Check Points:

1. The required Gas cylinders are available.
2. Chiller is working.
3. Cooling water supply is working.

Steps to operate the system:

1. Turn on the required gas cylinders from outside the Micro yellow room lab.
2. Turn on the main power supply switches on the panel on the wall.
3. Turn on the PC and LAN switches.
4. Start the PC.
5. Launch the "RIE Interface" software from the PC.
6. Tick the following to create the interface between PC and the Plant. (If connection is made, the LED at the right side will turn green)
    - ☐ RF Generator
    - ☐ Vacuum System
    - ☐ Gas Box Control
7. Start the Plant: Switch on the red button on the STSRIE system. (**Note: only after ticking on PC tool interface boxes mentioned above, one can turn on the plant**)
8. Start the rotary pump: Click on "Rotary On" button in the software.

Oxygen plasma cleaning before going for the process

9. Start the roughing process by clicking on "Roughing valve".
10. Wait for the chamber pressure to drop to 2.9e-2 Torr.
11. Once the base vacuum is created, close the "Roughing valve" take the system into backing by clicking on "Backing valve".
12. Start the turbo and monitor the frequency of the turbo to reach 549 Hz. (**In the software as well as at the gauge on the plant panel. Note: the moment we start the turbo, "turbo purge valve will be on automatically. Whereas, between two process when need to open/close the "turbo purge valve manually""**).
13. Once the turbo frequency is stabilized, open the gate valve by clicking on "Gate valve" to connect the turbo to the chamber.
14. Wait for the chamber pressure to drop till 2.9e-4 mbar.
15. Once the base vacuum in the chamber is created, go to the "process page" and edit the process recipe.
16. In the "process page" set the APC value to 70% which means to close the gate valve 70% (**automatic position control: Represents the gate valve position needed to adjust the desired pressure in the process chamber during process**).
17. Set the O_2 gas flow rate to 50 sccm. (Note: the maximum flow rate for all the gas is 50 sccm).
18. Set the RF power to 100W. Check the set power is being reflected in the gauge on the plant panel.
19. Set the "gas stabilization time". (**At max 1 min is enough to stabilize the gas flow**).
20. Set the plasma on duration in "Process duration" to 1 min. (**Maximum plasma on duration is 15 min. After 15 min one must take a break of 5 min**).

21. Start the process by clicking on “Start process”. Once the process is time is over, the plasma will be turned off automatically and APC position will be retain back to 8%.
22. Once the APC position reaches to 8%, wait for 1-2 min for the toxic gases to be removed by turbo.
23. Close the gate valve: “Gate V close”
24. Close the turbo purge valve: “Turbo purge valve”
25. Vent the chamber by clicking on “Chamber vent”.
26. Wait for green “Vacuum” button to turn into red “Atmosphere” button.
27. Close the “Chamber vent”
28. Click on “LID up” to open the chamber LID.
29. After clicking on “LID up”, press the two white buttons on the plant simultaneously to open the process chamber LID.
30. Once the LID is open, “LID open” bar in the software will turn red.

Process to be done

31. Load the sample in the chamber.
32. Click on “LID down” in the software window.
33. After clicking on “LID down”, press the two white buttons on the plant simultaneously to close the process chamber LID.
34. Once the LID is closed, “LID close” bar in the software will turn green.
35. Start the “Soft pump valve” to start the initial roughing.
36. Once the chamber pressure drops to 9e-1 Torr, close the “Soft pump valve” and start the “Roughing valve”.
37. Wait for the chamber pressure to drop to 2.9e-2 Torr.
38. Once the base vacuum is created, close the “Roughing valve” take the system into backing by clicking on “Backing valve”.
39. Start the turbo and monitor the frequency of the turbo to reach 549 Hz. (**In the software as well as at the gauge on the plant panel. Note: the moment we start the turbo, “turbo purge valve will be on automatically. Whereas, between two process when need to open/close the “turbo purge valve manually””**).
40. Once the turbo frequency is stabilized, open the gate valve by clicking on “Gate valve” to connect the turbo to the chamber.
41. Wait for the chamber pressure to drop till 2.9e-4 mbar.
42. Once the base vacuum in the chamber is created, go to the “process page” and edit the process recipe.
43. In the “process page” set the APC value to 70% which means to close the gate valve 70% (**automatic position control: Represents the gate valve position needed to adjust the desired pressure in the process chamber during process**).
44. Set the required gas flow rate. (Note: the maximum flow rate for all the gas is 50 sccm).
45. Set the RF power as per the requirement. Check the set power is being reflected in the gauge on the plant panel.
46. Set the “gas stabilization time”. (**At max 1 min is enough to stabilize the gas flow**).
47. Set the plasma on duration in “Process duration” option. (**Maximum plasma on duration is 15 min. After 15 min one must take a break of 5 min**).

48. Start the process by clicking on “Start process”. Once the process is time is over, the plasma will be turned off automatically and APC position will be retain back to 8%.

N_2 Flow to ensure the removal of toxic gases

49. Once the process is done, return back to “Manual Control” tab and manually set the APC position to 70%.
50. Set the N_2 flow to 50 sccm and keep the flow on for 2 min to remove the residue of process gases.

Closing of the system

51. Close the gate valve: “Gate V close”
52. Close the turbo purge valve: “Turbo purge valve”
53. Vent the chamber by clicking on “Chamber vent”.
54. Wait for green “Vacuum” button to turn into red “Atmosphere” button.
55. Close the “Chamber vent”
56. Click on “LID up” to open the chamber LID.
57. After clicking on “LID up”, press the two white buttons on the plant simultaneously to open the process chamber LID.
58. Once the LID is open, “LID open” bar in the software will turn red.
59. Unload the sample in the chamber. Load another sample if further process needed and start from step 20 again else close the lid and move to step 31.
60. Click on “LID down” in the software window.
61. After clicking on “LID down”, press the two white buttons on the plant simultaneously to close the process chamber LID.
62. Once the LID is closed, “LID close” bar in the software will turn green.
63. Start the roughing of the process chamber and wait for the chamber pressure to drop to 2.9e-2 Torr.
64. Once the base vacuum is created, close the “Roughing valve” take the system into backing by clicking on “Backing valve”.
65. Right after starting the backing open the gate valve by clicking on “Gate valve” to connect the turbo to the chamber.
66. Wait for the chamber pressure to drop till 2.9e-4 mbar. Close the gate valve: “Gate Valve”
67. Stop the turbo and wait the frequency to drop to zero.
68. Close the Backing: “Backing Valve”
69. Stop the rotary pump.
70. Close the software.
71. Stop the plant.
72. Shut down the PC.
73. Turn off of the PC main switch and LAN switch.
74. Turn off the main MCBs.
75. Turn off the gas from the cylinder outside.