JEOL 4500 Operating Instructions

Operating Instructions

Instrument Start Up

1. Chick on the JIB-4500 Icon to open the program
2. Open IR camera
3. Click on **'User'** icon and then select 'CEMMA USER'
4. Fill out the log book with all required information.

Stage Initialization

5. Confirm that there is no specimen holder on the stage (main chamber)
6. Click on **'Setup'** icon under **'Stage'** tab (upper right corner of screen)
7. Click on **'initialize'** tab
8. Select **'All axis'** and press **'Start'** icon
9. When finished click **'OK'**

Loading Sample

10. Confirm that the gate valve is **CLOSED**
11. Click the specimen **'EXCH'** icon
12. Open the chamber door
13. Place specimen support in door
14. Set the handle position of the specimen exchange rod to **HOLD** (black)
15. Close the chamber door
16. Click the **'EVAC'** button (goes to exchange position automatically)
17. When the EVAC button turns green open the **'Gate Valve Lever'**
18. Insert the specimen exchange rod until it stops.
19. Set the handle position of the specimen exchange rod to **RELEAS**E (red)
20. Pull the specimen exchange rod until it stops.
21. **CLOSE** the gate valve Lever (vents automatically)
22. Click on **'Holder'** icon and then select your holder.

Turing on the Electron-beam

23. Click on **'Origin'** button under **'Preset'** tab (X=0, Y=0)
24. Click on **'SEM'** button under **'Preset'** tab (Z=18, T=0)

25. Click on **'SEM'** imaging window (green highlighted)
26. Set kV, spot size
27. Click the **'Beam'** button (upper left corner)
28. Focus, Wobble and Stigmate

Fine Z Adjustment

29. Obtain a SEM image and focus on a reference point
30. Press **'FZ Adj'** (Above Target – middle right)
31. Follow notes in window

Turing on the Ion-beam

32. Click on **'FIB'** imaging window (blue highlighted)
33. Click the 'Beam' button (middle left side)
34. If **'Stdby'** is lit it may be necessary to Flash.
35. Click on **'FIB'** button under **'Preset'** tab (T=52°)

ALP

36. Select the **'Tuning'** tab
37. Click on the **'ALP'** button
38. Click on the voltage (kV)
39. Adjust spot image to smallest size.
40. Click **'Apply'**
41. Click **'OK'**

Ion Beam Alignment

42. Select the **'Tuning'** tab
43. Click **'Beams'**
44. Select **'Beam 12'**
45. Under **'Beam position'** set **X** and **Y** to **0**
46. Focus on a reference point at 3000x
47. Double click to center the reference point.
48. Click **'Wobb'**
49. Under **'Aperture'** adjust **X** and **Y** to minimize movement

50. Click **'Apply'**
51. Double click on the **'Beam'** to be aligned.
52. Under '**Beam position'** adjust **X** and **Y** to move reference point to center.
53. Click **'Apply'**
54. Repeat step 58 through 60 for alignment of additional Beams.
55. When all Beams are align Click **'OK'**

JEOL GIS Beam Alignment (Beams 7-9)

56. Double click on the **'Beam'** to be aligned.
57. Click **'Down'**
58. Under '**Beam position'** adjust **X** and **Y** to move reference point to center.
59. Click **'Apply'**
60. Click **'Down'**
61. Repeat step 56 through 60 for alignment of additional Beams.
62. When all Beams are align Click **'OK'**

Column Coincidence Alignment

63. Click on the **'Coincidence'** button
64. In **'SEM'** window obtain a image and focus on a reference point at 4500x
65. Right click on the screen and select **'Image Shift Reset'**
66. Double click to center the reference point.
67. Select the **'Tuning'** tab
68. Select **'Beam 12'**
69. Click on the **' FIB'** window obtain a image and focus on a reference point at 4500x
70. Right click on the screen and select **'Image Shift Reset'**
71. Under **'Alignment'** adjust the **X** and **Y** to center the reference point
72. Click **'Apply'**
73. Click **'OK'**

Deposition Layer (JEOL GIS – Carbon)

74. Click on **'FIB'** imaging window (blue highlighted)
75. Center area of interest

76. Click **'FRZ'** button
77. Go to **'Process Setting'** tab (lower left corner)
78. Click **'Box'** button
79. On the **'FIB'** image window draw a box over the area for deposition layer
80. Under **'Process Data'** tab set the following;
81. Click **'Auto'** button (green)
82. Click **'DEPO'** (green)
83. From the pull down menu select beam 7-9
84. Check '**Use Dose'** box
85. Select a **'Dose'** of 1.0 nC/μm^2
86. Input **'Tilt'** = 0
87. Select **'GIS'** = Gun1
88. In the last pull down menu select **'Auto'**
89. Under **'Process List'** select the process by highlighting.
90. Click **'Start'** button (top center)

Rapid Milling

91. Click on **'FIB'** imaging window (blue highlighted)
92. Click **'FRZ'** button
93. Click **'Box'** button
94. On the **'FIB'** image window draw a box over the area for milling.
95. Under **'Process Data'** tab set the following:
96. Click **'Auto'** button (green)
97. Click **'RAPID'** (green)
98. From the **'Beam'** pull down menu select Beam 3
99. Input **'Dose'** nC/μm^2
100. Select **'Finish Side'**
101. Click **'Start'** button (top center)
102. Repeat for second, third and fourth Rapid milling
103. Repeat for cleaning milling

Instrument Shut Down

104. Lower the magnification
105. Retract all nozzles and probes
106. Turn off the FIB Beam
107. Turn off the SEM Beam
108. Under **'Airlock'** click **'EVAC'**
109. Open gate value
110. Remove sample with exchange rod.
111. Close gate value
112. Remove holder.