AJA Sputter System – Operating Instructions

Chamber already under Vacuum

Updated 5th February 2008

1. Turn on appropriate gases

- Add your name and yellow magnets to the gas-sharing matrix in the other clean room.
- Use the blue key ring (key on the end with no label) to unlock the shed on roof
- Open cylinders (entirely and back a quarter-turn), blue knobs and switches on gas pod.
- Lock the shed door again.
- Turn on the other switches next to the gas-sharing matrix.
- Put on small shoe covers, hair net and blue gown.
- Check the ion gauge reads ~ 1^{0-7} – 1^{0-8} and Turbo is running at 630 Hz (LCD screen).
- Check behind the system that the cooling water is flowing at ~ 8 L/min, and the feed and return pressures are ~ 100 psi and 40 psi, respectively.
- Turn on the gas taps behind system, and the small N_2 tap on the side wall.

2. Loading your sample

- Open the loadlock and *carefully* place the lid on rubber stops below.
- Lift out the sample holder plate onto tissue. Check you are using the correct plate.
- Load your sample under washers. Screw just past finger-tight so you don't break your sample. Don't force the screws – some have been cross-threaded so don't use these ones.
- Ensure all screw holes are covered, then gently blow any dust off with N_2.
- Place the plate back into the loadlock with your sample facing down. Check it sits in the groove evenly, and that the unsputtered claw marks underneath are facing the front & back.
- The two protruding cross-threaded screws should be aligned to the front and back as well.
- Run your finger around the O-ring and under the loadlock lid, checking the latter for dents.
- Carefully replace the loadlock lid so it sits neatly in its groove.
- Turn on the 'Loadlock' vacuum pumps on the left-most PD30S box.
- Turn on the laptop & open the PhaseIIJ programme (Section 4) while you're waiting.

3. Transferring sample to chamber

- Check the height of the substrate holders/claws in the chamber. Move the joystick up/down until the metal tube (on top of chamber) is exactly on the green line (102 on the scale).
- Check the claws are aligned front/back to line up with the substrate plate. Move the joystick left/right to rotate accordingly.
- Wait until the loadlock pressure drops to less than 4×10^{-5} mbar (LCD screen above laptop).
- Open the gate to the loadlock entirely.
- Using the black magnet below the laptop, slowly slide the sample into the chamber. Stop just before middle position and have a look at the height in the chamber. Pay attention to the screws that stick out of the plate and make sure they don't catch – adjust the height if needed. Slowly move the arm the entire way in.
- Use the joystick to lift the sample plate up until the orange line is visible (93 on scale). Be careful not to rotate the substrate claws while you are lifting them.
- Check the plate is clear and then entirely retract the arm using the black magnet.
- Close the gate valve completely.
- You can usually leave the Loadlock vacuum pumps on while you are sputtering, so it's quicker to unload your sample afterwards.

4. Preparing to sputter

- Lower your sample to the appropriate height for sputtering (black mark at 105).

- Turn on automatic substrate rotation (turn knob next to joystick to 20).
- Turn on required power supplies and matching networks.
- Ensure the VAT control and touch-screen are both in 'Remote' mode.
- Open the PhaseIIJ programme located on the Desktop of the laptop.
- Check the Config settings look correct – don't change anything without permission.
- Enter your name and click Config Save/Close.
- If the VAT control has automatically Closed, use the mouse to 'Open' it again, and check that the pressure begins to drop again.
- Click Create Layers, and load the ones you will be using, to check they are correct.
- The Strike layer should be correct; however you may have to change the deposition time (in seconds) in the Dep layer. Check with Ian or Hoe if you are unsure about something.
- To save over the existing file, it is easier to copy the name before clicking Save.
- Return to the main control screen, click Create Process, and check that your process will run the correct layers in the right order.

5. Sputtering

- When everything is in order, click Run Process and set the system to *Log As A Single Text File*, every 30 seconds.
- Run the process.
- See that the Strike pressure (25 mTorr) and Main Chamber Ar flow (20 sccm) are reached.
- Observe the purple light on the laptop, and also the relevant gun in the chamber to check that the plasma strikes successfully.
- The process will then switch to the Dep layer – see that the pressure drops (to 4 mTorr).
- The source power will then ramp up to the final value. Watch this, and the reflected power.
- When the gun shutter opens and sputtering begins, immediately close the shutter over the viewing window, and tighten with the grub screw.
- Before leaving the system, check the chamber pressure and gas flow are correct, the source power is correct (or just below), and the reflected power is only a few Watts.

6. Unloading your sample

- After the process is finished, a dialogue box should appear on the laptop telling you so.
- Close this dialogue box, open the VAT valve and open the shutter on the viewing window.
- Stop the substrate rotation, and manually rotate so that the claws face the front and back.
- Raise the substrate so the marker is above the orange line (93).
- Check that the load lock pressure is still less than 4×10^{-5} mbar, then open the gate valve entirely. Move the arm under the sample holder, looking through the window again.
- Lower the substrate holder to the green mark (101) and carefully retract the arm.
- Close the gate valve and turn off the Loadlock vacuum pumps. Make sure you have turned on the small N_2 tap on the side wall, so the load lock can vent.
- After five minutes, you should be able to remove your sample. Remember to *carefully* place the lid from the load lock on to the rubber feet below so it doesn't get damaged.

7. Shutting down

- After your last sample, carefully replace the sample holder and the lid.
- Turn off the power supply & network, shut down the laptop and turn off the N_2 & gas taps.
- Check VAT valve is open (switch to 'Local' if you need to change this).
- Remove you name from the gas-sharing matrix and if no one else is using them, turn off your gases at the pods and on the roof.