



**Saint Mary's
University**

Electron Microscopy Centre

**Title: STANDARD PROCEDURES TO USE THE SPUTTER
COATER**

Equipment: Bio-Rad JBS-PS-3 Sputter Coater

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Warning!

Before you attempt to operate this equipment for the first time, please make sure you are aware of the precautions that you must take to ensure your own safety.

Working Environment

Do not use electrical equipment in:

- Rain or excessive moisture environment
- The presence of flammable or explosive gases

The equipment is not designed to be water or splash proof, or to be used in area where there are flammable or explosive gases or fumes.

Standard Procedures to Use the Sputter Coater

The purpose of sputter coating is to apply a thin layer of a charge conducting material to non-conducting specimen. This prevents charge build-up in sample while under the electron beam.

1. Mount Dried Specimens onto SEM stub with double-sized tape or conductive glue.
2. Remove the metal top plate and glass work chamber carefully (two separate pieces; handle by glass work chamber).
3. Place stub(s) in the sputter coater chamber (maximum 6 stubs allowed). **Gloves and forceps should be used when loading stubs.**
4. Re-place the work chamber and top plate back on.
5. Check the leak valve is closed (fully clockwise).
6. Set the timer to minimum position (30 seconds).
7. Turn on cooling water valve mounted on the wall: turn the valve anticlockwise and check that a trickle of water flows.
8. Check both cylinder valve (fully clockwise) and regulator valve (anticlockwise) are closed.
9. Turn on argon: slowly turn the cylinder valve clockwise until there is a reading at the first meter. Slowly turn the regulator clockwise until the second meter is reading between 5-8 psi.

Note: Please refer to a separate document for detailed operation procedures for handling high pressure gas cylinder.

10. Switch on the power. The rotary pump will start immediately and the needle of the vacuum gauge will register falls. If the needle is falling below 0.2 mbar, the “Ready” light will be illuminated. The unit should then be left pumping until a vacuum of better than 0.1 mbar is reached.

Note: A vacuum of better than 0.1 mbar indicates that there are no major leaks in the system. If the needle could be fall under 0.1 mbar for a quite while, contact the EMC staff for support.

11. Turn the leak valve counter-clockwise slowly to flush the specimen chamber with ultra pure Argon gas. The chamber pressure should rise to about 0.5 – 1 bar for at least 15 seconds during the flushing.

12. Close the leak valve and allow the work chamber to pump down. The needle of the vacuum gauge should fall back to below 0.1 mbar and reach its minimum position. **Repeat step 10 and 11 at least 2 more times before process next step.**
13. If the chamber vacuum drop to 0.04-0.06 mbar, gently turn the leak valve counter-clockwise until the pressure just starts to rise (~ 0.07 mbar). This requires approximately three to four turns of the knob.
14. Press onto the TEST button and monitor the plasma current reading. If the reading is below or above 18 mA, adjust the leak valve so to set the plasma current reads around 18 mA while pressing the button.
15. Release the TEST button to quit test procedure.
16. Set the timer to desired value, e.g. 80 to 100 seconds.
17. Press the START button to start coating. The discharge will now be visible in the chamber as a blue or purple glow. The discharge will cause the sputtering of gold onto the base plate. The discharge will terminate after the preset time.

Note: The plasmas current will be around 18 mA after the “Start” button has been pressed although the initial outgassing of the system may tend to make the current unstable. Adjust the leak vale so the plasma current remains at 18 mA.
18. Repressing the “start” button will repeat the coating process it is required to have more than once coating.

Note: In most case, a total of 110 seconds should give a good coating. User has the option of a single sputtering time of between 30 and 140 seconds or alternative any number of short sputtering bursts.
19. Switch off power after the coating. Turn off water valve and cylinder valve while the regulator valve is on.
20. Turn the leak valve fully anticlockwise to vent the chamber with residue argon gas. By doing this, user not only vents the work chamber but also release the residue high pressure argon gas remained in the regulator and tubing.

Note: User could also admit the air into the work chamber by tilting the “Vent” valve located on the metal top plate of the chamber. In this case, user should remember to release the pressure in the regulator and tubing.

21. Close the regulator valve by turning the knob counter-clockwise when regulator meters read zero.
22. Close the leak valve (fully clockwise). Remove the work chamber, top plate and specimens (with powder free gloves).
23. Replace work chamber and top plate.
24. Record the usage of sputter coater on the log book.

The Layout of JBS-PS-3 Sputter Coater

