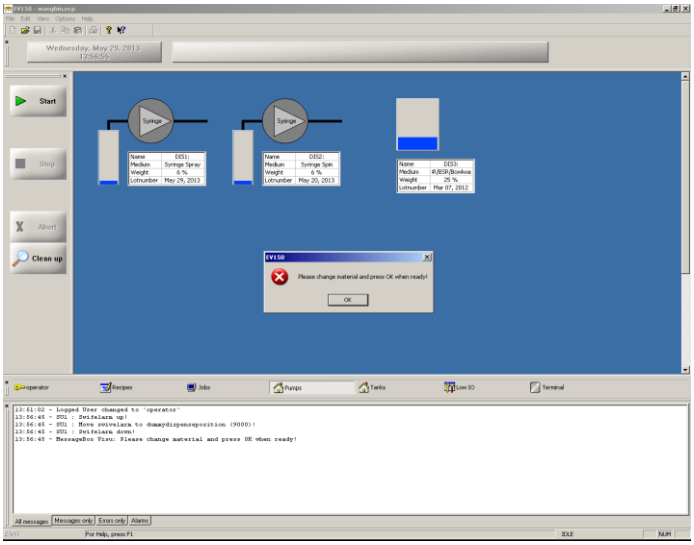


3. Keeping syringe in inverted position and wrapping a cleanroom clothe wiper over the tip, and push-fit the resist line onto the tip of syringe. Keep the syringe inverted for this entire procedure.



4. Hold the push-fit and the syringe push the plunger until the resist has filled the line.
5. On the user interface, click “pumps” from bottom toolbar to show a screen about all pumps. Select the syringe in the top left corner DIS1 (spray syringe), left click

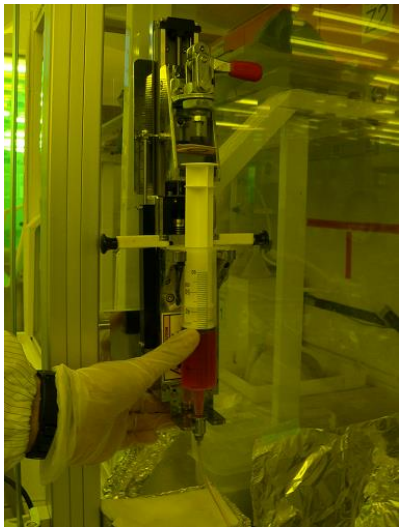
on syringe and then choose “change material” on the next screen. A window will be pop out.



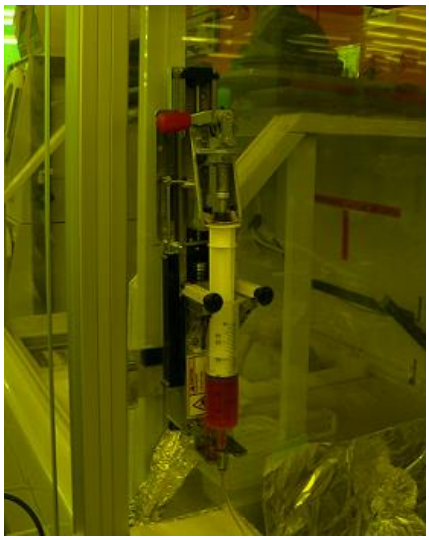
6. Using the motor controls, Press keyboard “⬆” or “⬇” button to move up/down the plunger until the syringe can fit easily within the holder.



7. Invert the syringe to download orientation. Slide the syringe into the holder.



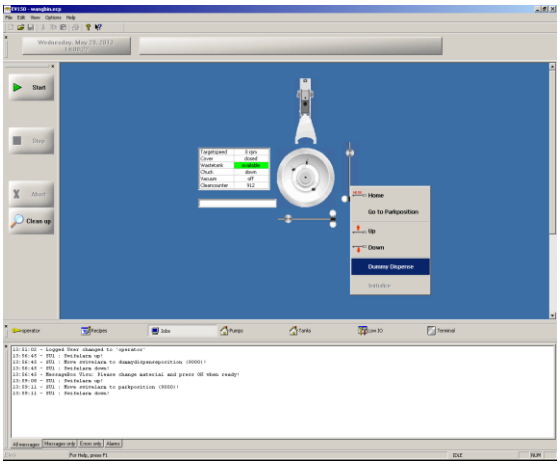
8. Using the motor controls, hit keyboard " ⬆ " or " ⬇ "button to move up/down the plunger until the plunger touches the top of the syringe. Flip the red lever to the left (use hand to hold the syringe). Then the plunger will push on the top of the syringe. Close the Door.



