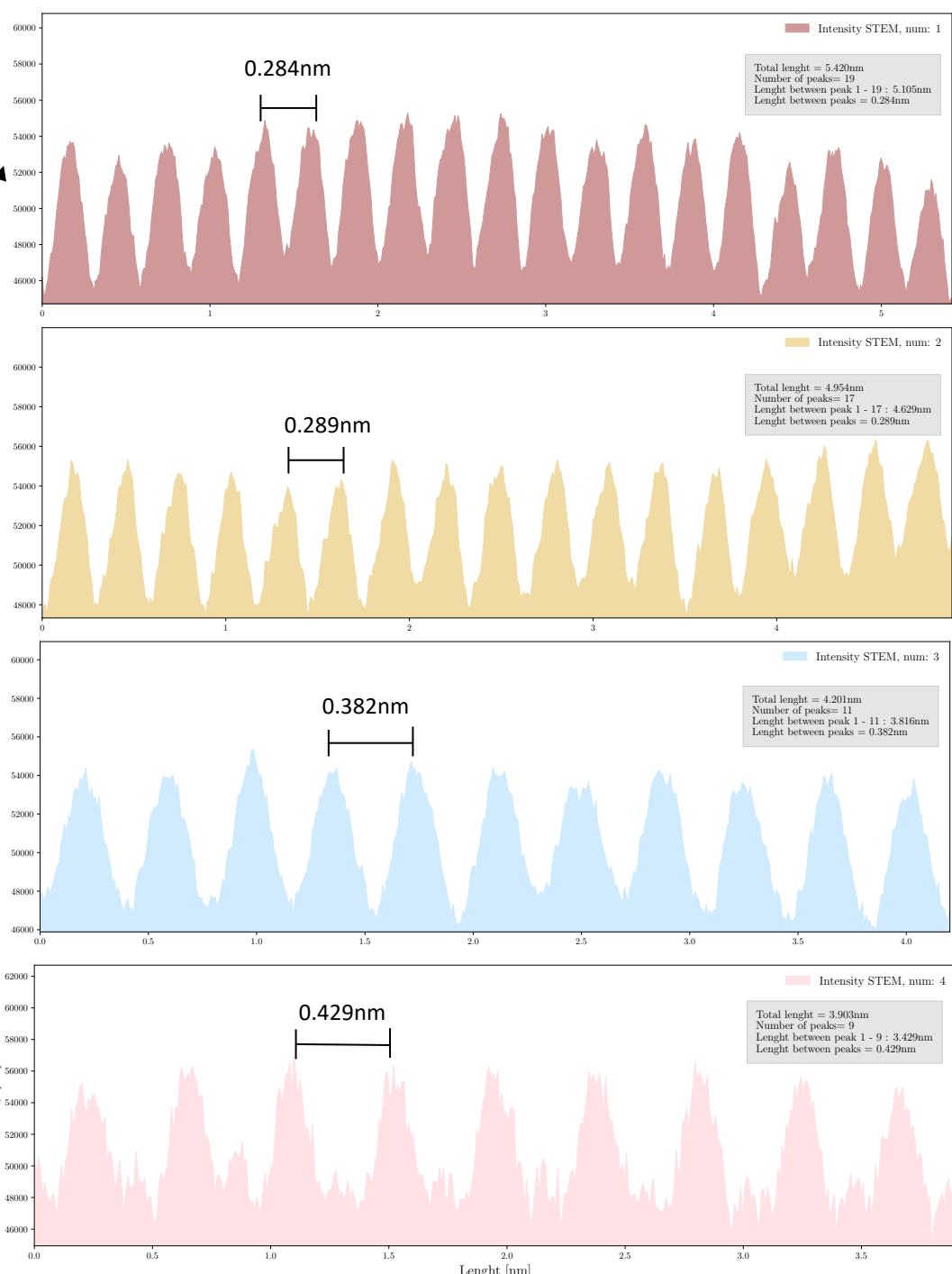
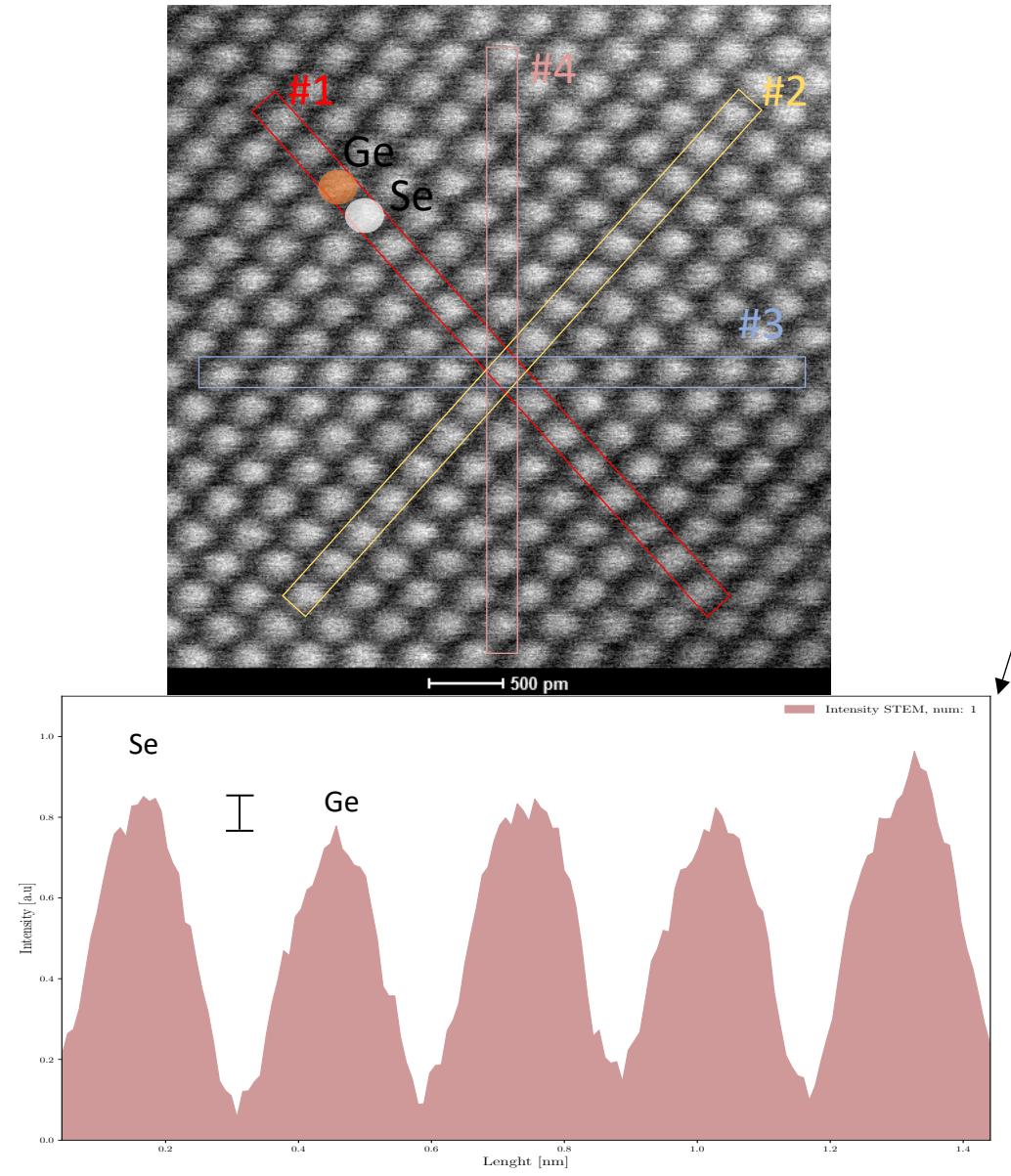
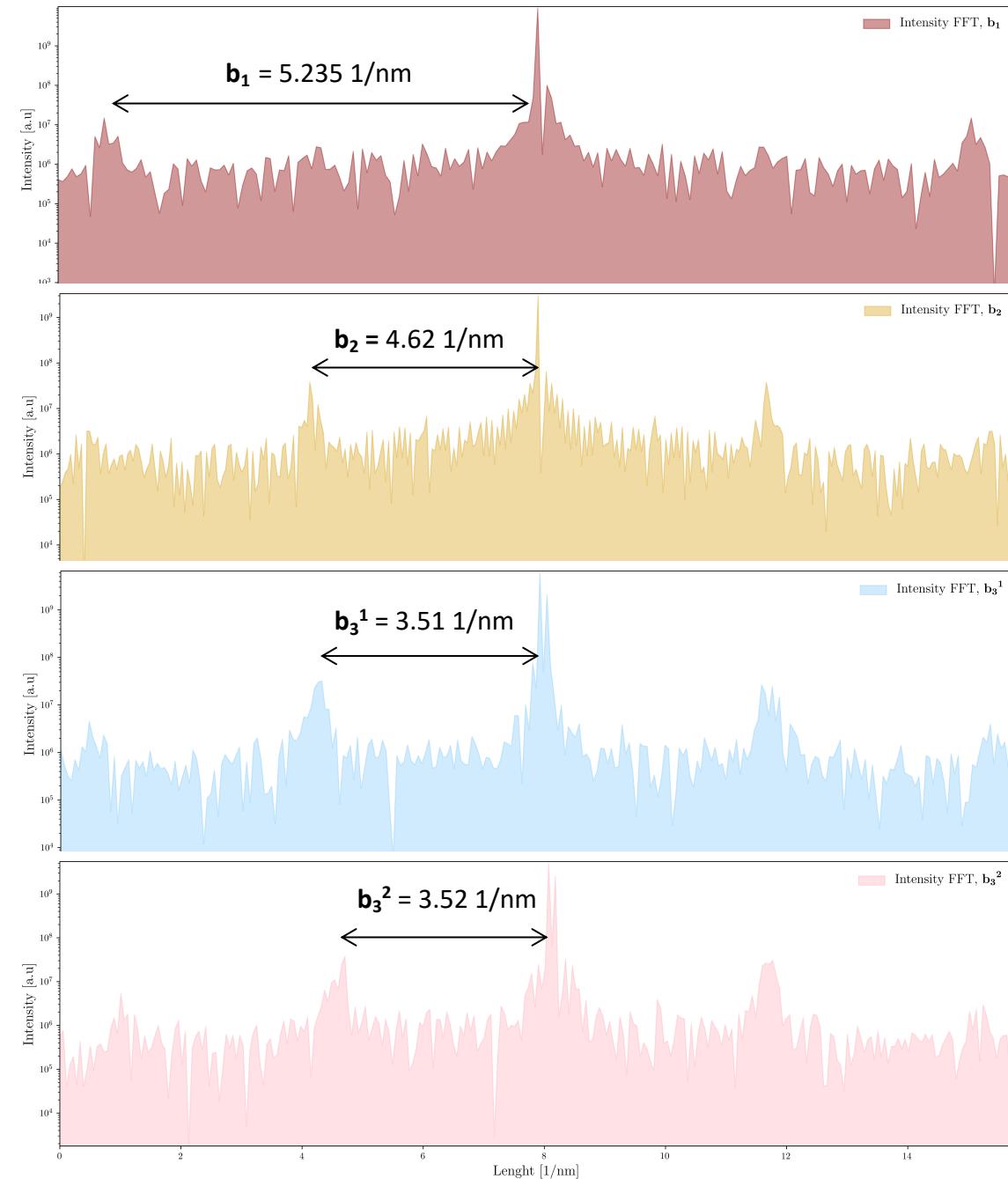
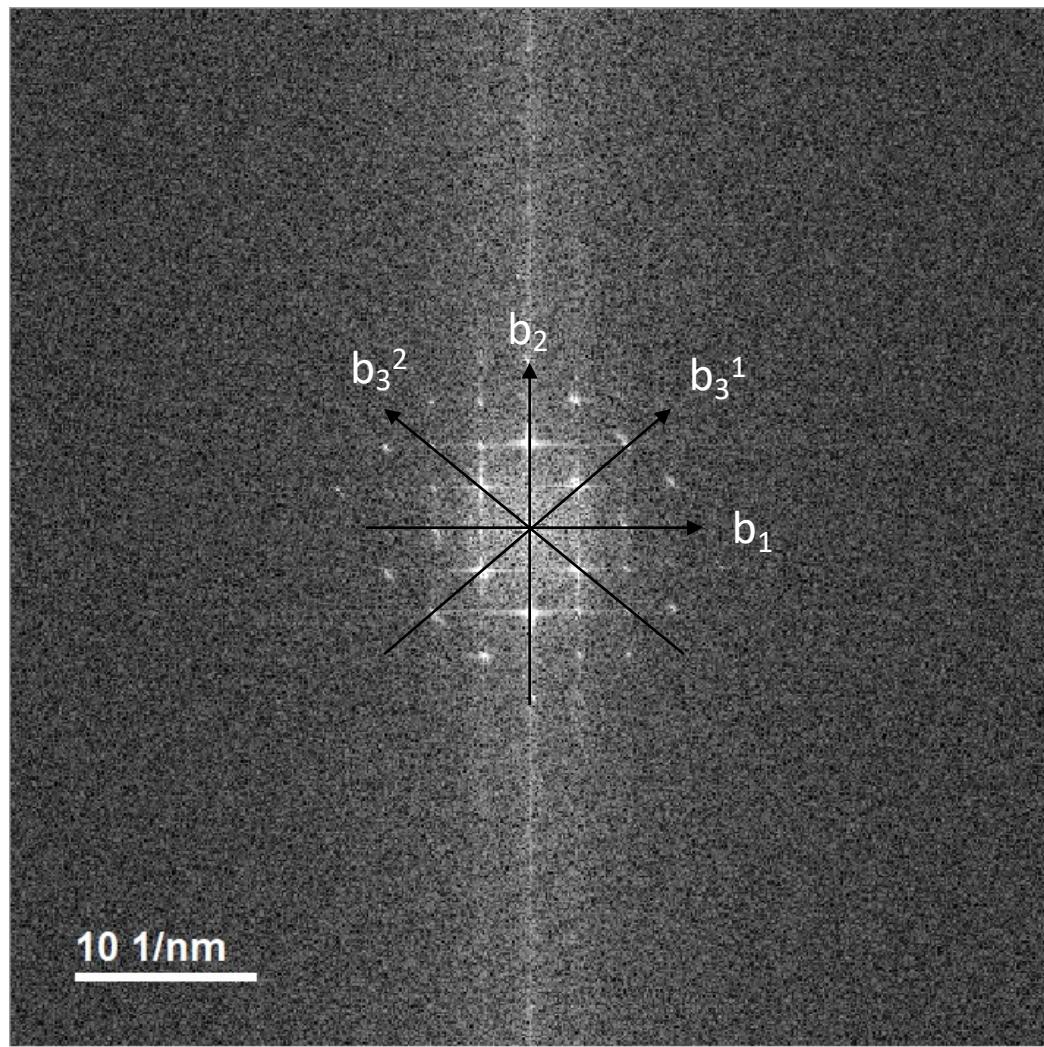


Supplementary information

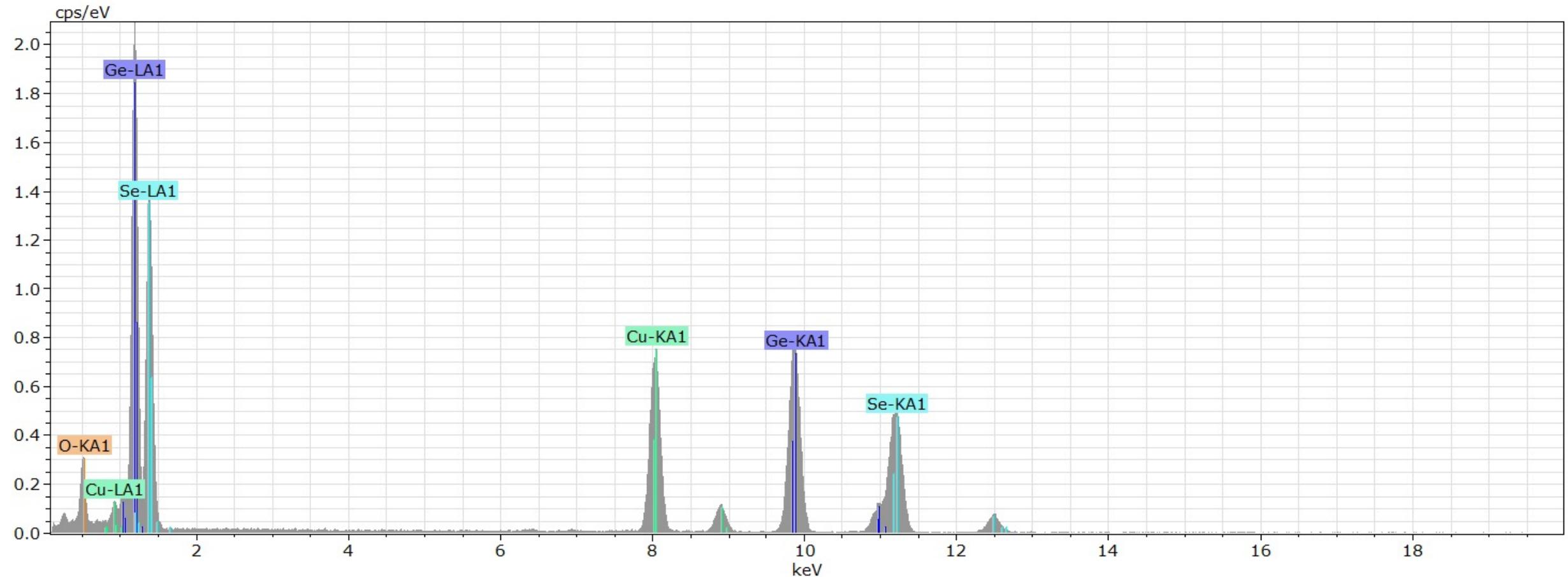
The Effect on Plasmon Peaks in Quasi Two-Dimensional GeSe by Variation in Thickness & Phases

