Standard operating procedure (SOP)

for Cressington Carbon Coater 108 carbon/A

Alexey Nikiforov, Ph.D.

617 353 9045/ alnik@bu.edu

Cressington Auto Carbon Coater 108 carbon/A is a coater to evaporate conducting carbon layers onto insulating samples for high resolution FESEM/EDS/FIB-SEM applications. The unit employs Bradley-type carbon rods for efficient and reproducible carbon evaporation on nanoscale (5-10 nm).


Sample requirements and preparation:

Dry solid samples free of dust, organic residue and oils mounted on standard SEM stubs. Inspect the O-rings, glass jar for damage. Do not use Kimwipes

with IPA on rubber O-rings. Wear clean powder-free nitrile gloves. Use nitrogen spray gun to dust off sample and cover O-ring before loading samples onto the sample table inside the jar. Load your sample onto the sample chamber table using tweezers for handling SEM stubs.

NOTE: do not put FESEM sample holder carousel into the sputtering unit. Your samples should be mounted onto SEM stubs for sputtering.
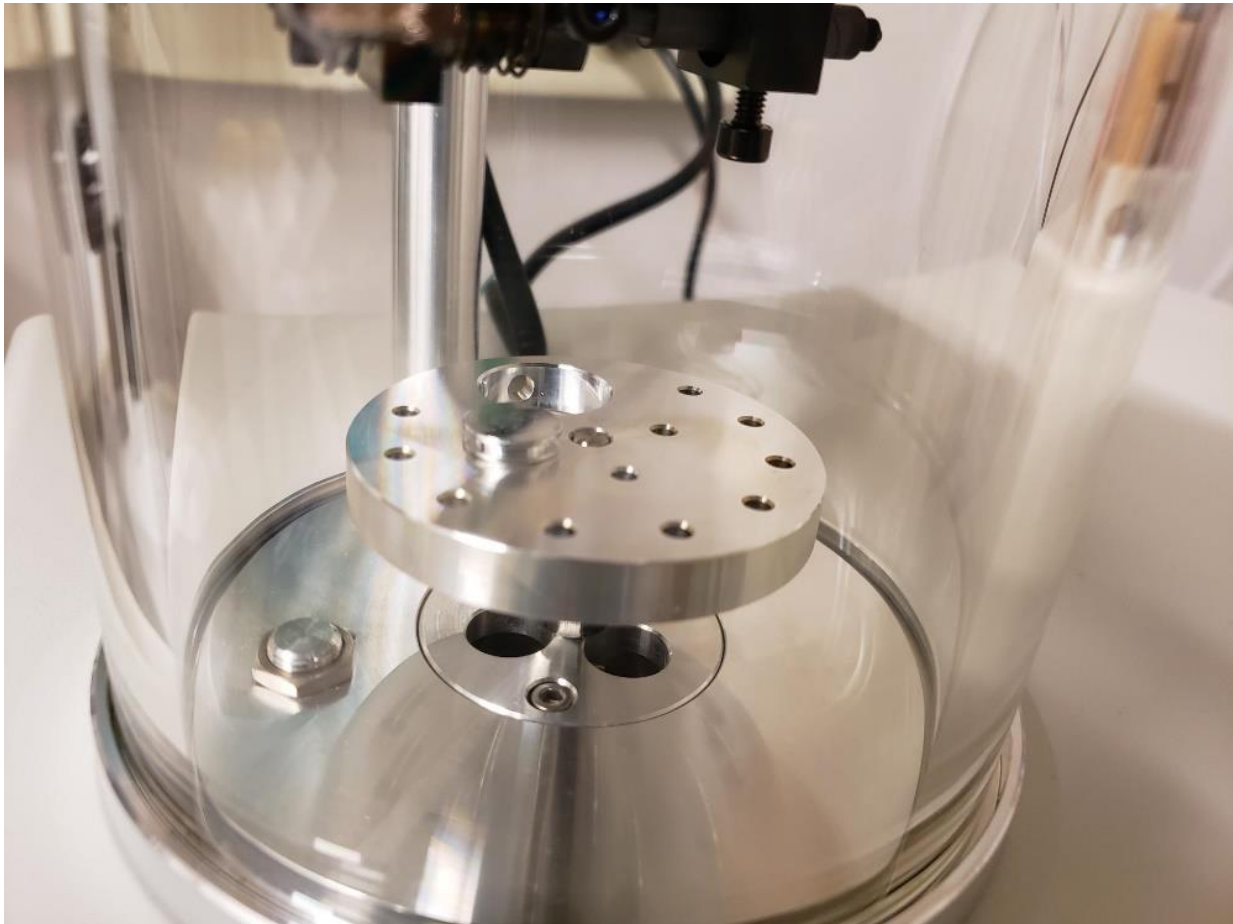