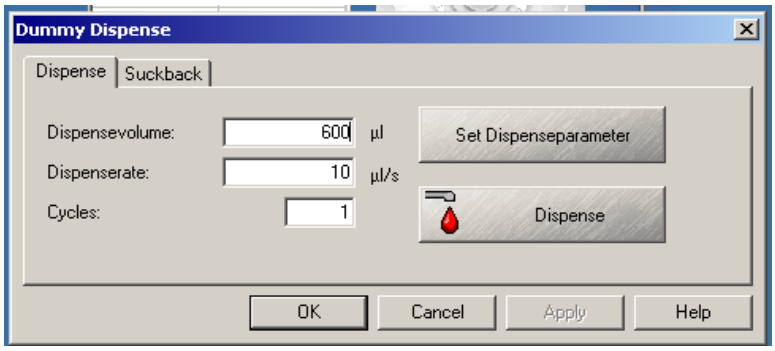
9. To make sure the photoresist fill the photoresist line, Press keyboard "down" button on the motor controller until the resist has filled the whole line and has entered the nozzle. And, make sure no any air bubbles are left in the line.
10. On the computer control screen, press "Okay" to having finished the materials change.

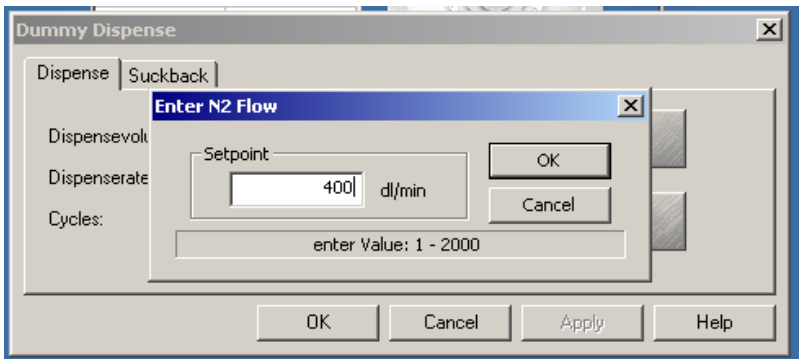
4.12 Dummy Dispense

1. Select "Job" from the lower task selection bar on the computer control, left click the spray arm and select dummy dispense to exercise the head.



2. A window will pop out. Press “Dispense” and set the N2 pressure to 400dl/min gas flow





3. Wait for the prompts in the terminal window to declare the dummy dispense is finished and press “OK” button back to job window.
4. Put the photoresist mixture bottle back to freezer.

4.13 Chuck replacement

If the lid is closed, you can’t replace the chuck, ignore this section, and do it

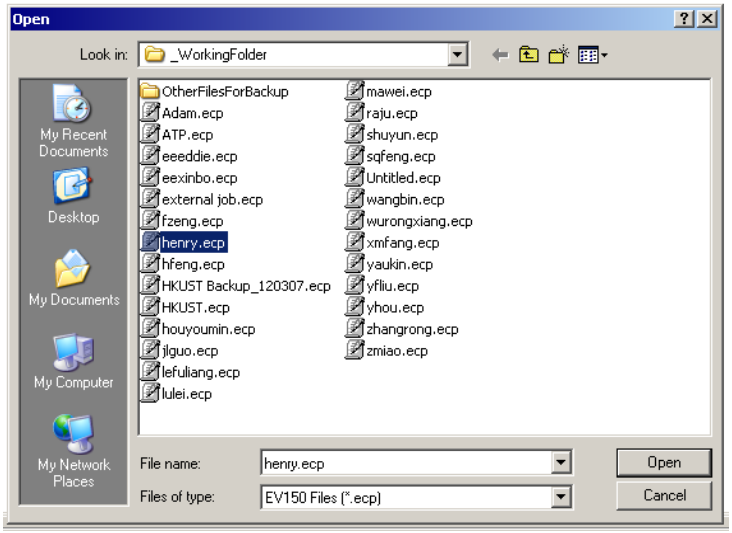
later.