Line Profile of GeSe_ROI_2 along four direction

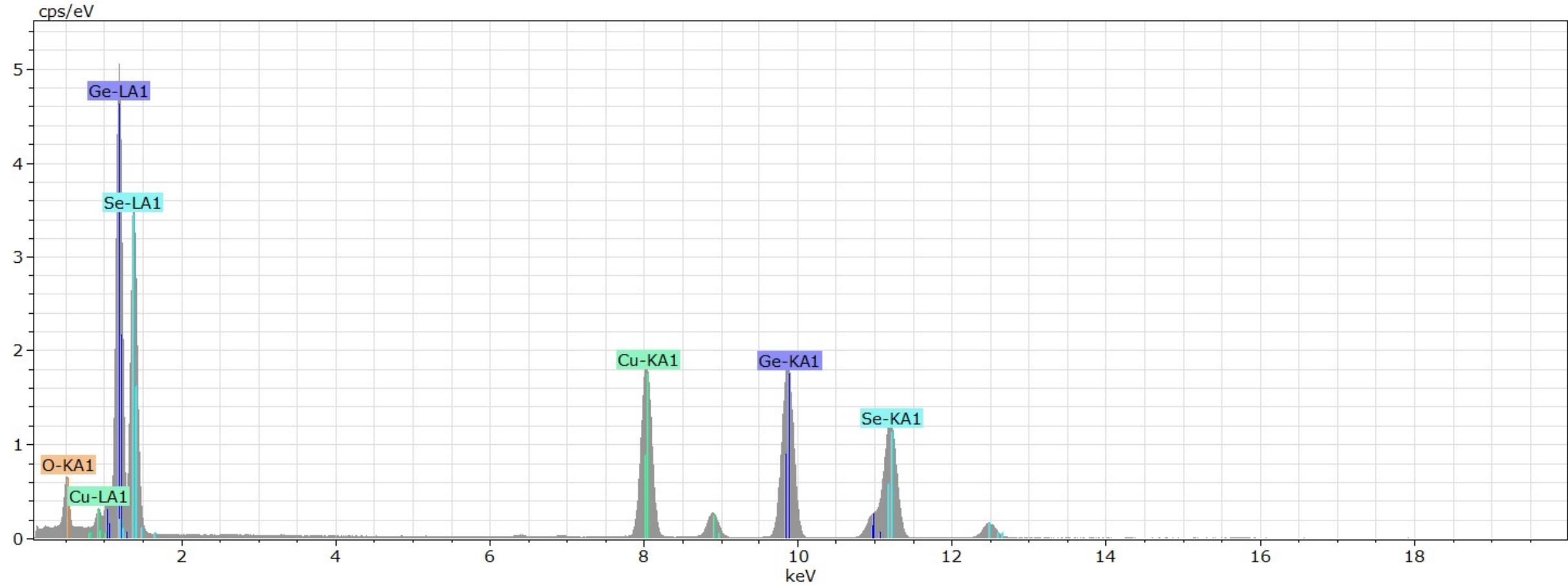


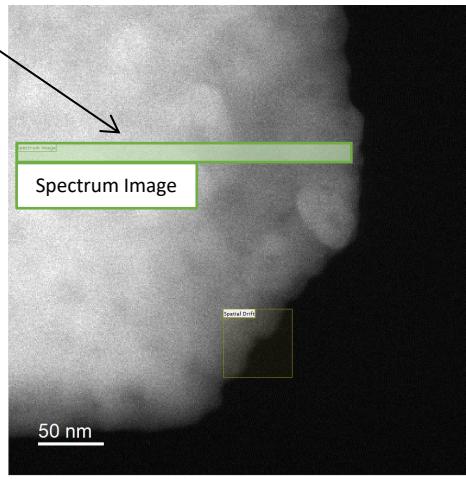
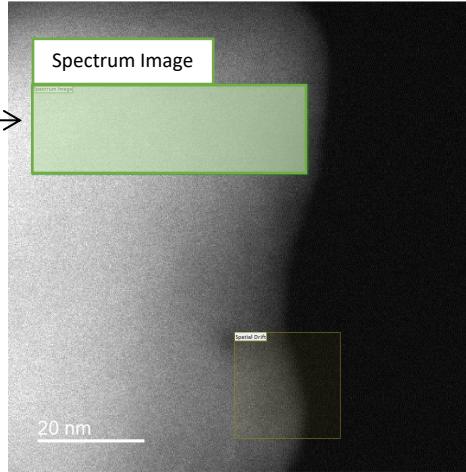
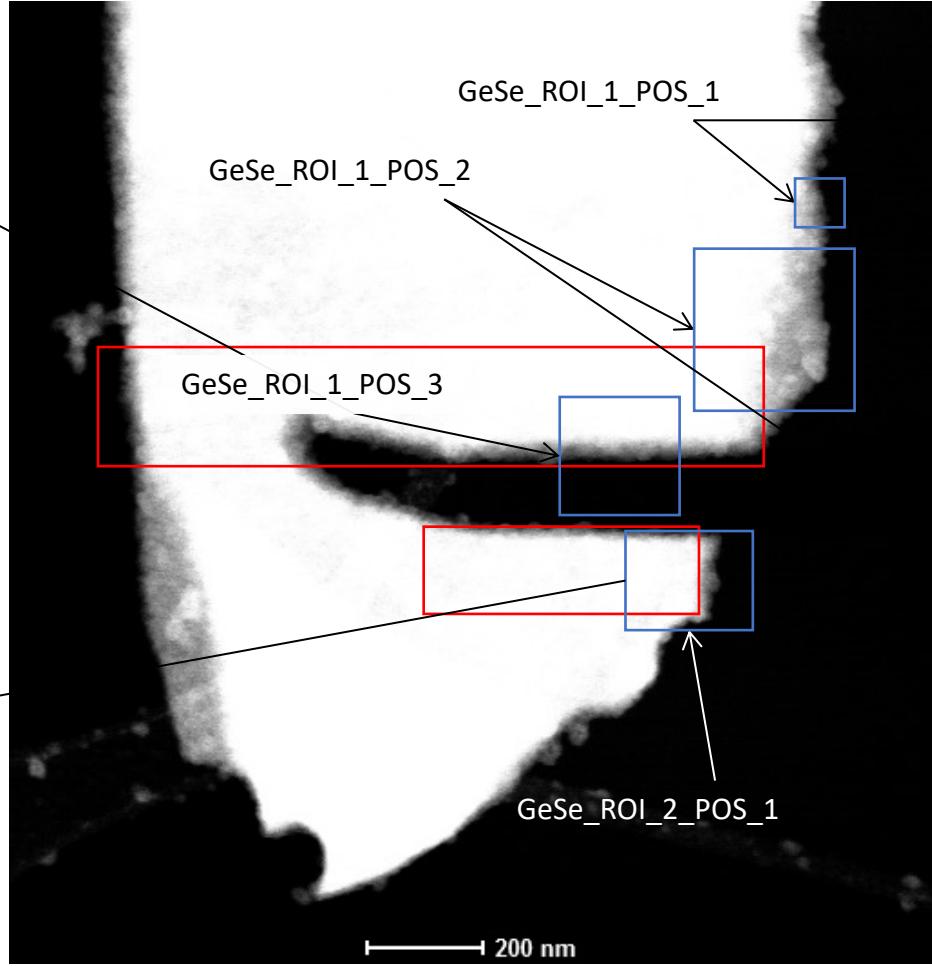
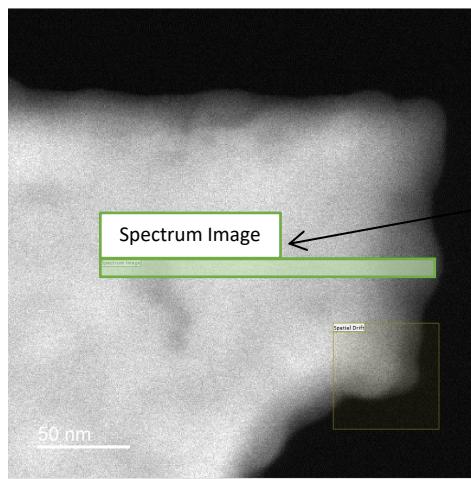
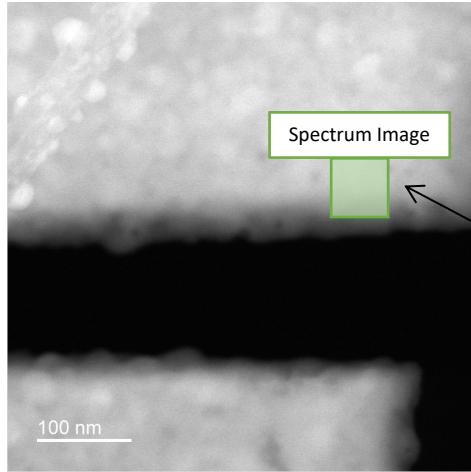


EDX-spectrum of GeSe_ROI_1

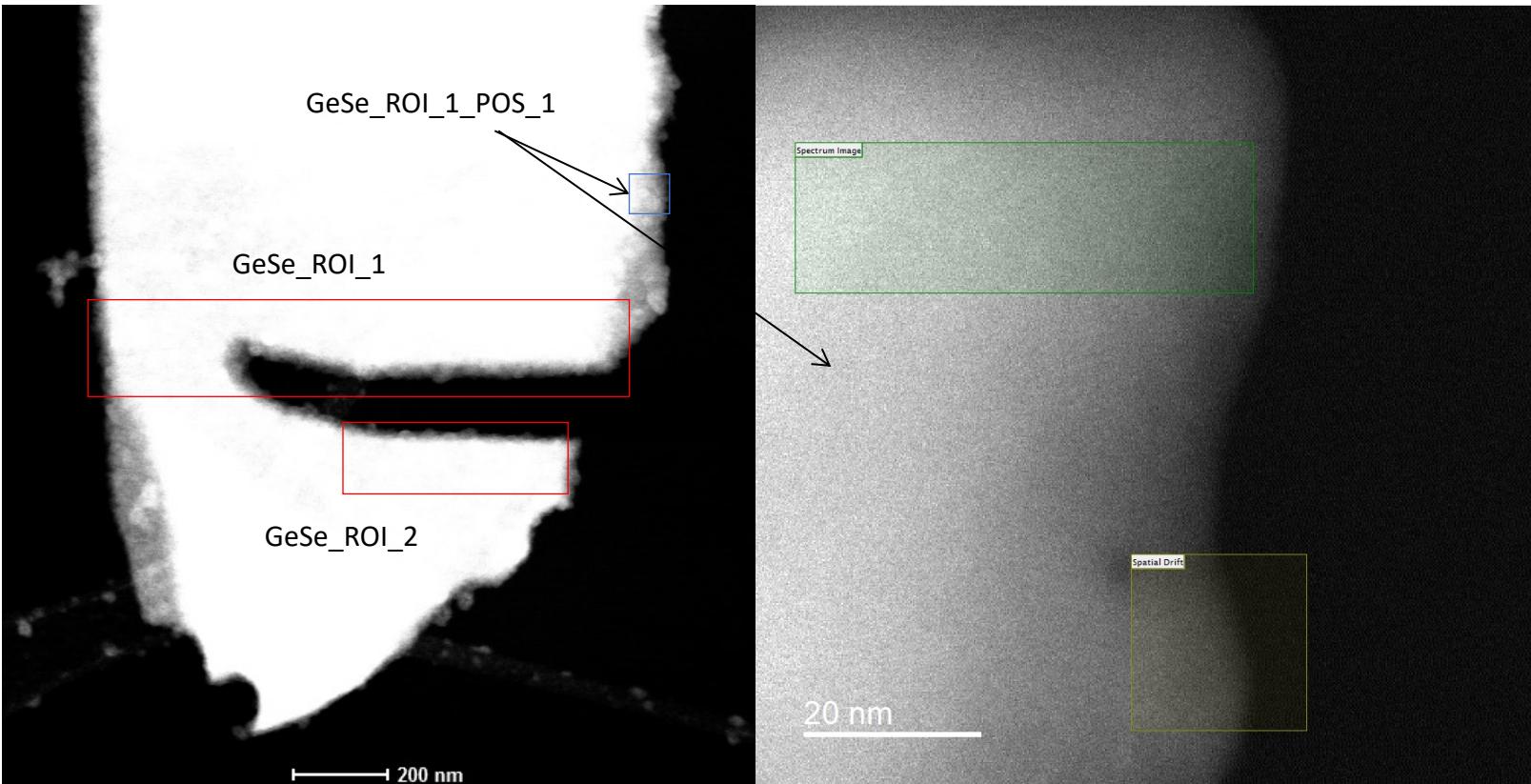


EDX-spectrum of GeSe_ROI_2



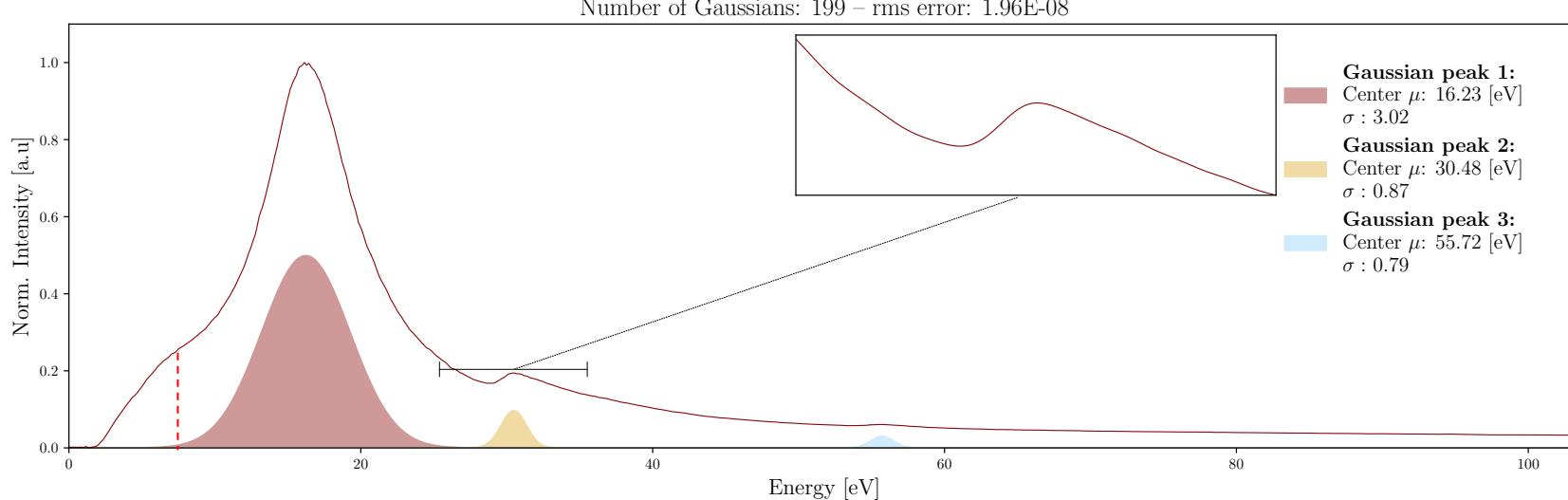
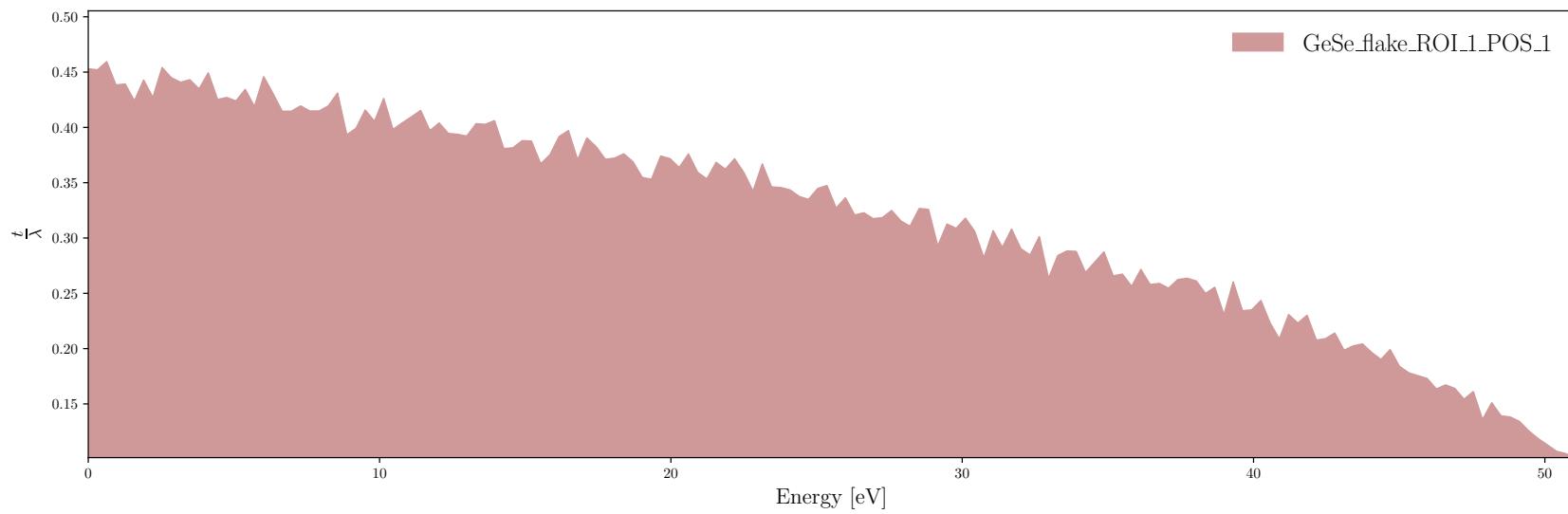
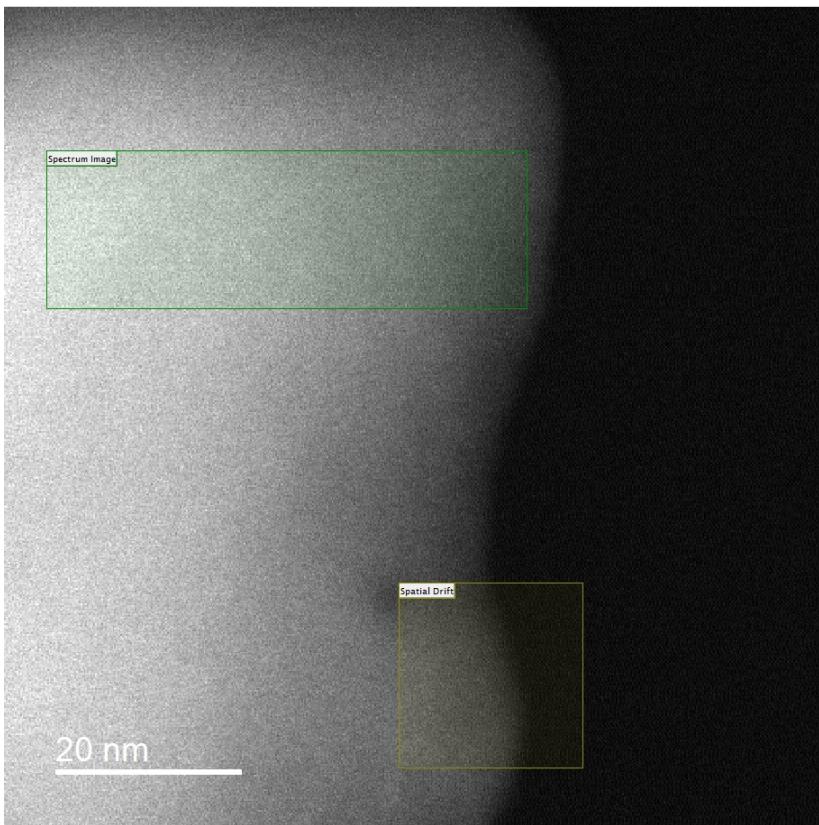