Lower the top plate **slowly** onto the glass jar to ensure a vacuum seal:
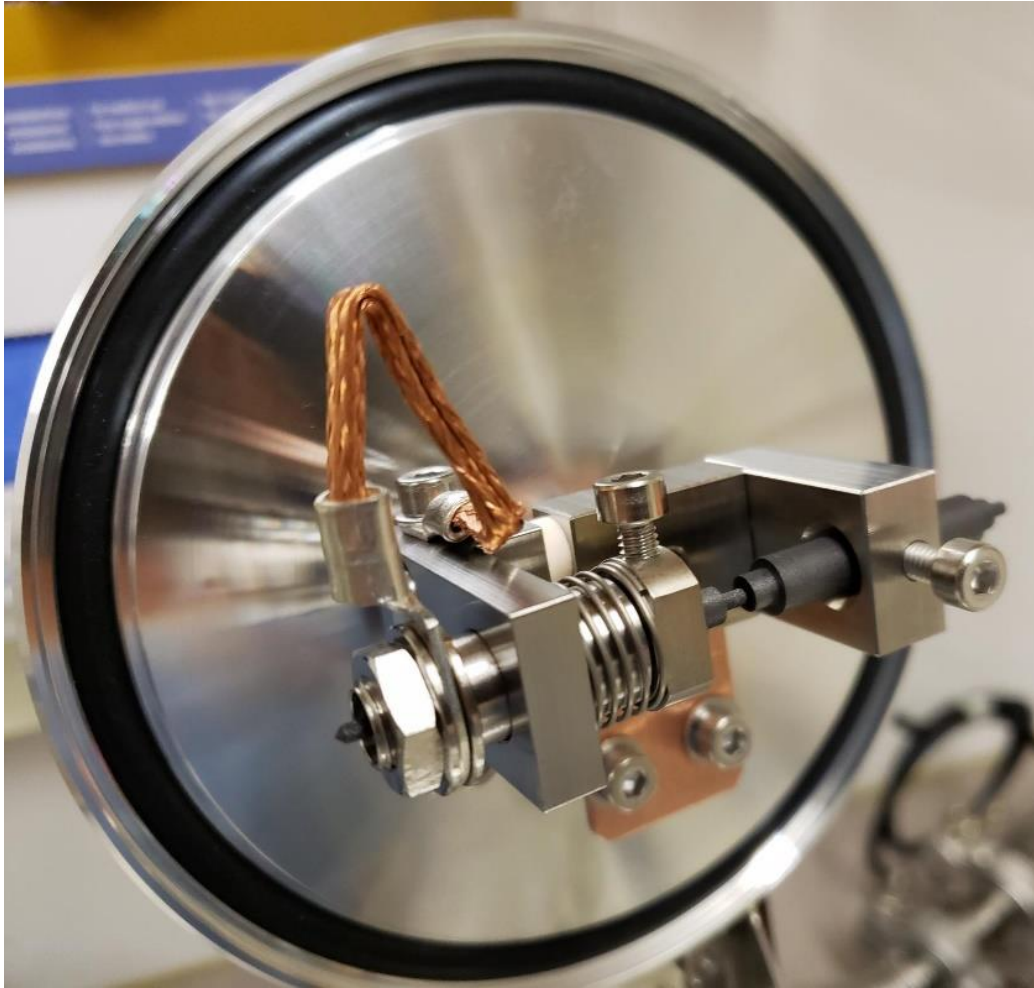
Press **Power** button on the front panel. Pumping starts automatically. There should be no hissing or gargling sound from the system, which indicate a leak. In case of the hissing/gargling noise from the pump, turn the power off and recheck the O-ring seal. Close the top cover plate gently ensuring a tight seal and begin pumping. Press power off after 15-30 sec of pumping and restart pumping. Repeat this step 3-4 times to purge the lines and to achieve a better vacuum level.