1. Carefully lift the chuck from the spindle.
2. Replace the chuck with proper cleanliness level. Three chucks are available, for clean, semi-clean and non-standard.
3. The notch in the chuck fits over the motor shaft. It fits over the pin in the shaft to prevent twisting on the shaft.
4. Return the removed chuck to its proper place.

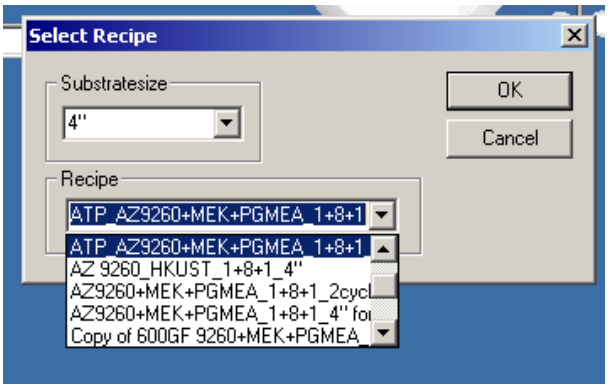


4.14 Wafer Coating Procedure

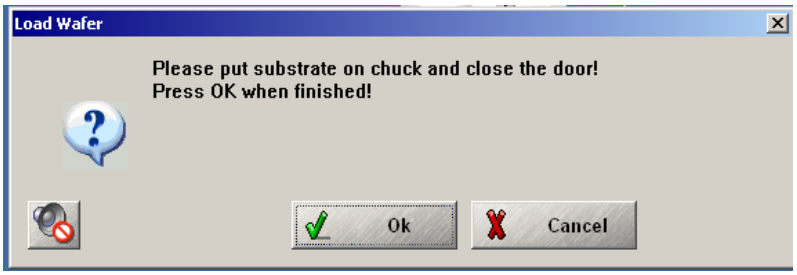
15. Click open to open an existing recipe in your recipe folder from menu bar, if you need edit or make a new recipe; please contact staff to do it with you.



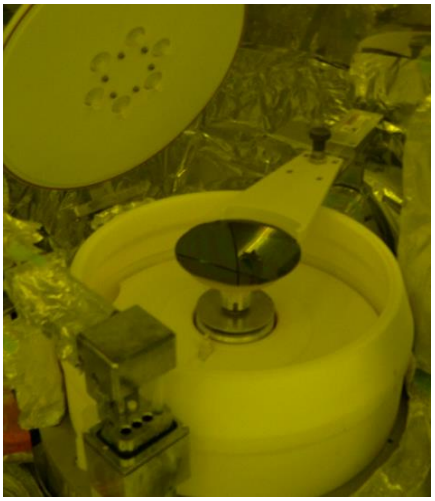
16. Select “Jobs” from lower task selection on the computer control, and press “Start” in the process control bar; a window will be pop out.
17. Select your wafer size, 2”, 4” and 6”, and then select the recipe.



18. The Mechanical Pre-aligner jig will lower down and prompt you to put a wafer on the raised chuck.

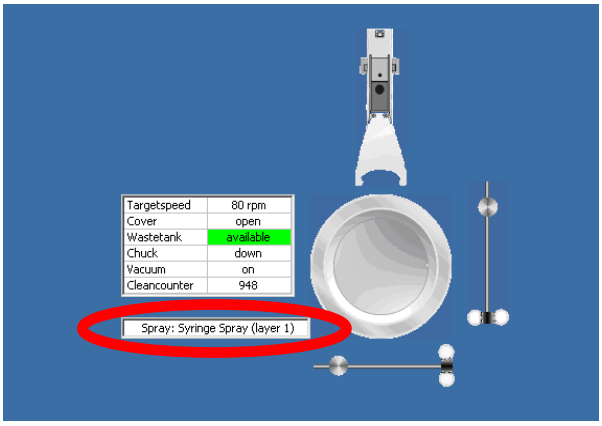


19. If you can’t replace the chuck before, you can replace the chuck with proper cleanliness level now. Please follow Section 4.13.
20. Place your wafer onto the spin chuck, making sure the end it pressed against the mechanical pre-aligner jig.
21. The wafer flat part cannot be the part pressed against the alignment jig; otherwise, the wafer may not be centered.