ADF – GeSe_ROI_1 POS_1

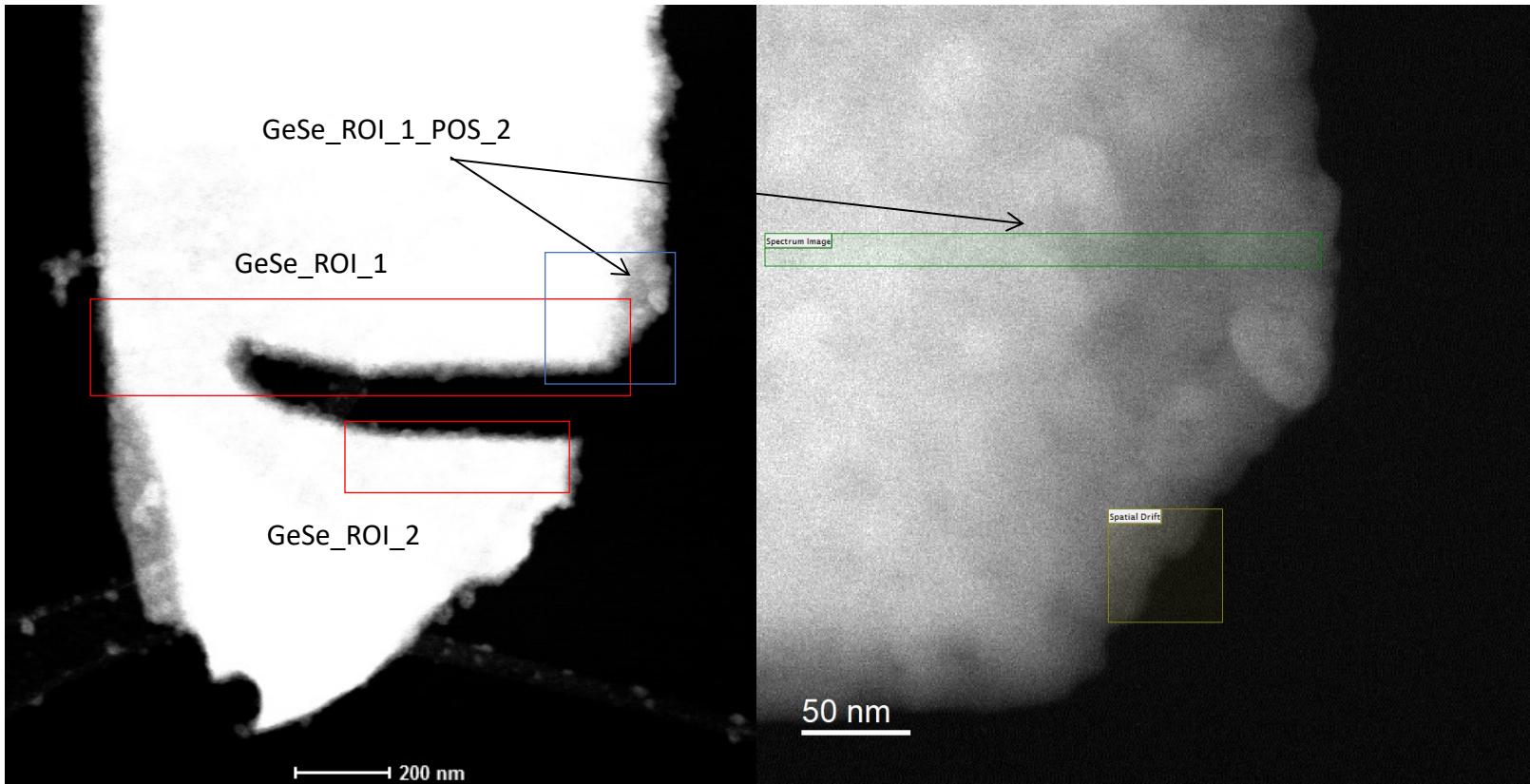


Thickness profile and Low-loss spectra – GeSe_ROI_1 POS_1

- Low-loss spectra collected from entire region
- Plot from real data
- Inset from estimated function
- Gaussian peaks estimated through peak-finding algorithm

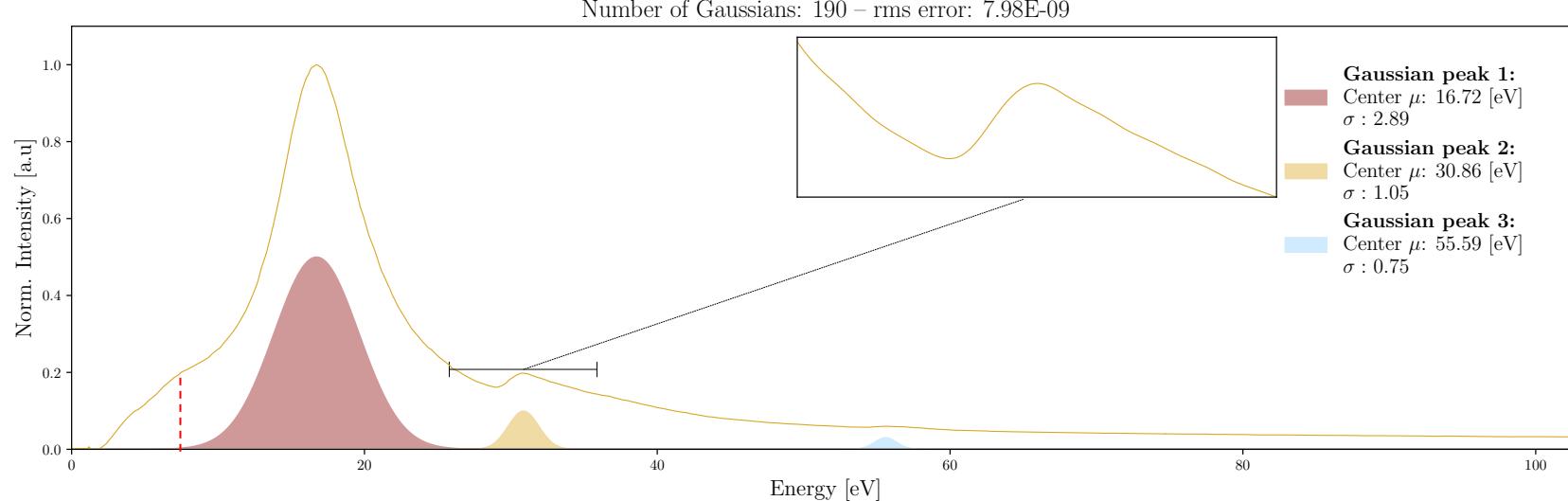
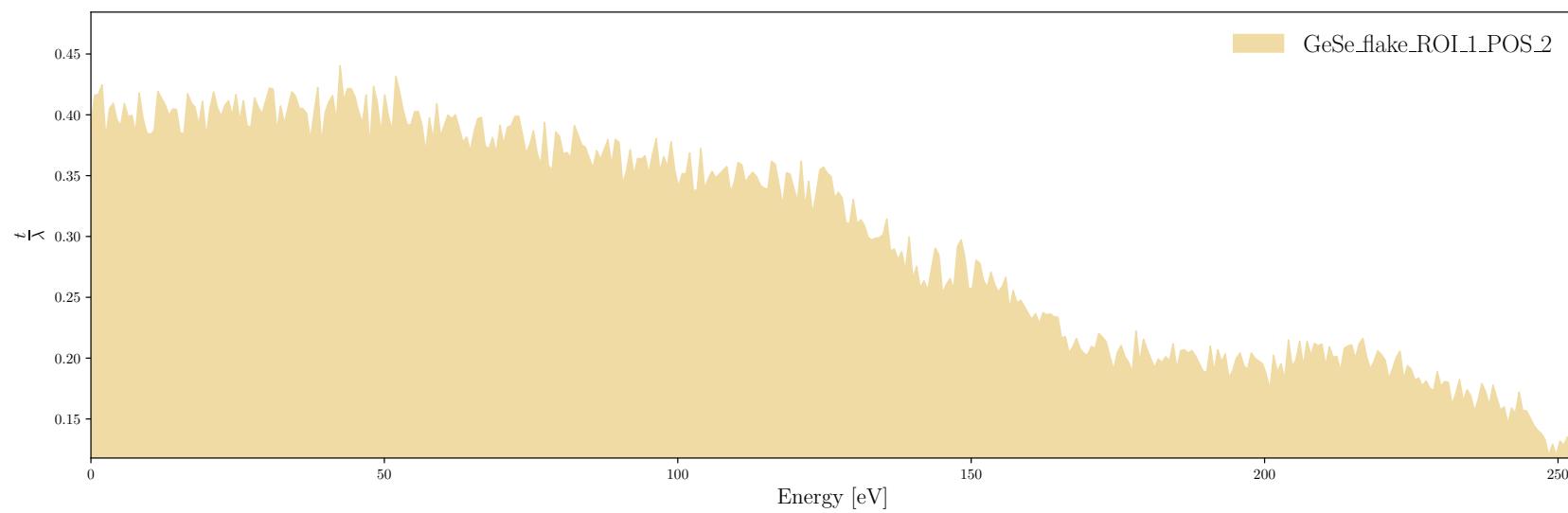
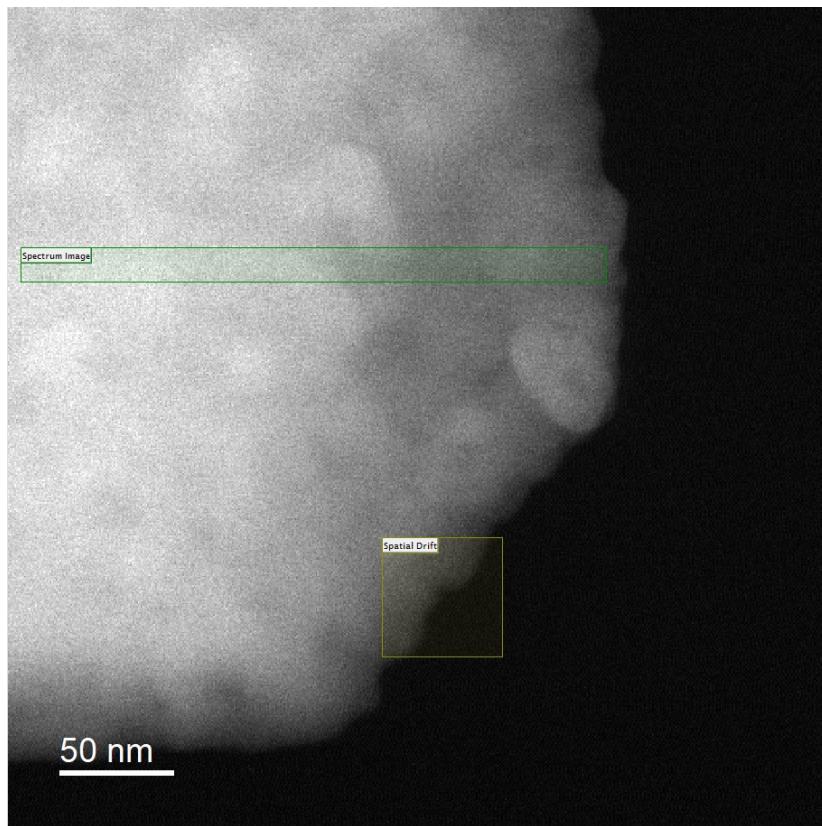


ADF – GeSe_ROI_1 POS_2

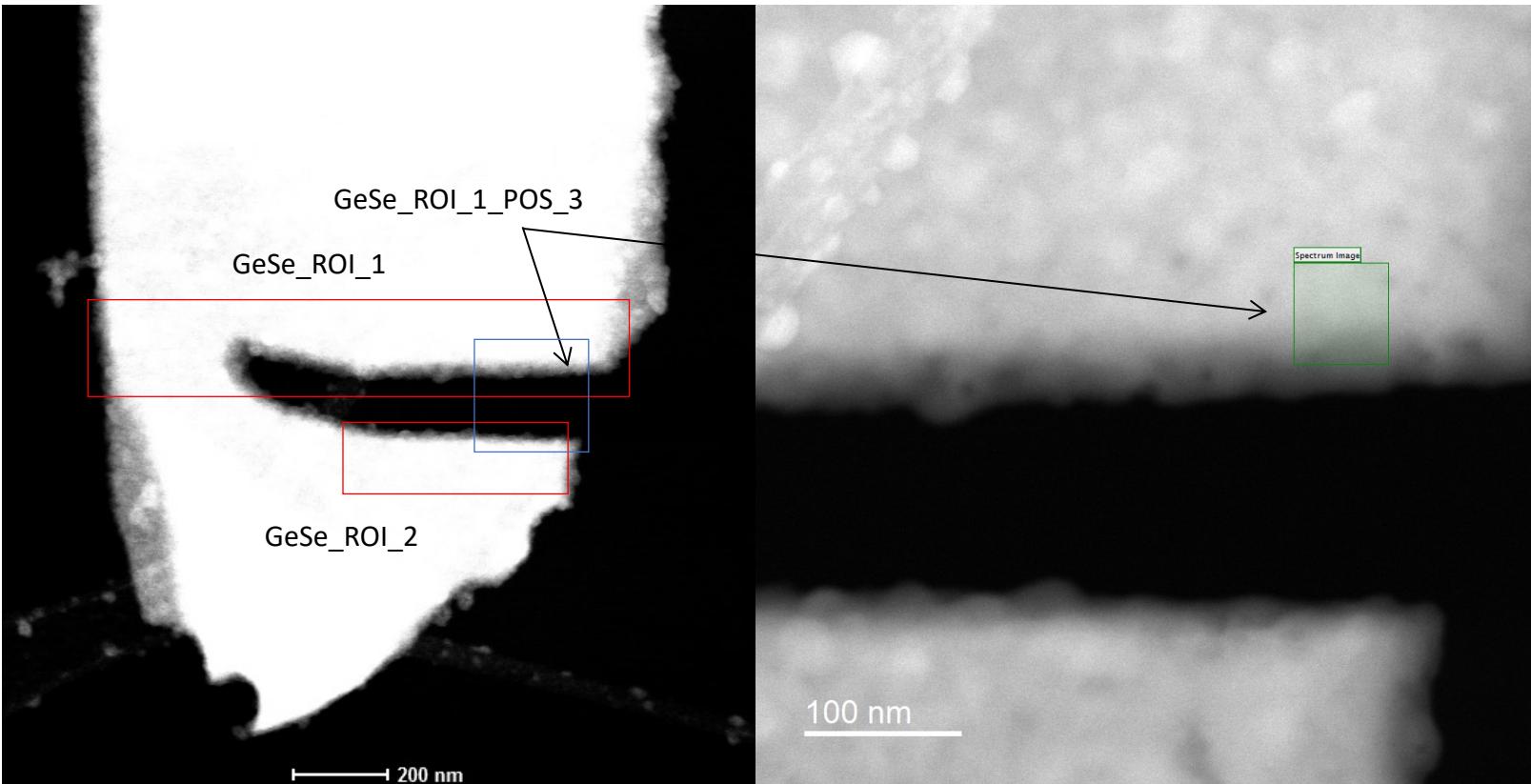


Thickness profile and Low-loss spectra – GeSe_ROI_1 POS_2

- Low-loss spectra collected from entire region
- Plot from real data
- Inset from estimated function
- Gaussian peaks estimated through peak-finding algorithm

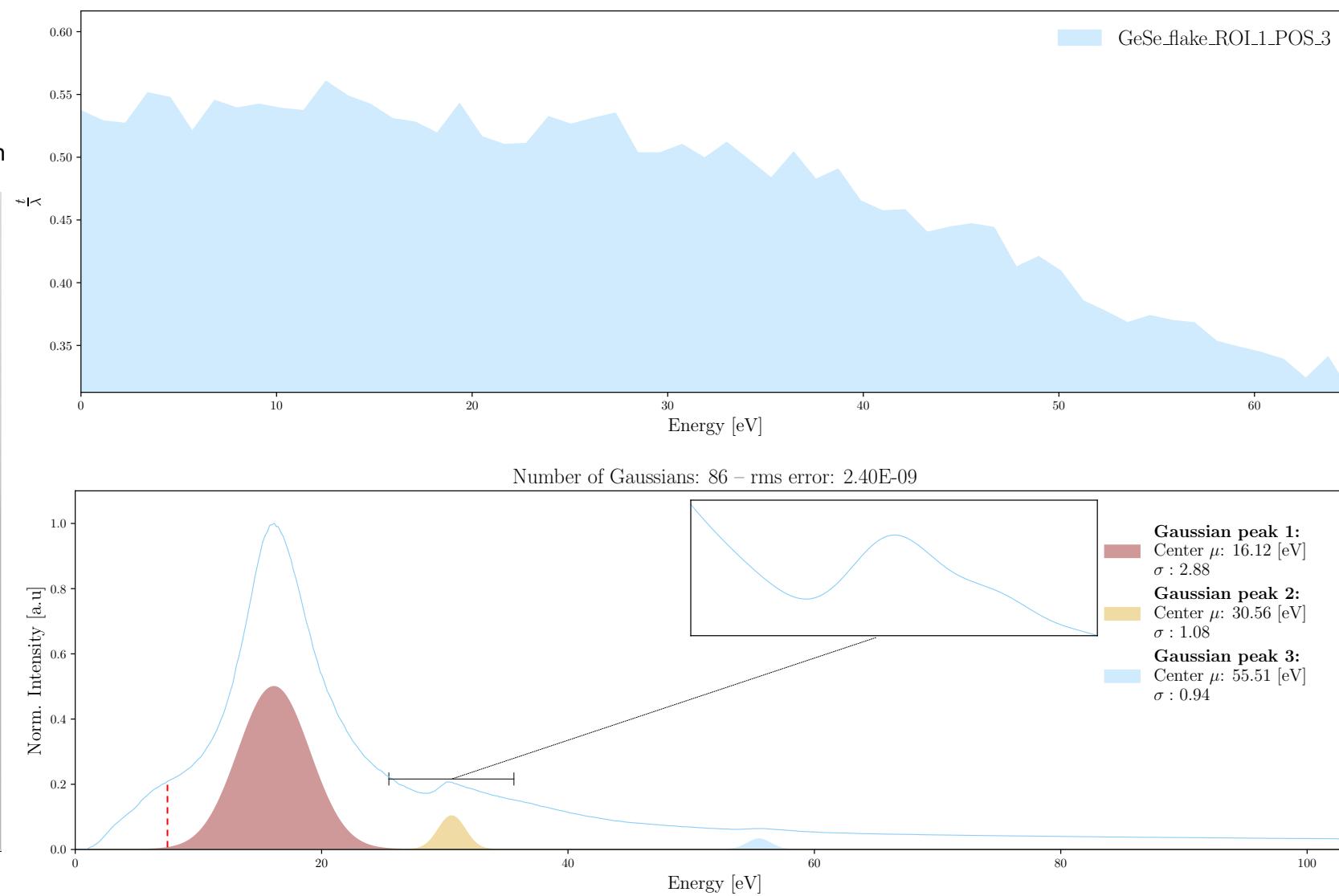
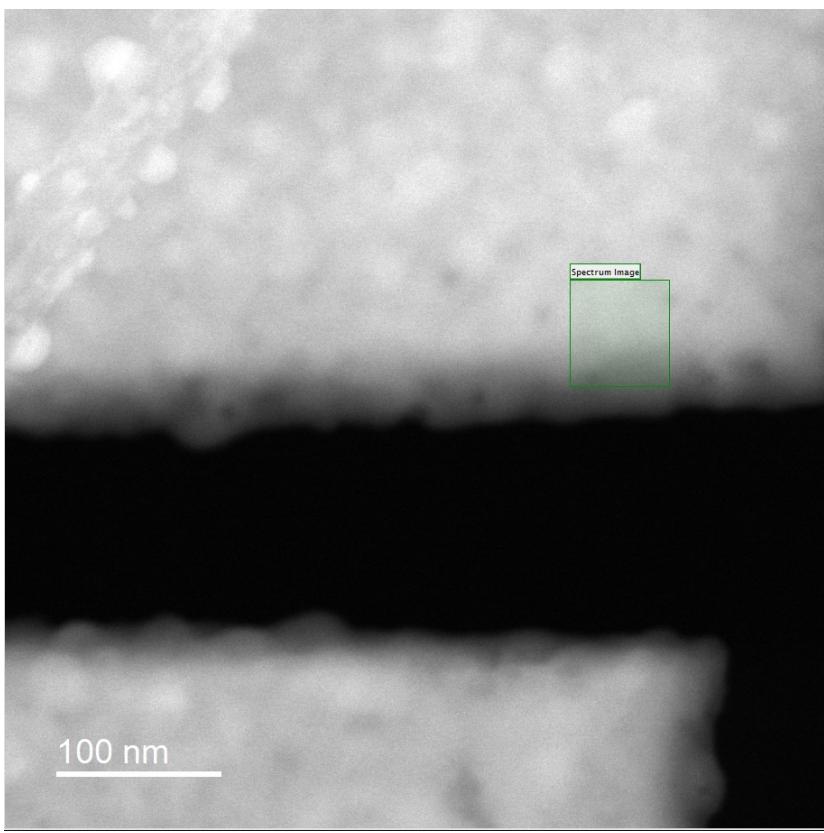