Pump the sample chamber to a pressure lower than **0.05 mbar**. Check the pressure level by pushing down the switch from Current to Vacuum Check on the front panel. Wait 5-10 minutes to achieve a suitable vacuum level.
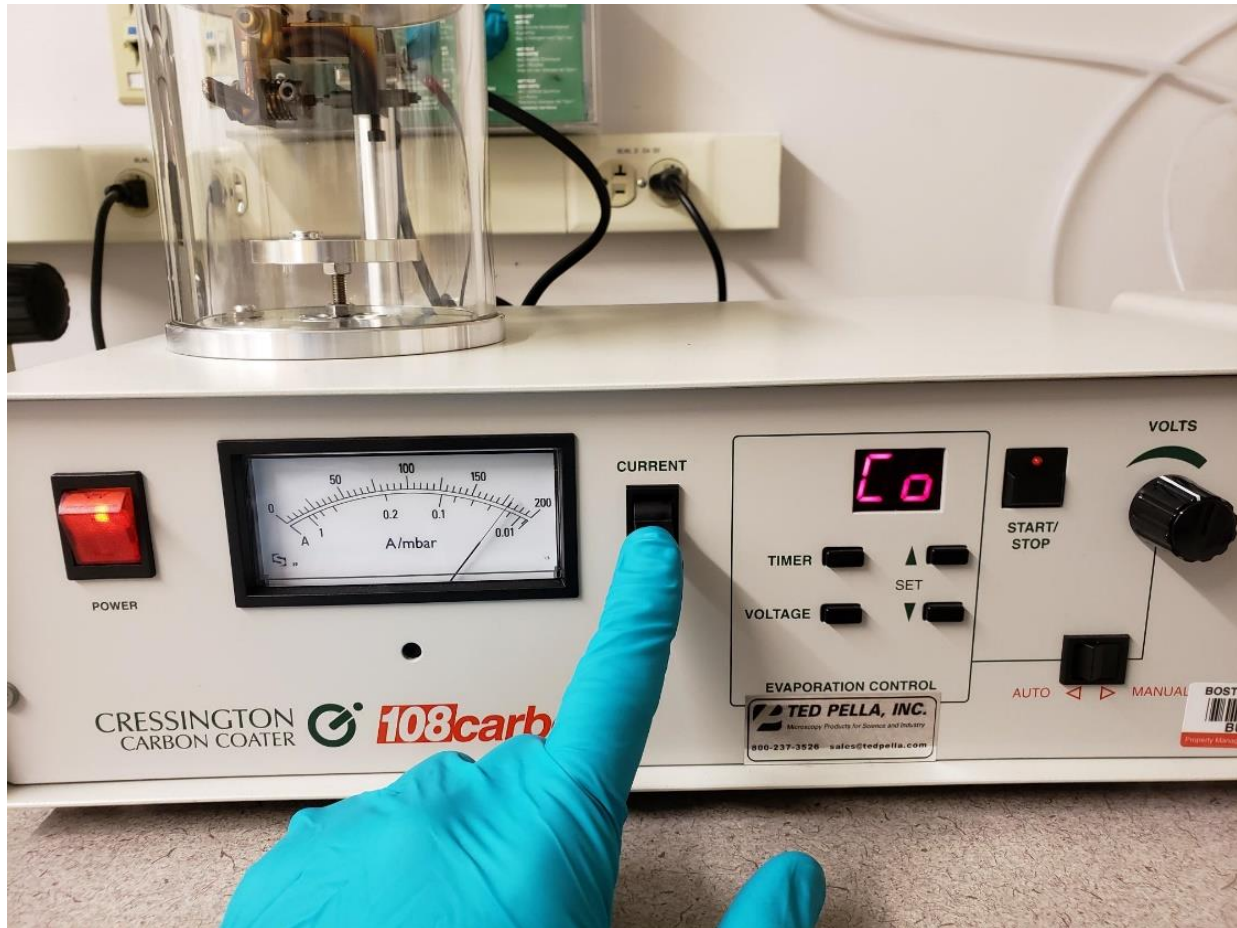
Note: Do not attempt to achieve better vacuum by pumping for extended periods of time (>10-12 minutes): if your sample is not dry, if it is contaminated with organic or oil residues, the system will not pump down and system interlocks will prevent operating of the rod heating electronics. Remove your sample and clean it before using it in the sputtering unit.

Sputtering Process

Select **Manual** and **Co** (stands for Continuous)

Do not change voltage settings or timer settings: V ~ 2.2V

Press **Start** to begin sputtering.

Observe current values during deposition. Typical currents close to 50 A are suggested for high quality coatings. Higher currents will result in heating but no carbon evaporation as well as carbon rod and assembly failure.

Perform sputtering for 10-15 sec to evaporate a thin conducting coating.

Press **Stop** to finish the coating process. Let the system cool down before venting.

IMPORTANT: This is an automatic unit, which vents automatically when **Power** switch is turned off. During sputtering the rod and the assembly inside the glass jar heats up significantly. Allow it to cool down to prevent oxidation and premature rod failure for 5-10 minutes before venting. Observe the vacuum levels after finishing the sputtering process. You should see a small vacuum improvement due to the rod heating breaking up the water molecules inside the jar. Keeping your sample under vacuum after the sputtering will result in a good quality conductive carbon layer with good uniformity and

stability required for high resolution imaging and microanalysis electron microscopy applications.

At the end of the session:

Vent the jar by turning the Power button off. The system will vent automatically. Gently open the top cover plate and remove your specimen (on the stub) using special tweezers.

The glass jar walls and the specimen table can be cleaned with a lab napkin moistened with IPA. Follow up with the nitrogen spray gun. Close the top cover plate and record information about the session into the logbook for the Carbon Coater indicating sample used and all relevant details about the process.

In case you encounter a difficulty, please describe the nature of the problem, your sample, ask for assistance.

Updated February 2024 Author: Alexey Nikiforov, Ph.D.