22. Close the chamber door, select “Okay” on the computer controller to run the recipe

23. You can check the status from the window.



24. After coating, the chuck will move up and a window will be pop out to ask you to remove the wafer from chuck, wait at least 1 minute for fumes to dissipate before opening chamber door.



25. Open the chamber door, and use tweezers to remove the wafer from the chuck and clean the wafer backside with wiper dipped acetone in the wet station before

soft bake.

26. If you want to coat another wafer, repeat the wafer coating procedure step 5 -10.
27. If you complete your process, clean-up the machine.

4.15 Interrupted Coating

1. Stop process

   Click 

in the Process Control Bar to stop the process. The current movement will be finished.

2. Abort process

   Click 

in the Process Control Bar to stop the process immediately (even the current movement).

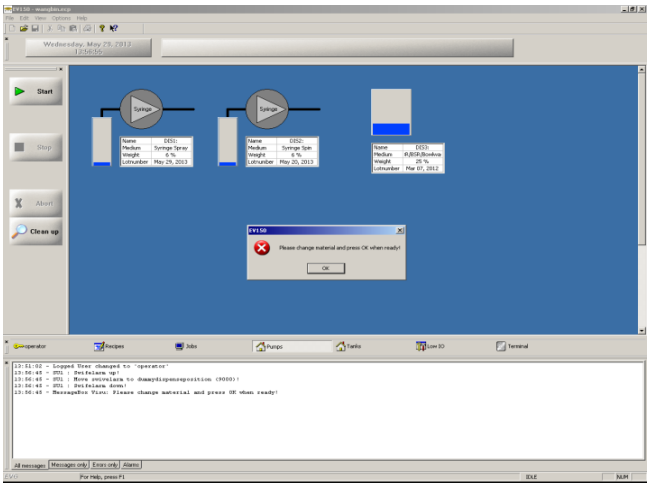
3. System Clean up

   Click 

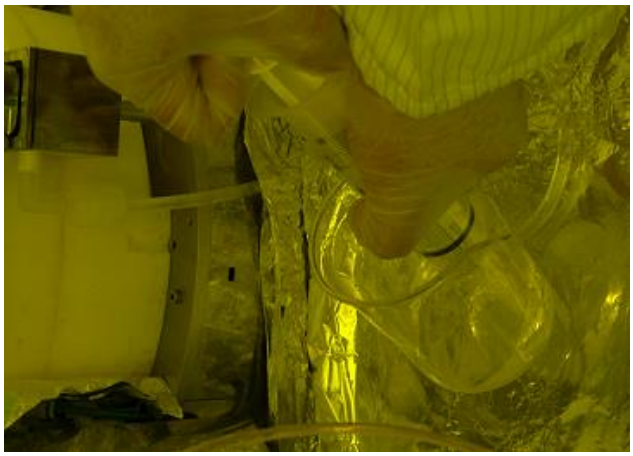
in the Process Control Bar. After a process has been aborted, a clean-up needs to be done before staring a new process.

4.16 Acetone Syringe Wash

1. Select “pumps” from lower task selection on the computer control, select the top left corner spray syringe pump, and chose “change material”.



2. Flip the red lever to the right to move up the plunger doesn't push on the top of the syringe.
3. Slide syringe out of holder and invert, keep the syringe in inverted position.
4. Separate the push-fit from the syringe, squeeze out remaining resist into acetone waste collector in Wet station Z
5. Fill up beaker with acetone. Re-load syringe with acetone, invert, and carry back to machine.