ADF – GeSe_ROI_1 POS_3

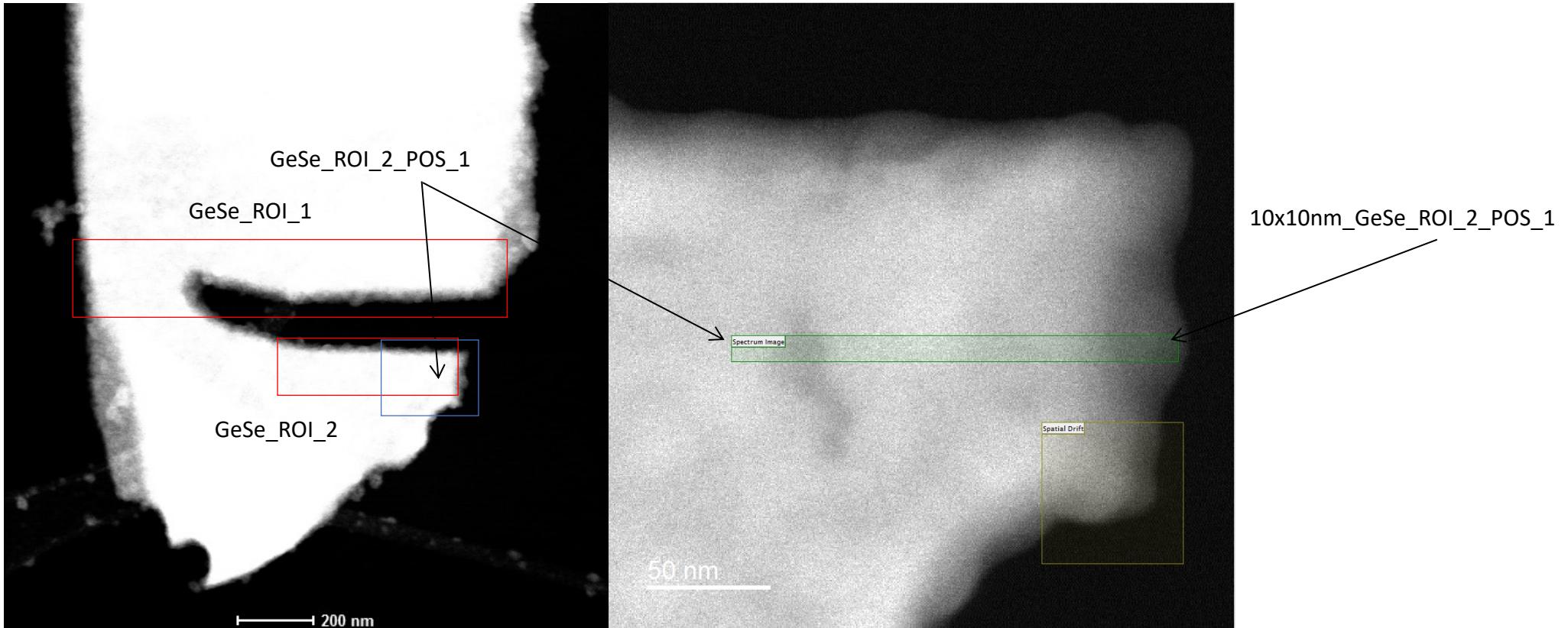


Thickness profile and Low-loss spectra – GeSe_ROI_1 POS_3

- High loss spectrum collected from entire region
- Plot from real data
- Inset from estimated function
- Gaussian peaks estimated through peak-finding algorithm

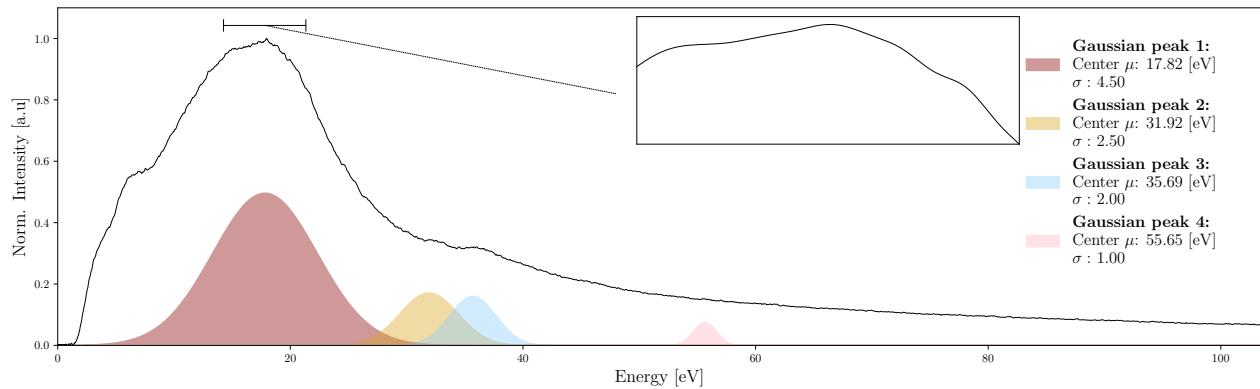
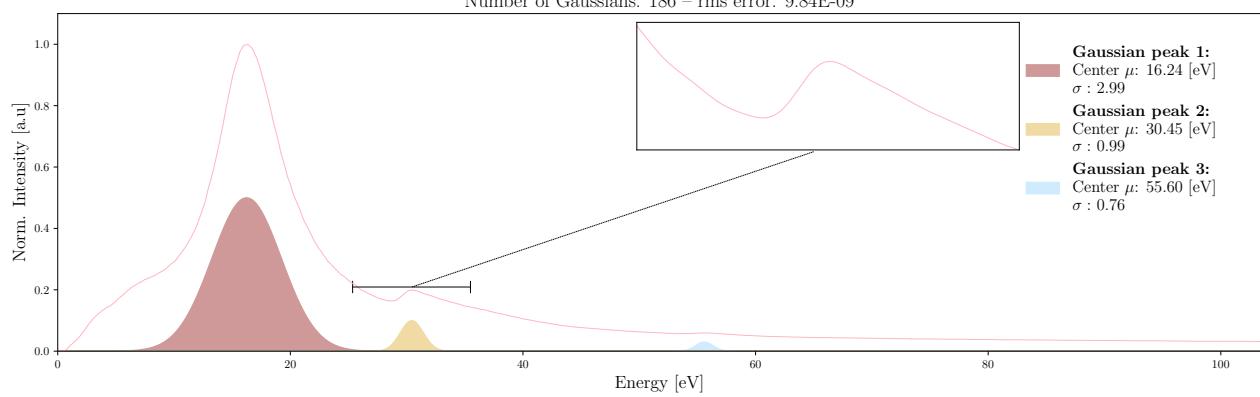
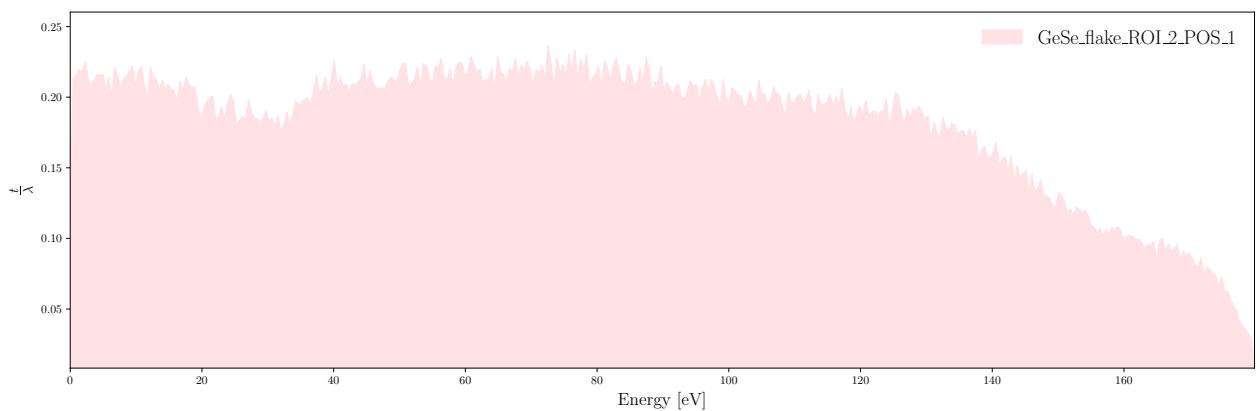
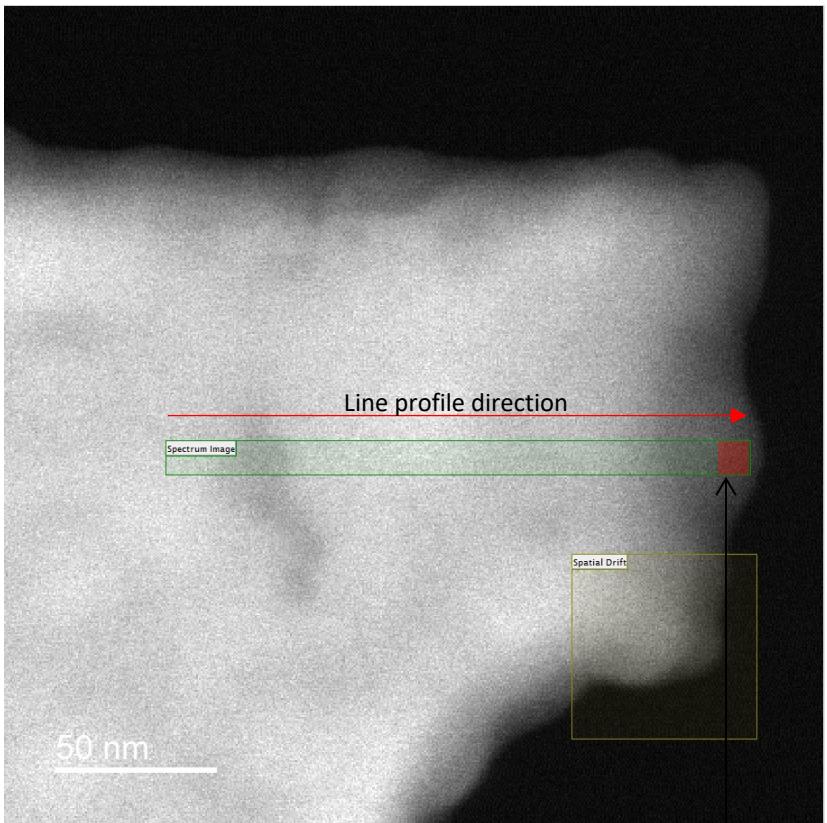


ADF – GeSe_ROI_2 POS_1



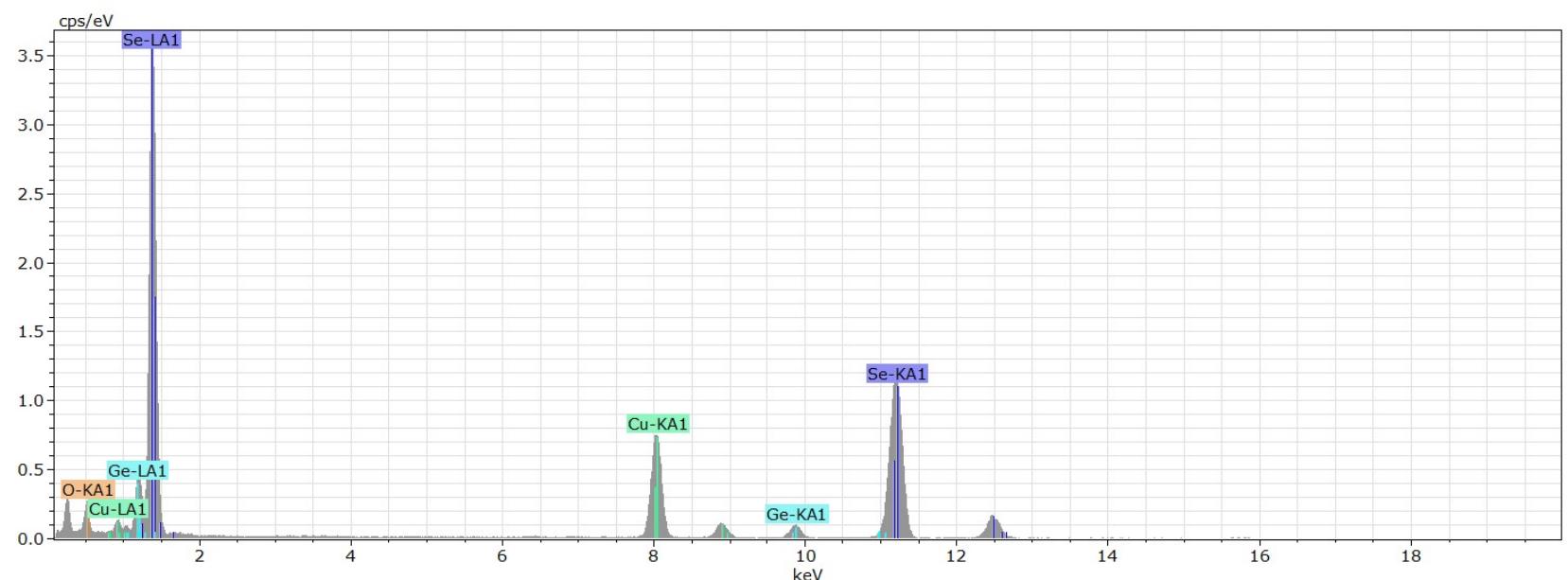
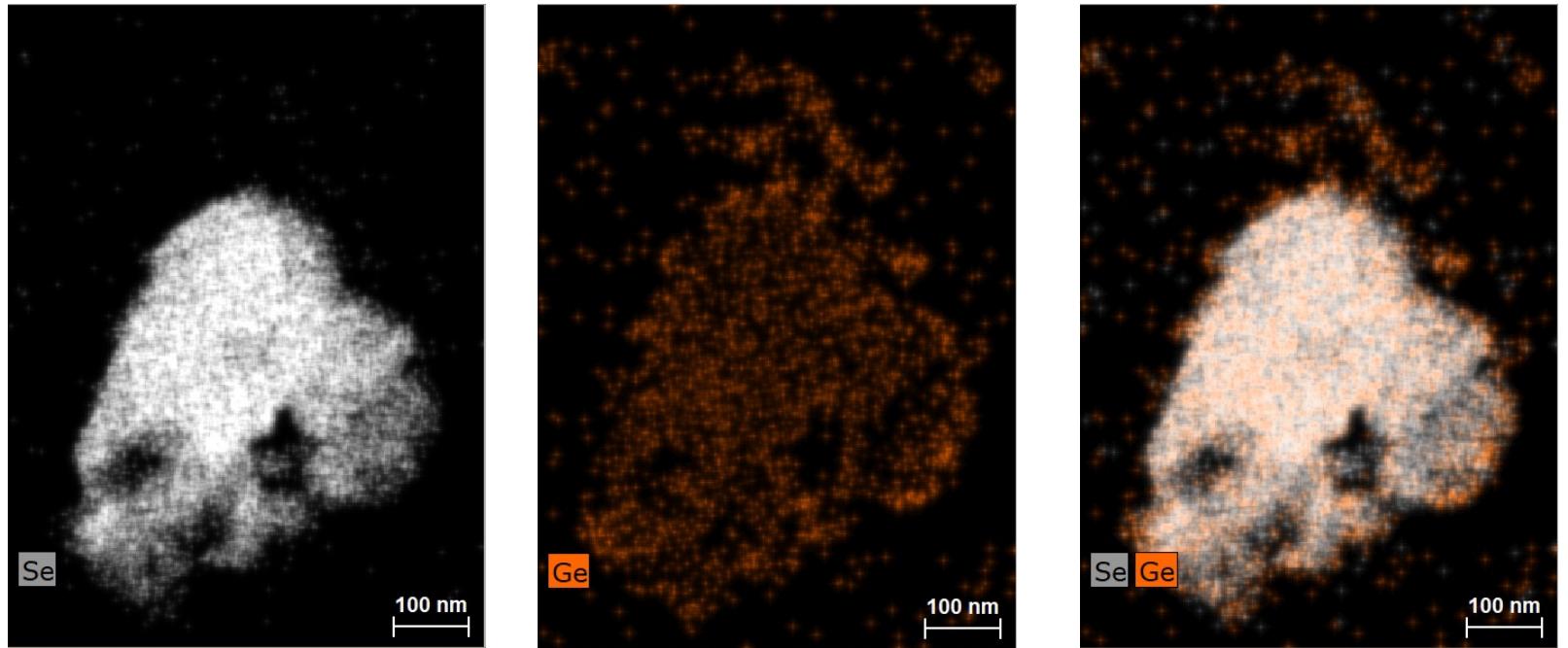
Thickness profile and Low-loss spectra – GeSe_ROI_2 POS_1

- Low-loss spectra collected from entire region
- Plot from real data
- Inset from estimated function
- Gaussian peaks estimated through peak-finding algorithm

