

## Part III: EELS alignment and acquisition

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**After the alignment in TEM and STEM mode, to use EELS in STEM mode:**

1. Lower the Screen
2. Open DZM scripts in DM: **Acquire EELS** and **Align EELS**
3. Stop search in Digiscan and **move beam to vacuum**
4. Make sure **S.E. Aperture 650  $\mu\text{m}$**  is active
5. In **Align EELS** window, select **MCR Slit** = 60  $\mu\text{m}$  (for core loss) or 0.5  $\mu\text{m}$  (for low loss), adjust **Slit** (~4250 for 60  $\mu\text{m}$  and ~ 6490 for 0.5  $\mu\text{m}$  ) to obtain a bright spectrum caustic on the screen.
6. Check probe current under **Setting/ Dose Calibration** ( ~68 pA for 60  $\mu\text{m}$  and ~15 pA for 0.5  $\mu\text{m}$  ) . Type (~300) in **MCR Fine**, select **Fine Active** to reduce the probe current.
7. Choose the **Dispersion** value (0.2, 0.1 or 0.05 eV/ch) in Align EELS window
8. Make sure **MCR Slit** = **0.5  $\mu\text{m}$**  and **Fine Active** is selected
9. Click on **EELS in DM** (Auto filter tab)
10. Set EELS energy = **0 eV** and exposure time to **0.05 s** in EELS, click **View**
11. If the spectrum is red or yellow, increase MCR Fine until it becomes green.
12. In the spectrum viewing window, change image display to **survey whole image**
13. Align ZLP to zero by **Shift X** and **Shift Y**
14. Focus ZLP by adjust **FX** and **FY** (make it straight, symmetric and thin)
15. After ZLP is aligned, stop viewing and **move beam** to the region of interest
16. To acquire an EELS spectrum, set **Offset**, **Exposure** and **Number Spectra** for **Low-Loss (0.5  $\mu\text{m}$  slit)** or **Core-Loss (60  $\mu\text{m}$  slit)** in Acquire EELS window. Click **set** and **Active**. Click **Start** to acquire EELS.
17. To obtain a spectrum Image, first select **Assign Image** in Spectrum Imaging tab. Assign a ROI by a selecting tool, adjust the DigiScan paramters, select slit and choose Low-Loss or Core-Loss in Acquire EELS window, click start to acquire.
18. Click EFTEM in AutoFilter tab to quit EELS mode