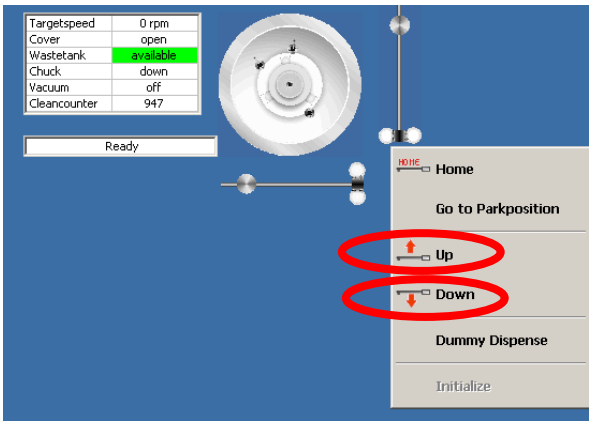


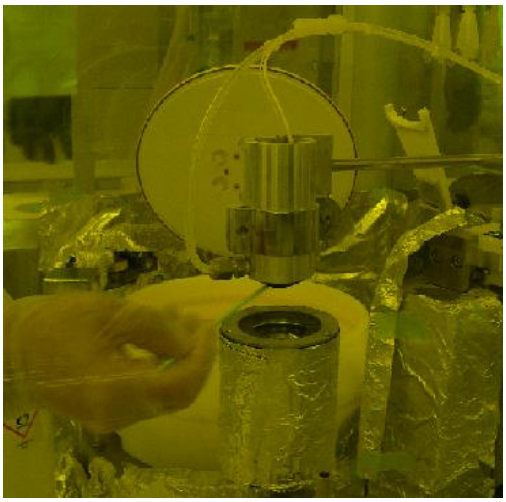
6. Push-fit the resist line onto the tip of syringe. Keep the syringe inverted for this entire procedure.
7. Hold the push-fit and the syringe, push the plunger until the acetone has filled of the whole tube and has entered the nozzle, and no any air bubbles are left in the tube.

8. Press keyboard “⬇ ”button to move up the plunger until the syringe can fit easily within the holder.
9. Invert the syringe to downward orientation. Slide the syringe into the holder.



10. Using the motor controls, hit keyboard “ ⬇ ” button to move down the plunger until the plunger touches the top of the syringe. Flip the red lever to the left. Then the plunger will push on the top of the syringe.
11. Keep hit keyboard “ ⬇ ”down button until acetone has completely filled the line and is running out of the bottom of the nozzle.
12. On the computer, press “Okay” to having finished the materials change
13. Repeat the Section 4.12 for dummy dispense procedure to clean the spray head..
14. Select up in the spray arm to move up the spray arm, use cotton stick or cleanroom wiper dip with acetone to clean spray head (black part) gently, press down to bring spray arm to original down position.





4.17 Process Bowl Cleaning

Use Cleanroom Wipes dips with proper solvents (i.e Acetone) to clean the bowl thoroughly. Take out vacuum chuck and clean it at the wet station.



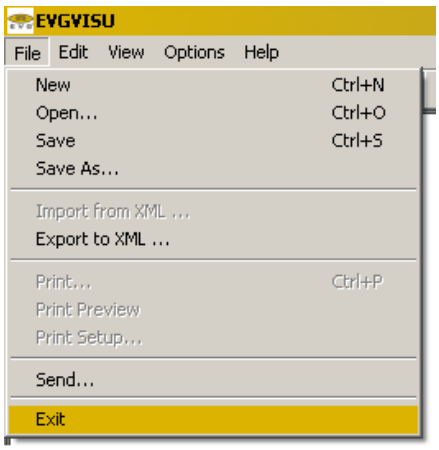
4.18 Check Out

Logout EVG software and check out the equipment in the NFF Equipment

reservation website or card reader immediately after use.

4.19 System Shutdown (For Staff ONLY!)

1. Close the EVGVisu-Software, by clicking on the menu “File” and on “Exit”.



2. To shut down the PC, click on the “Shutdown”-Button in the EVG Explorer.
3. The red button means OFF and the green button means ON.

   Press the red button.

   Turn the main switch (2) fully counter-clockwise.

This will turn off all hazardous energy to the system.