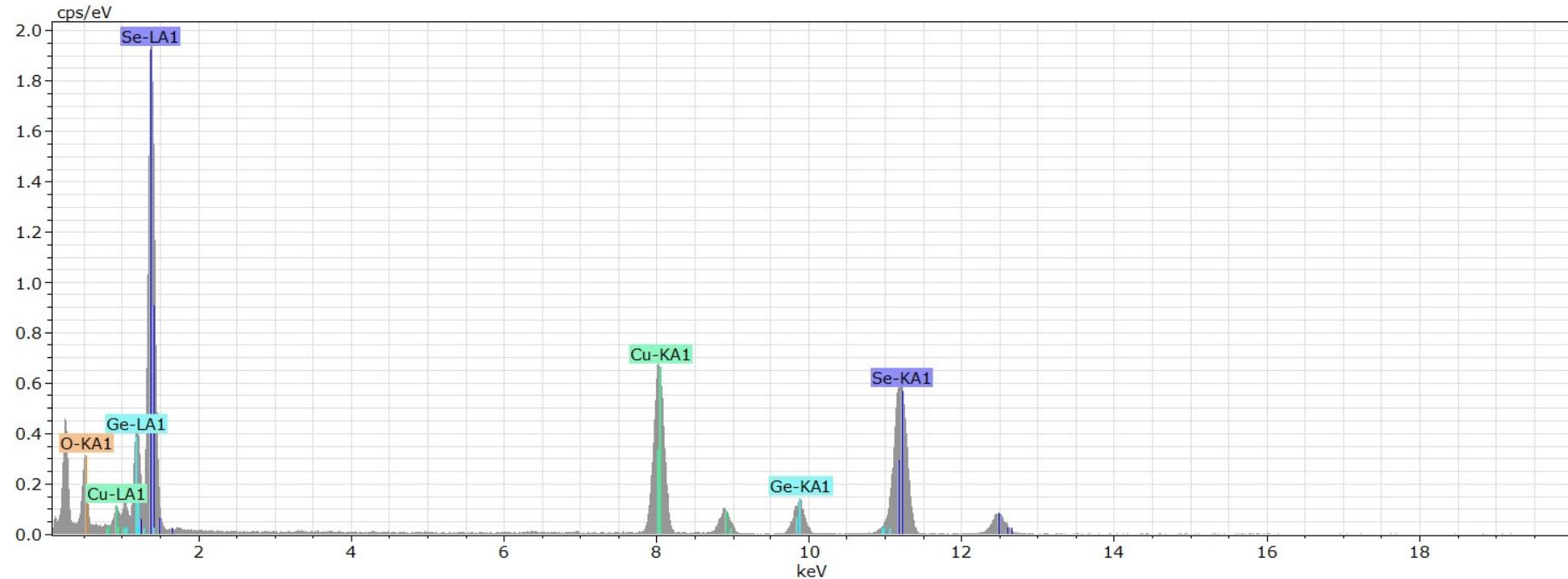
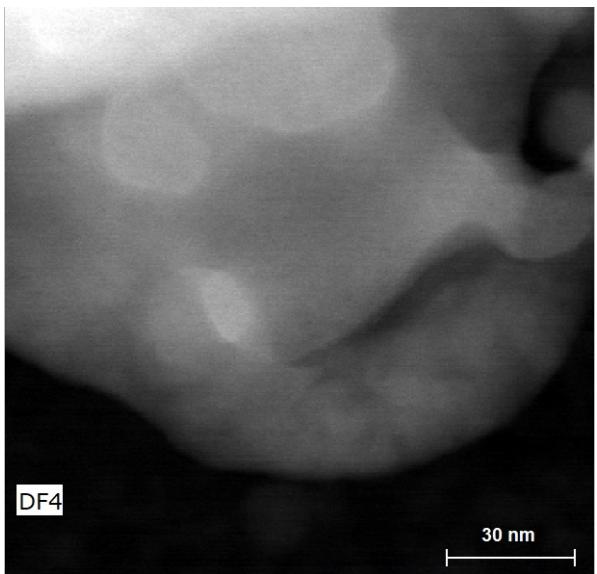
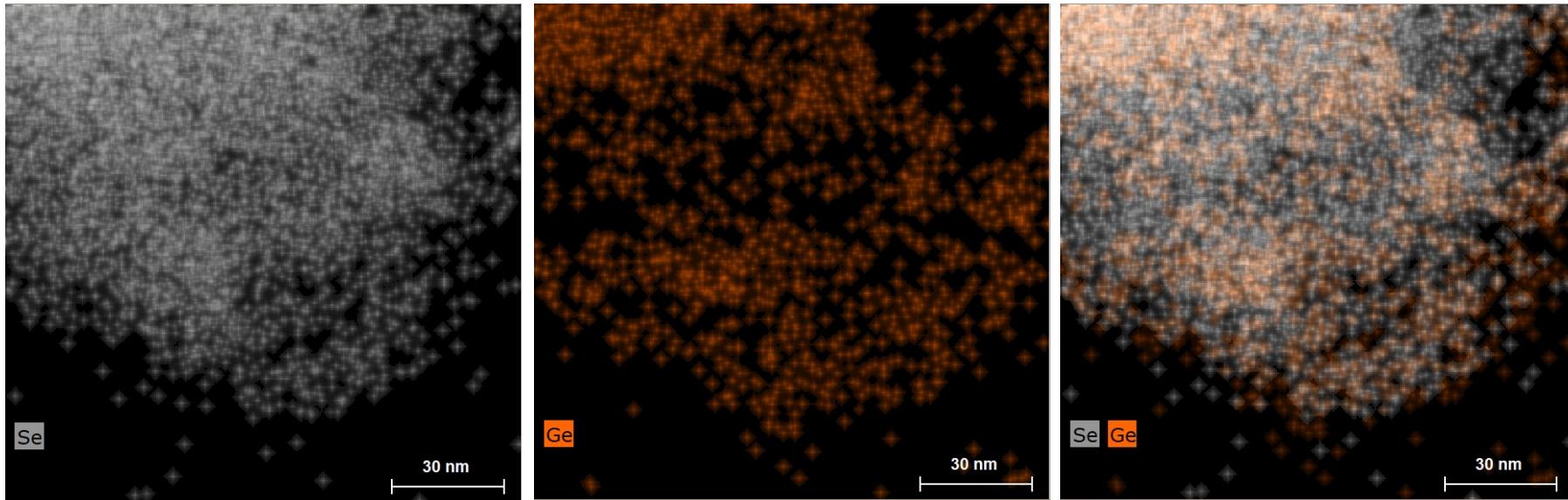


Se-rich phases (Random morphology)

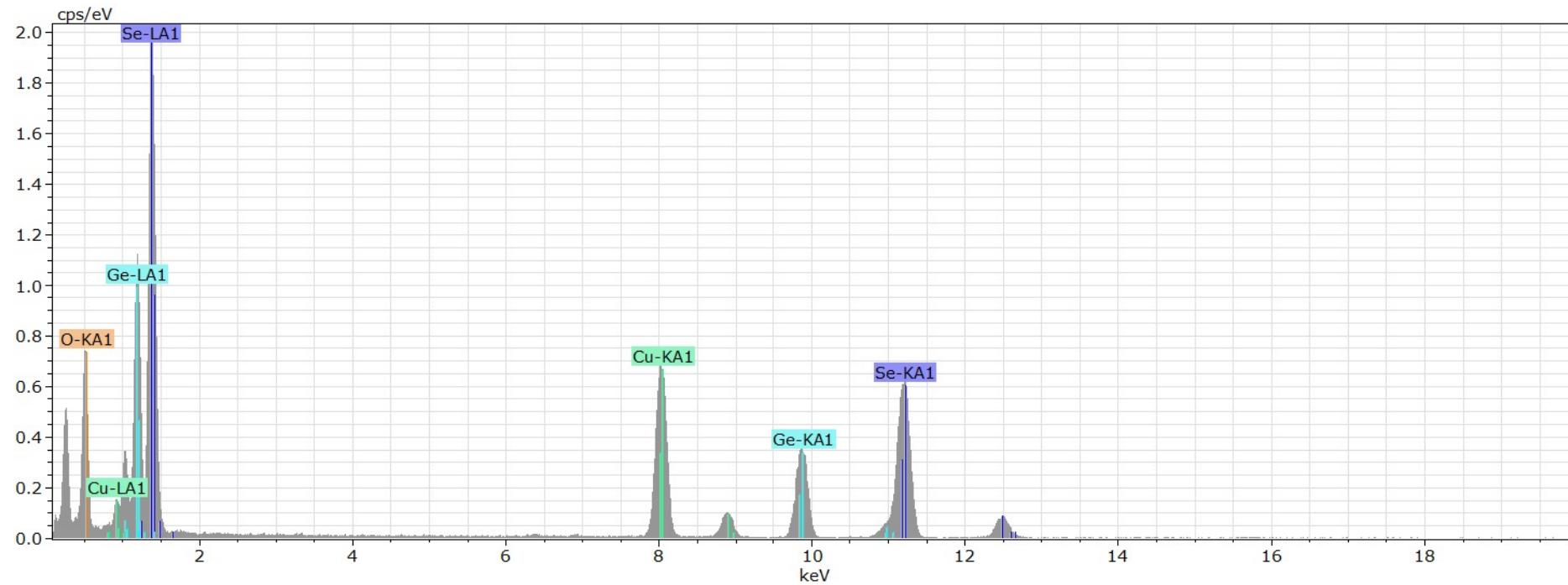
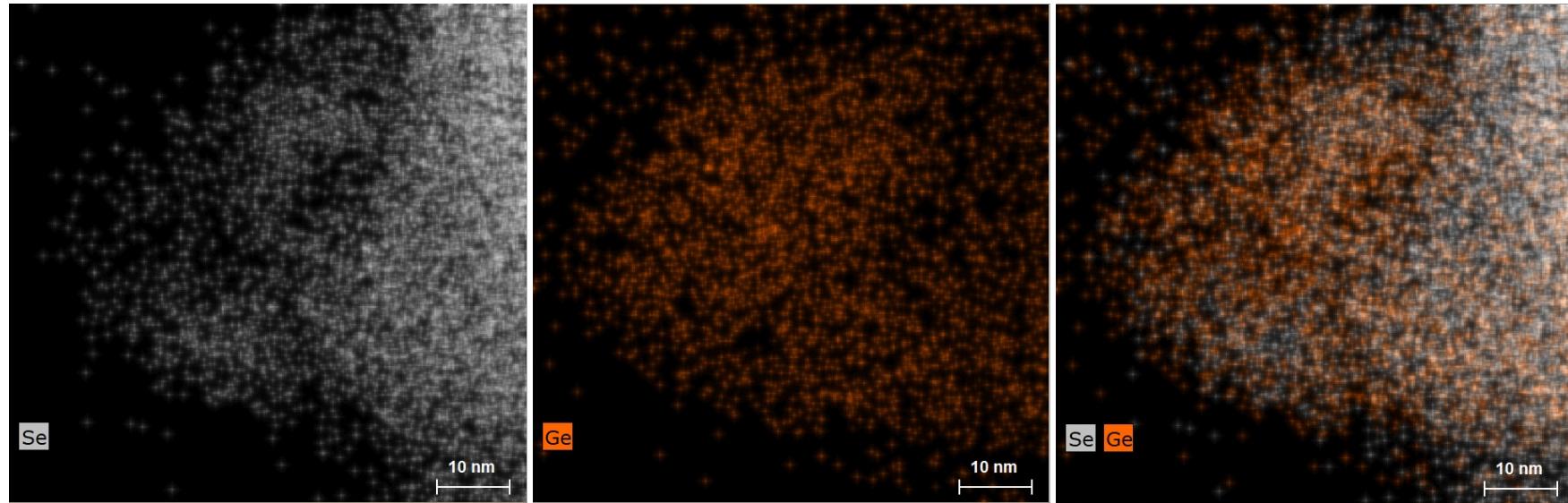
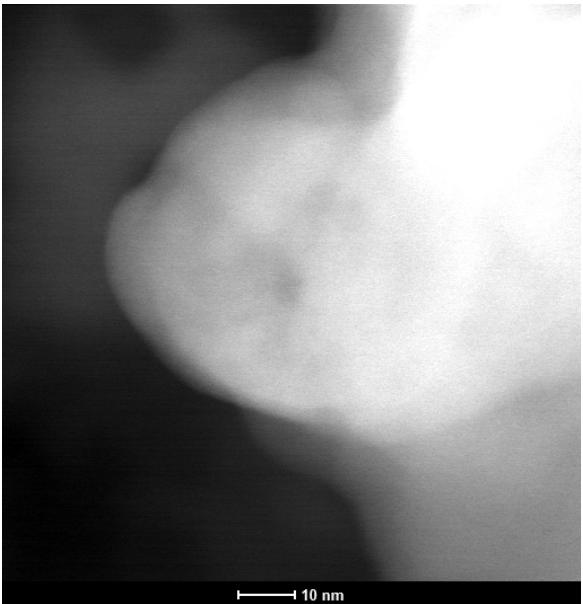
EDX map & spectrum of Se-rich phases

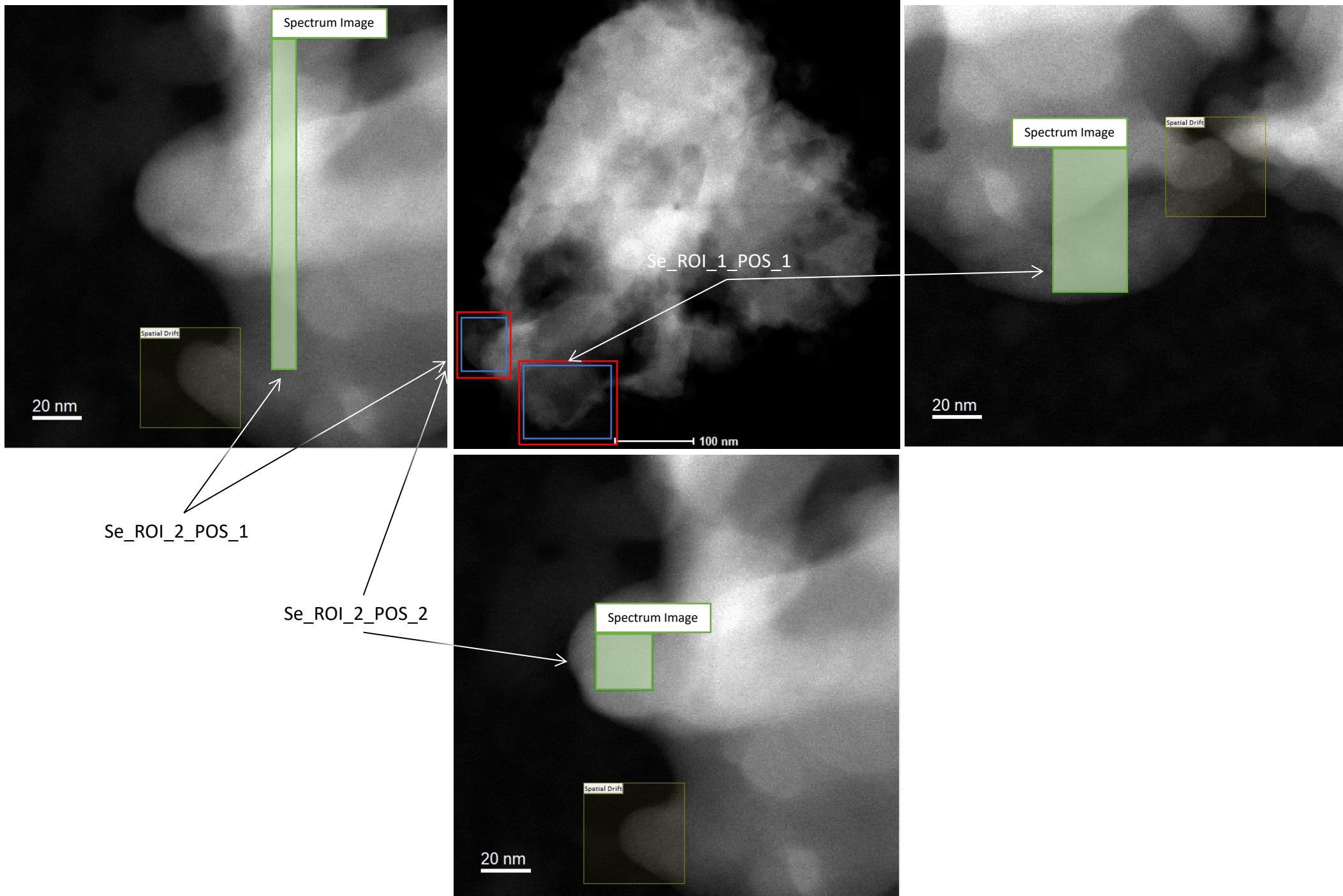


EDX map & spectrum of Se_ROI_1

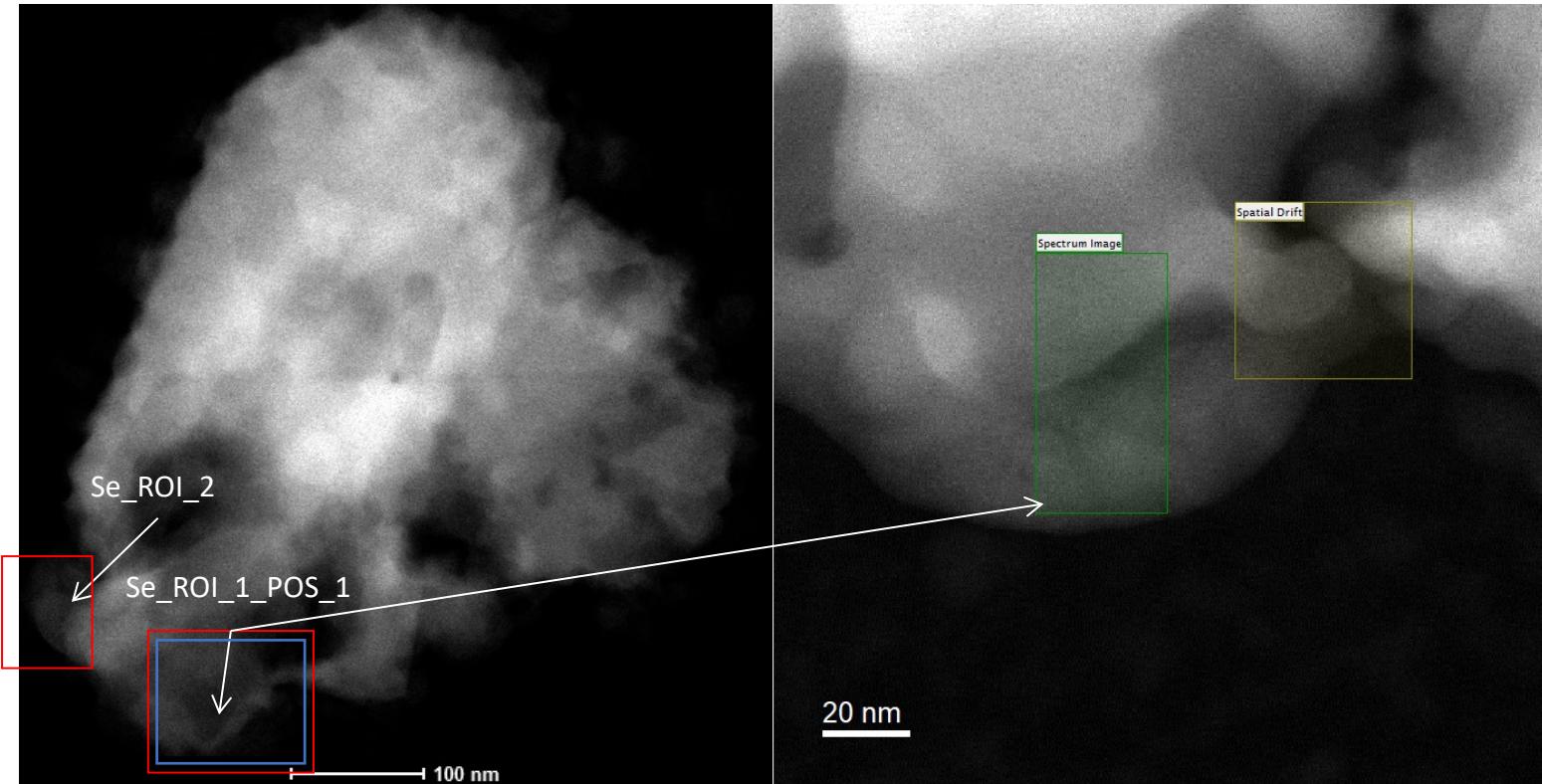


EDX map & spectrum of Se_ROI_2

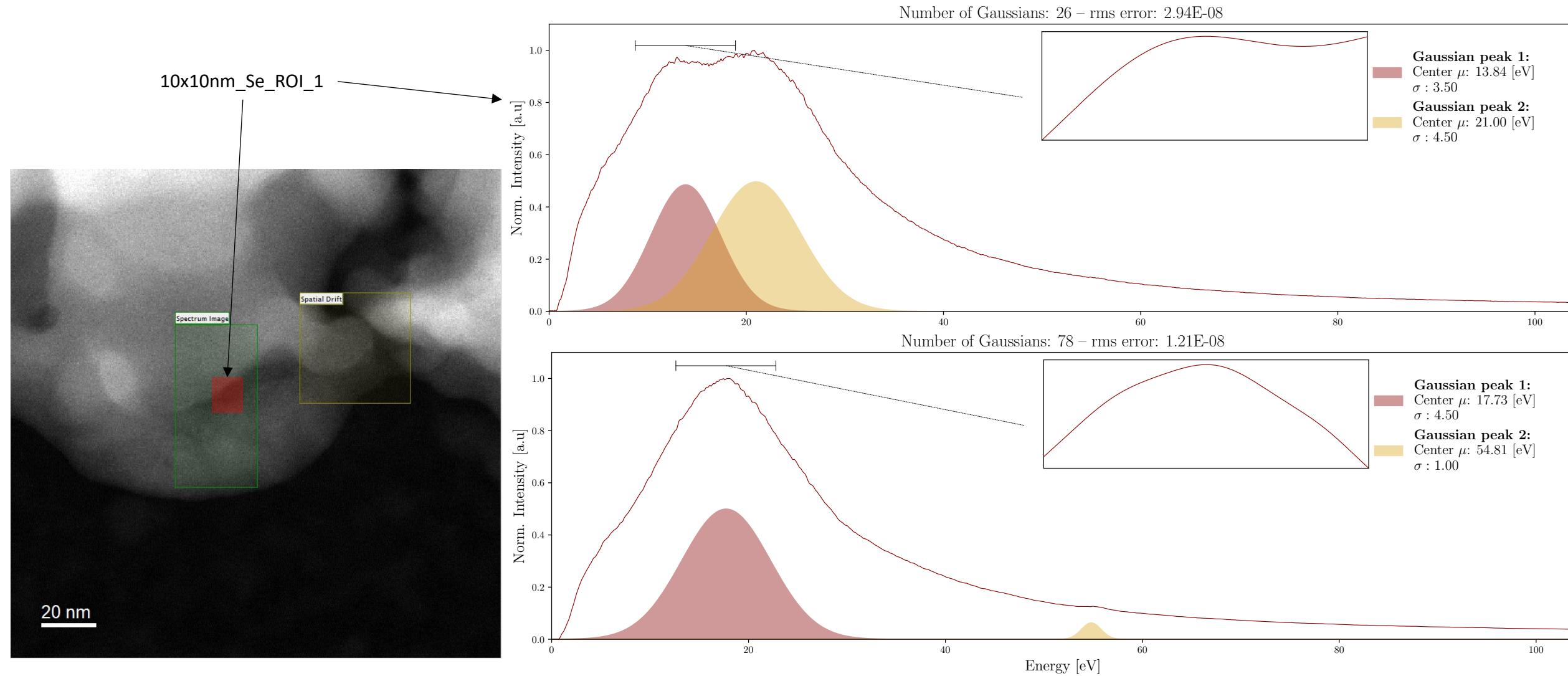




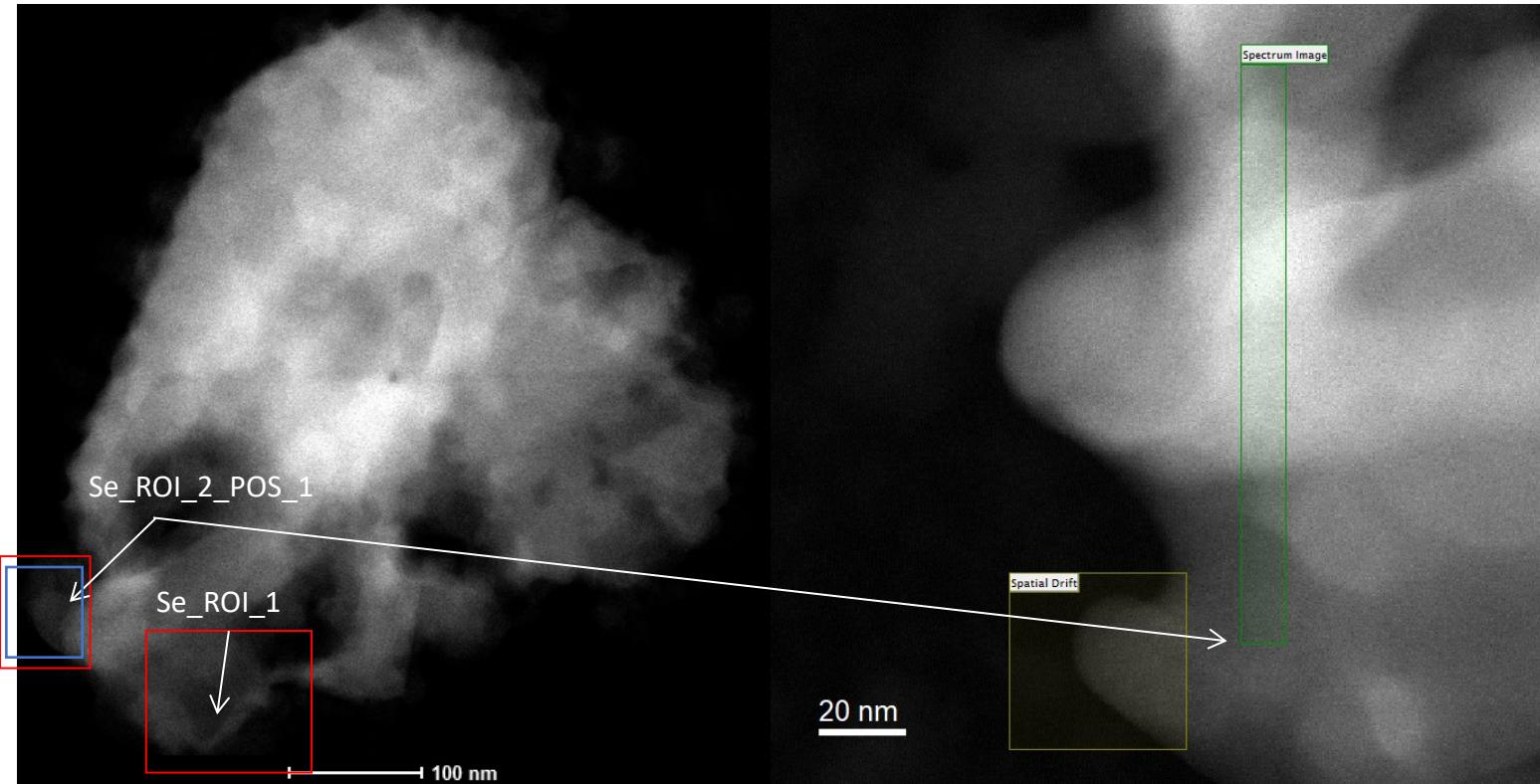
ADF – Se_ROI_1



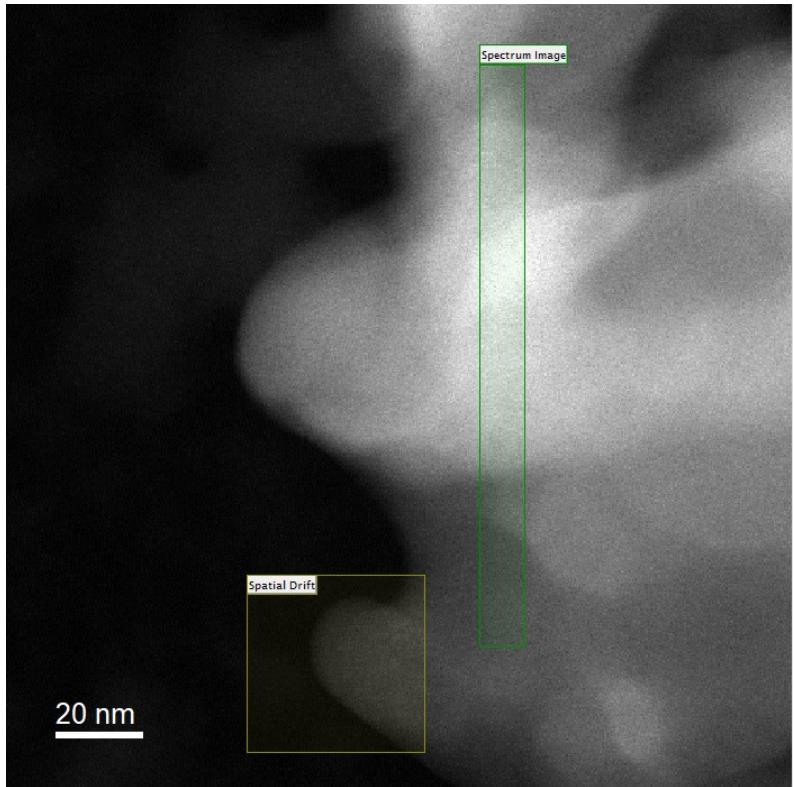
High loss spectrum – Se_ROI_1



ADF – Se_ROI_2 POS_1

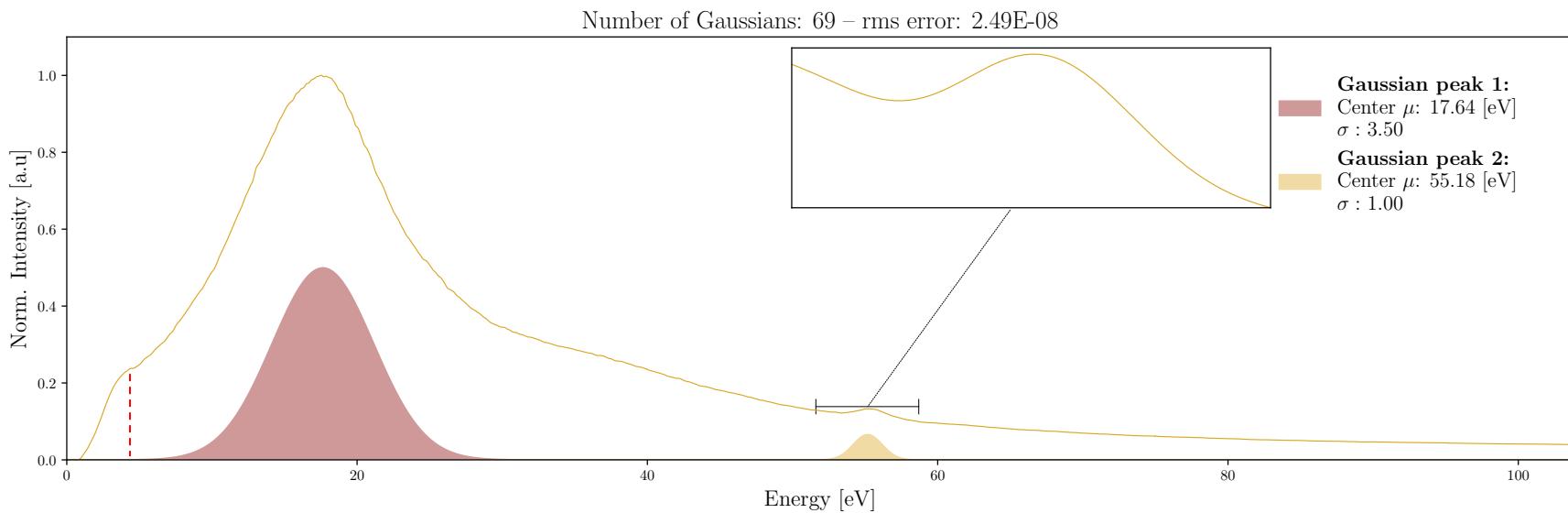


Low-loss spectra – Se_ROI_2_POS_1

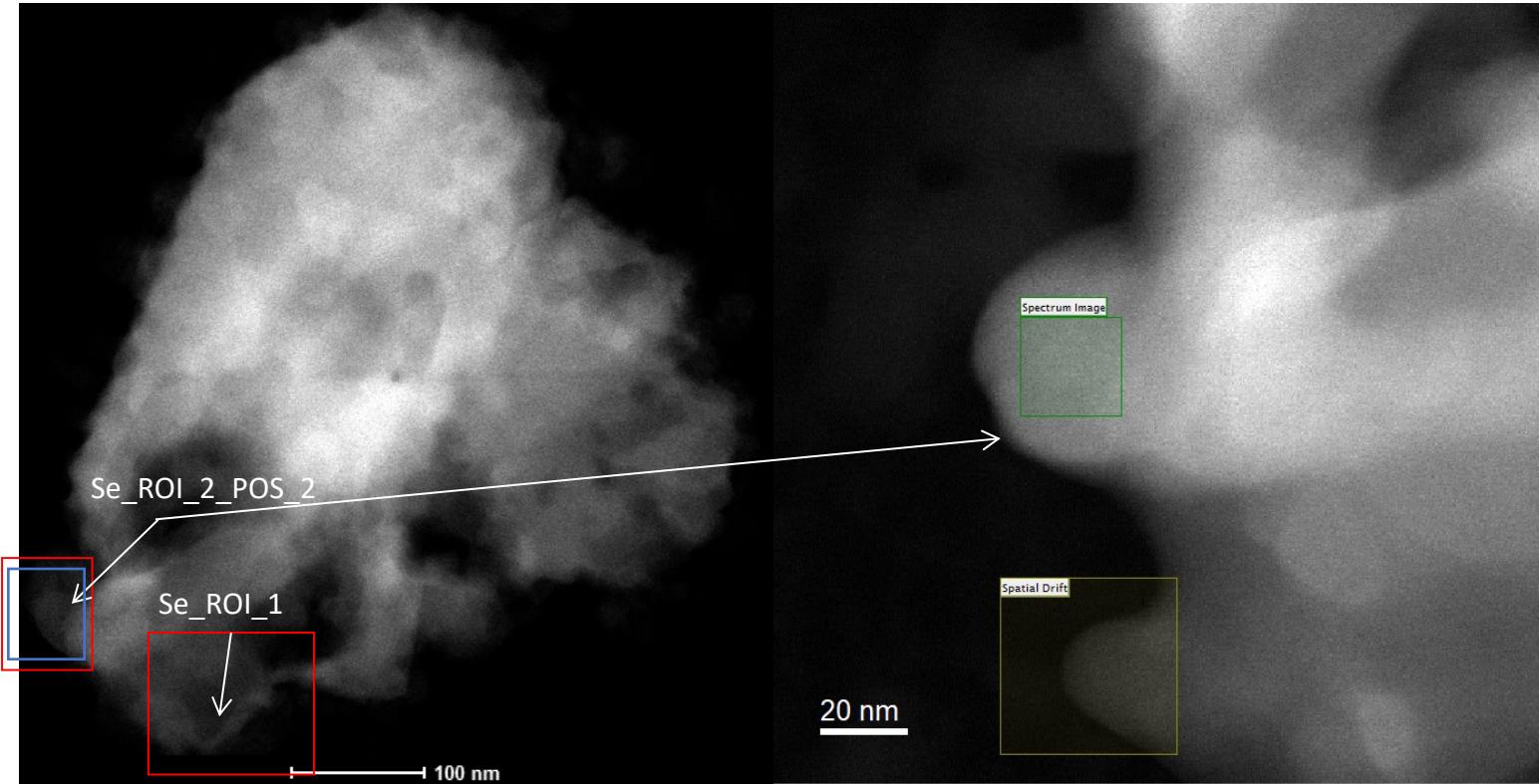


Main peak features:

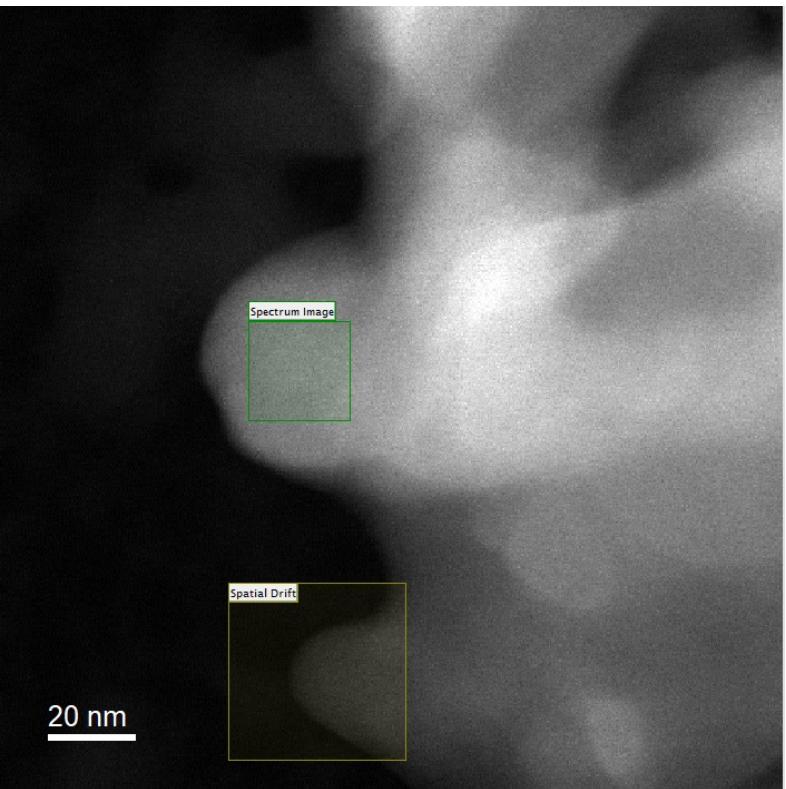
- Gaussian peak 1 (Plasmon peak):
 - Centered at 17.59eV
- Gaussian peak 2:
 - Centered at 55.28eV



ADF – GeSe_Accumulation_ROI_2_POS_2

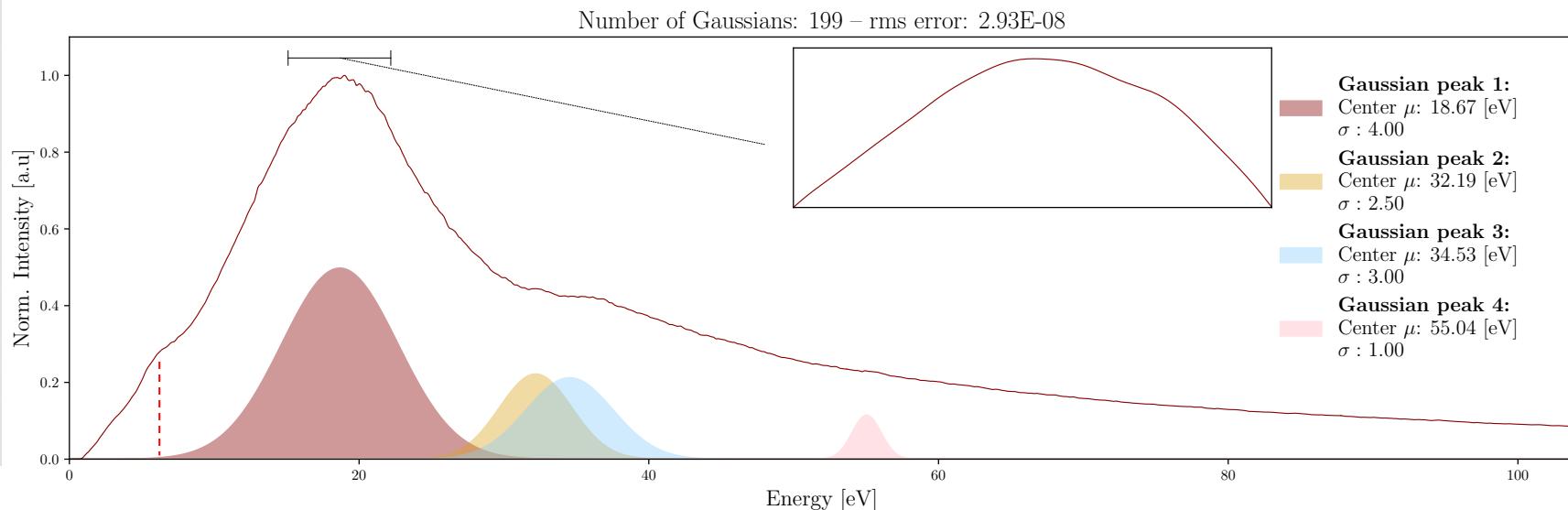


Low-loss spectra – Se_ROI_2_POS_2

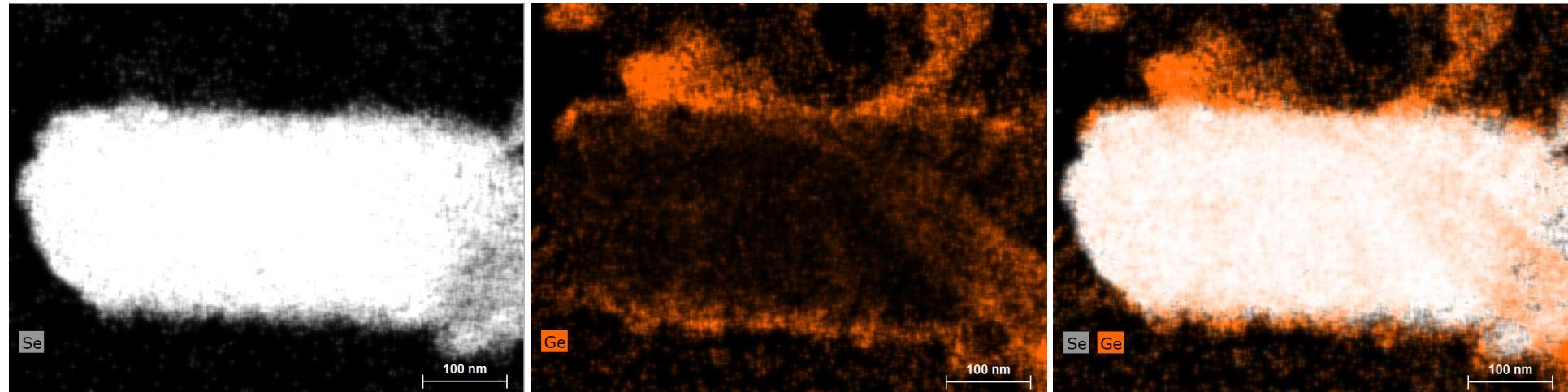


Main peak features:

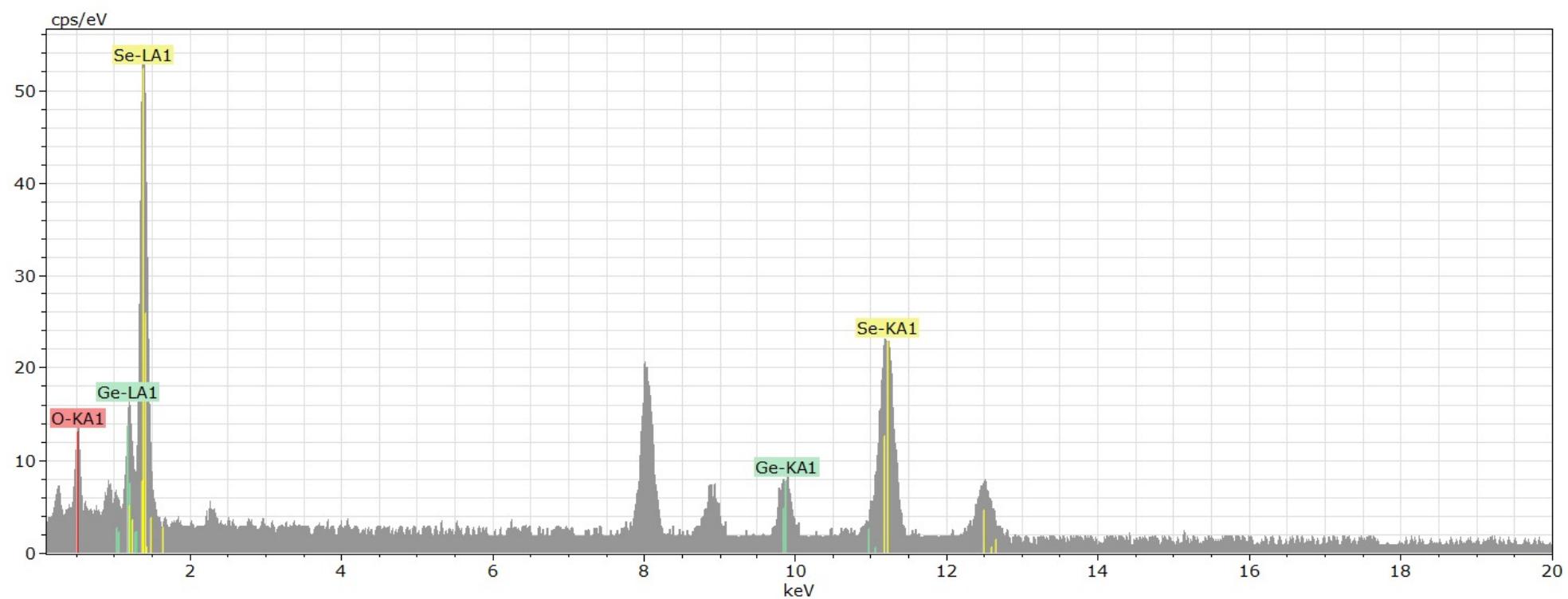
- Gaussian peak 1 (Plasmon peak):
 - Centered at 18.67eV
- Gaussian peak 3:
 - Centered at 34.53eV
- Gaussian peak 2:
 - Centered at 32.19eV
- Gaussian peak 4:
 - Centered at 55.04eV

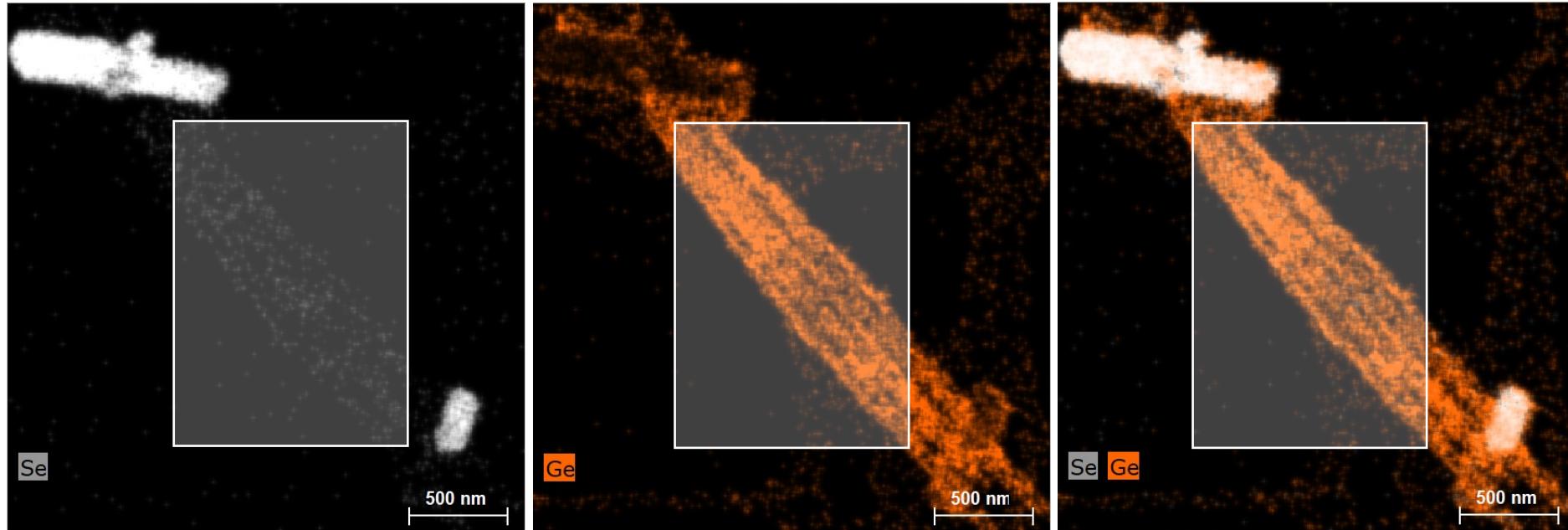


Ge-rich phases (Needle-like morphology)

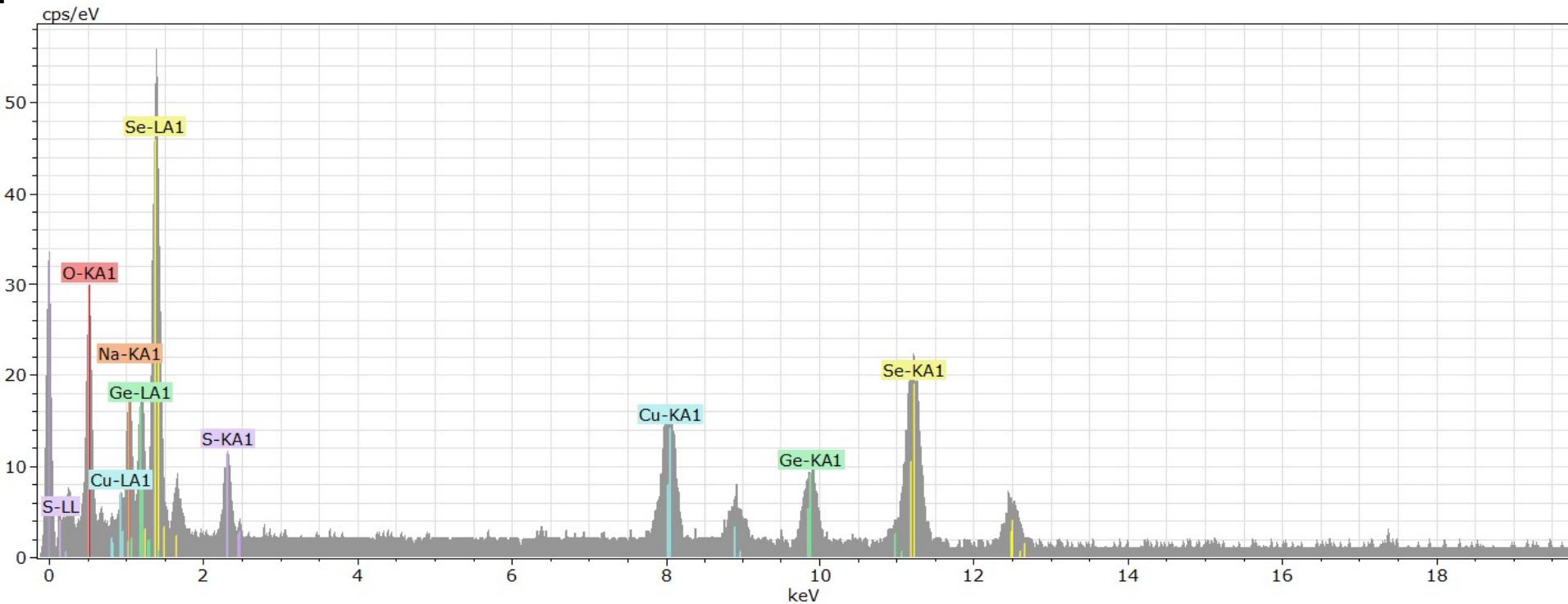


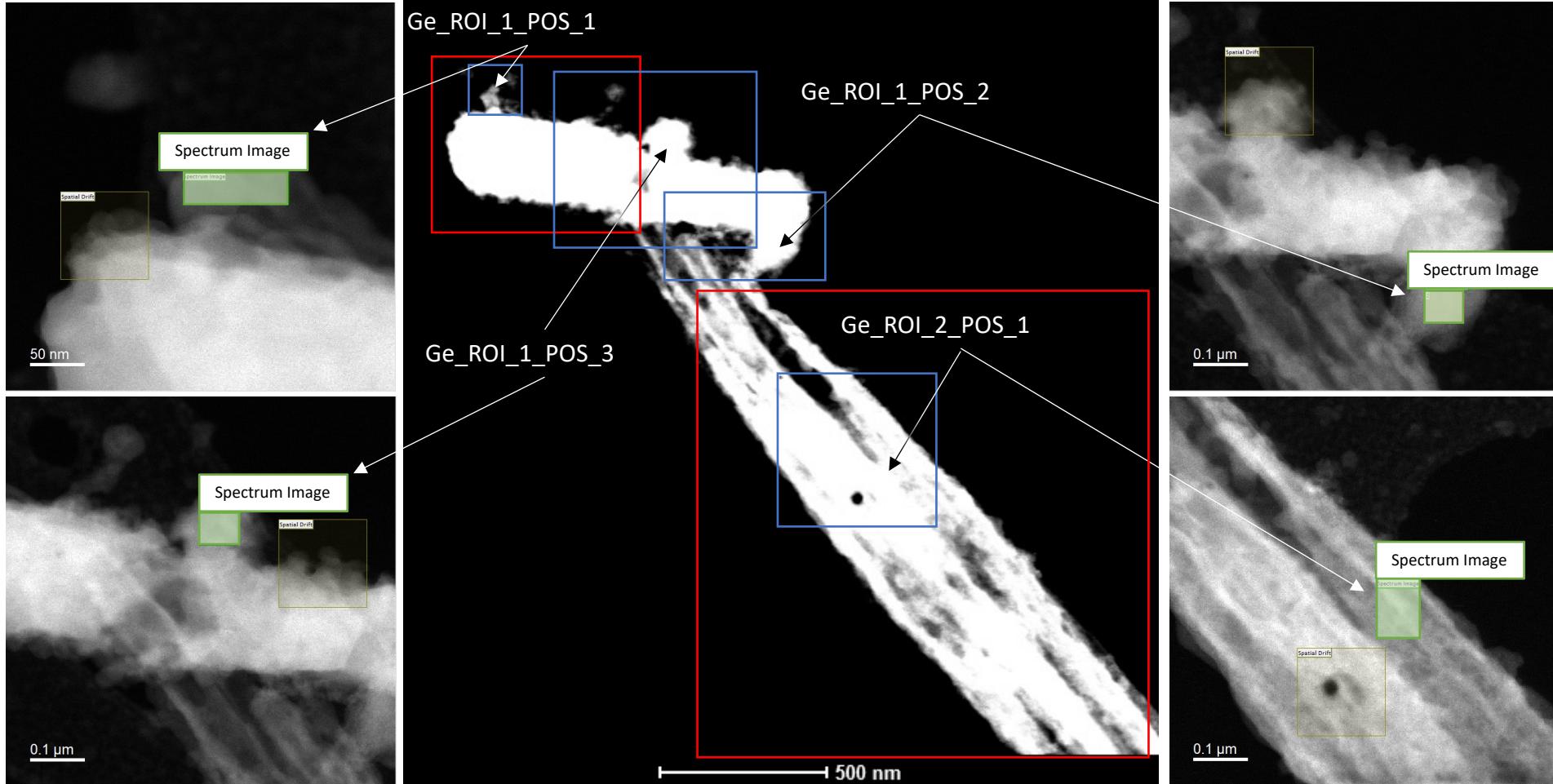
EDX map & spectrum
of Ge_ROI_1



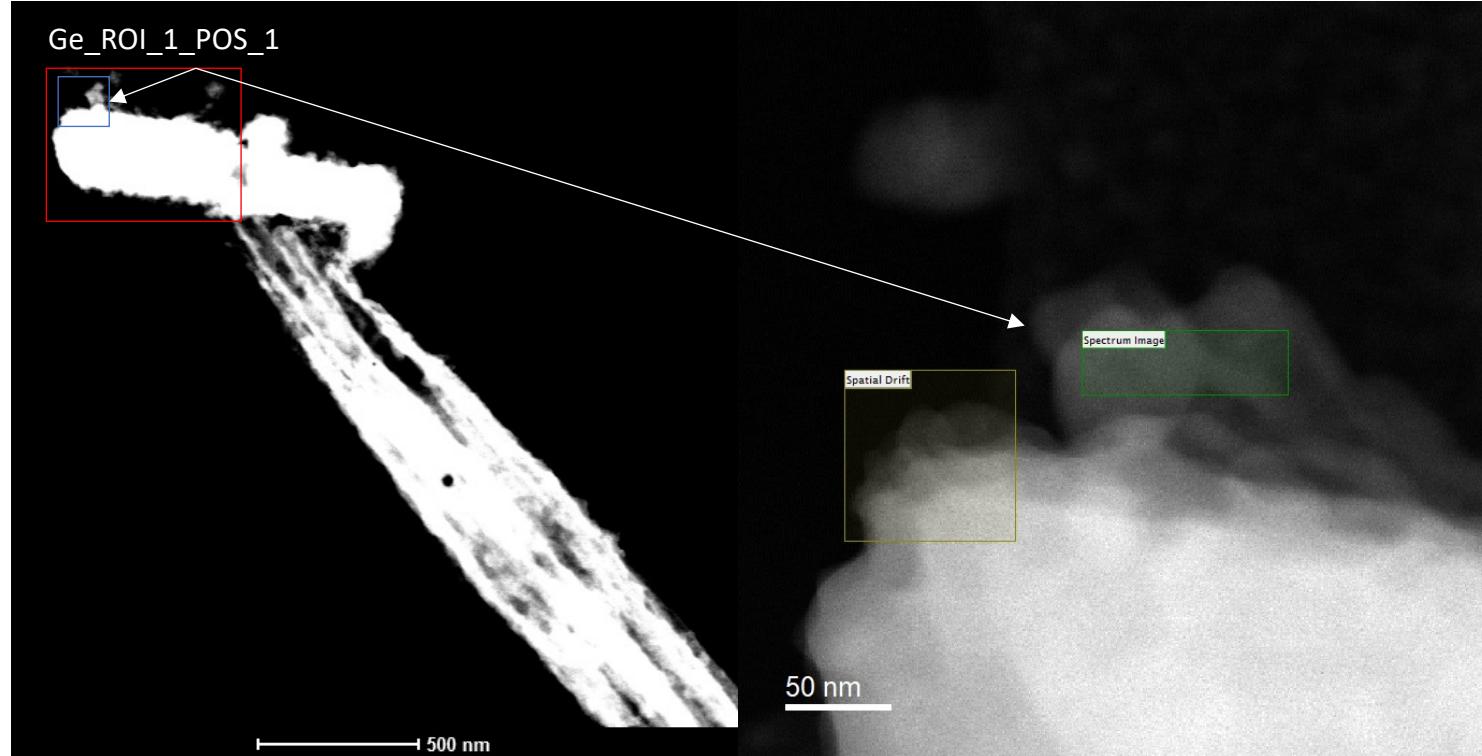


EDX map & spectrum of
Ge_ROI_2

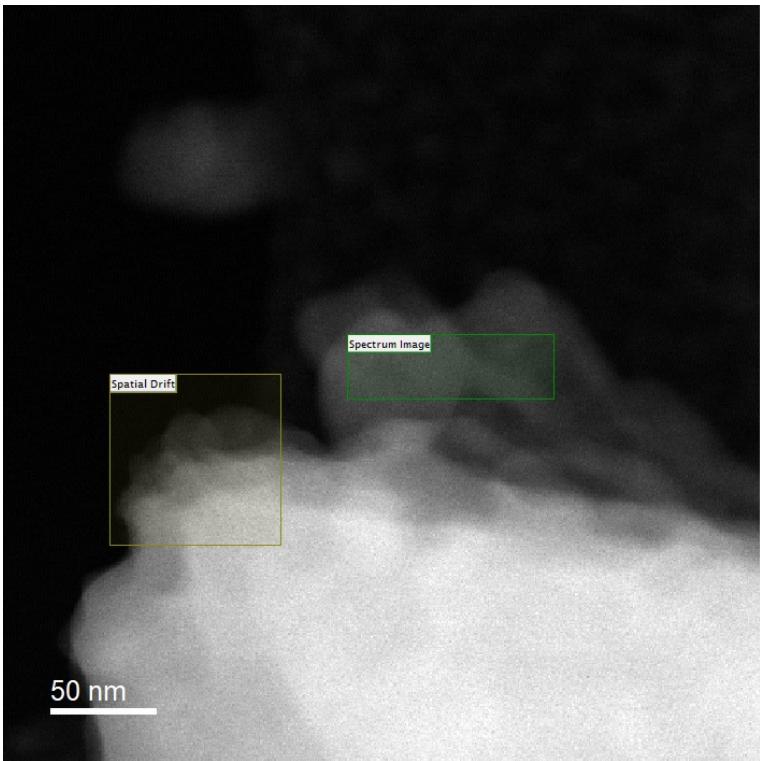




ADF – Ge_ROI_1_POS_1

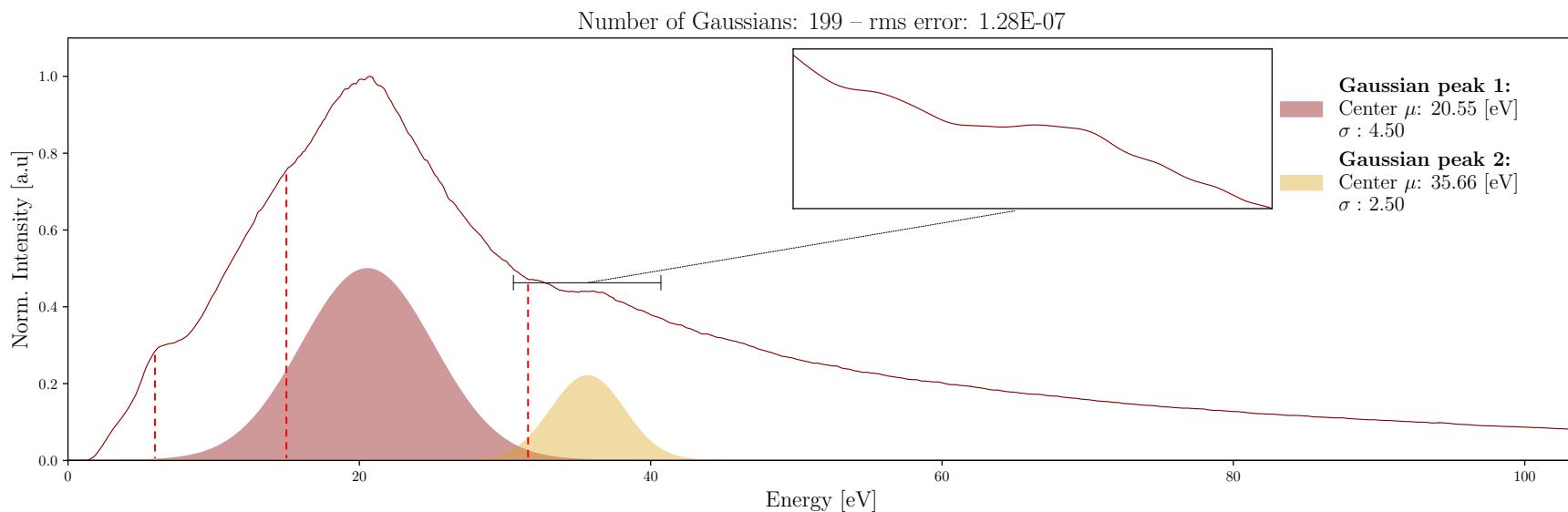


Low-loss spectra– Ge_ROI_1_POS_1

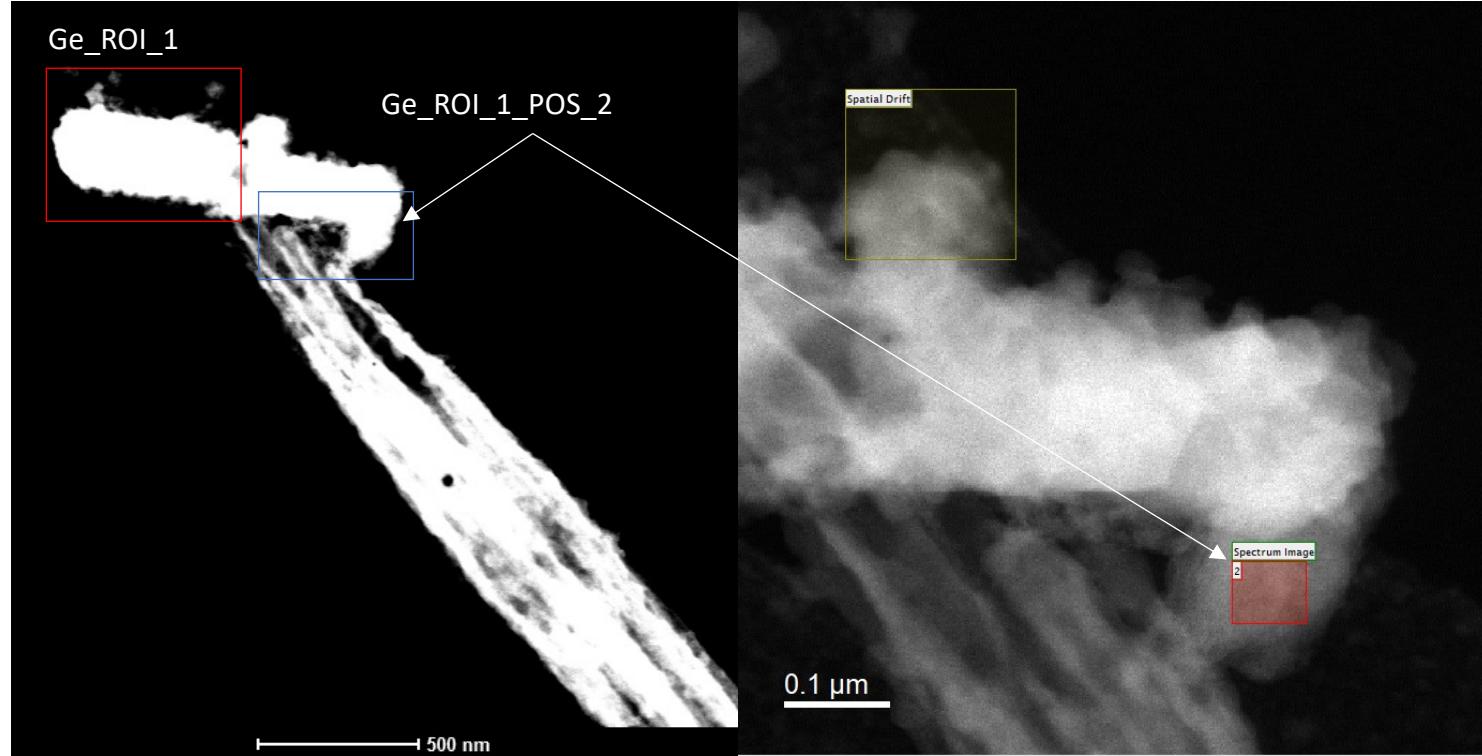


Main peak features:

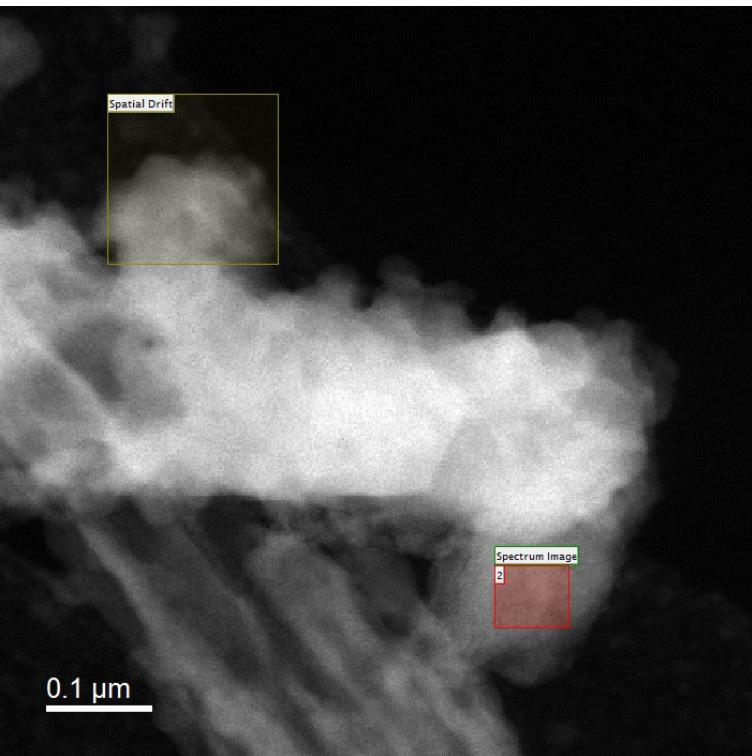
- Gaussian peak 1 (Plasmon peak):
 - Centered at 20.55eV
- Potentially many other peaks in hidden shoulders



ADF – Ge_ROI_1 POS_2

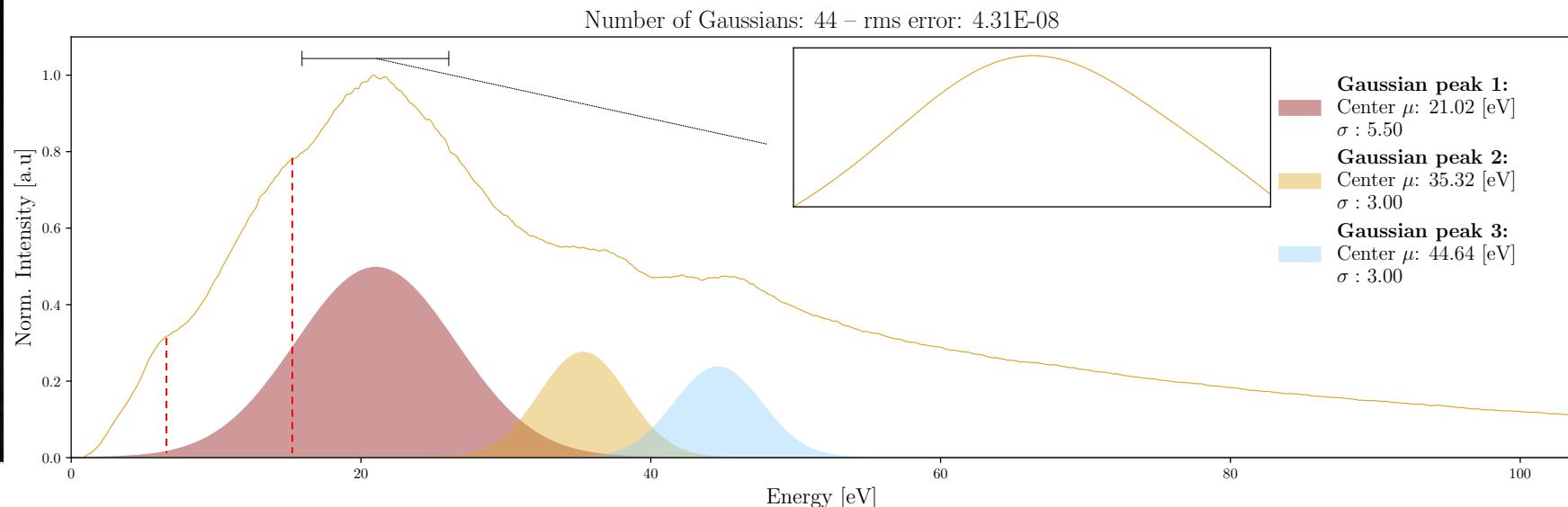


Low-loss spectra – Ge_ROI_1_POS_2

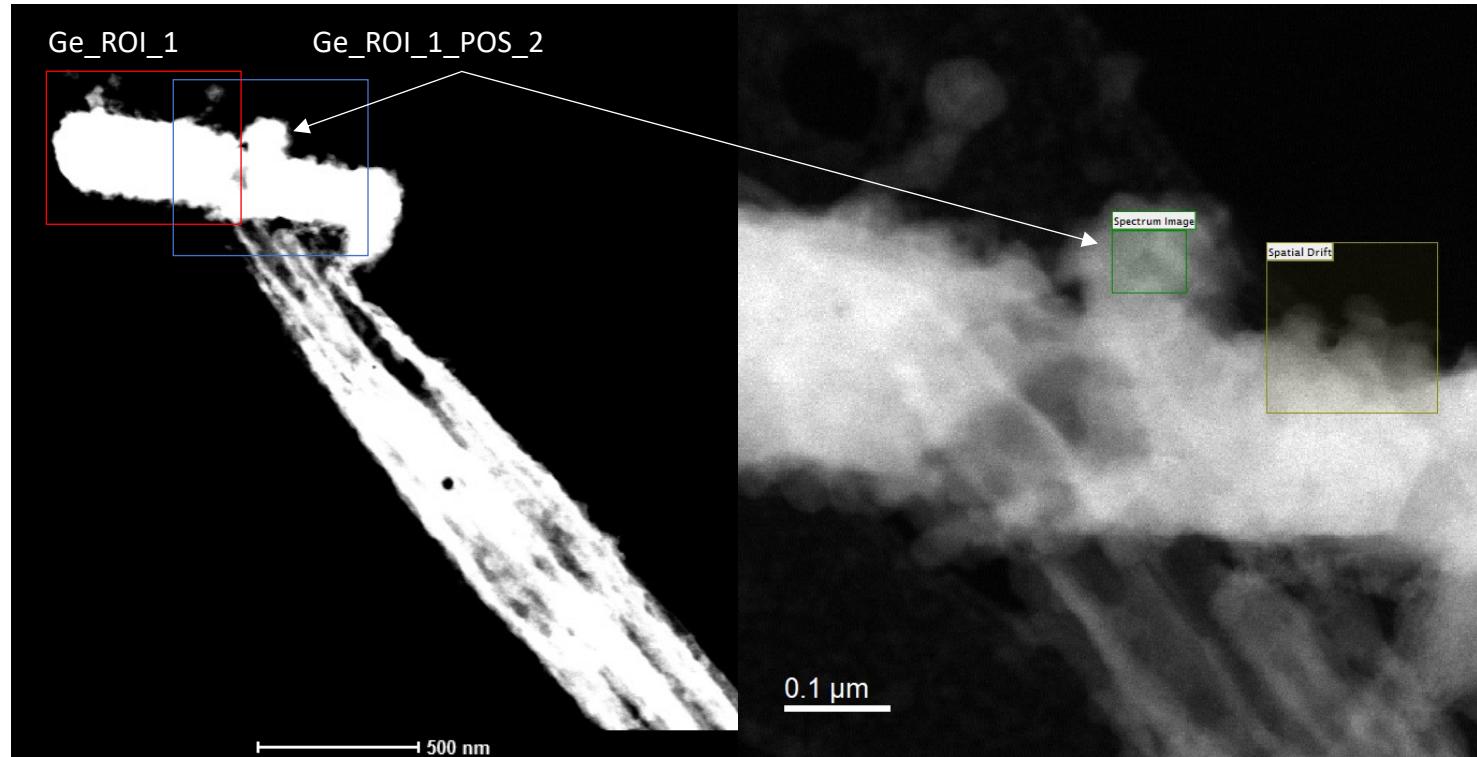


Main peak features:

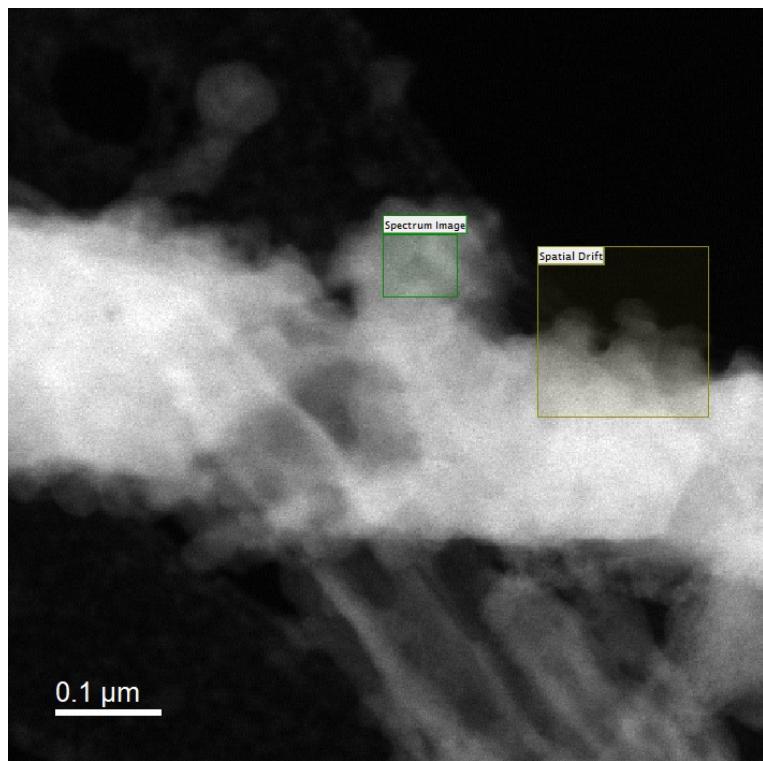
- Gaussian peak 1 (Plasmon peak):
 - Centered at 21.02eV
- Gaussian peak 3:
 - Centered at 44.57eV
- Gaussian peak 2:
 - Centered at 35.27eV



ADF – Ge_ROI_1 POS_3

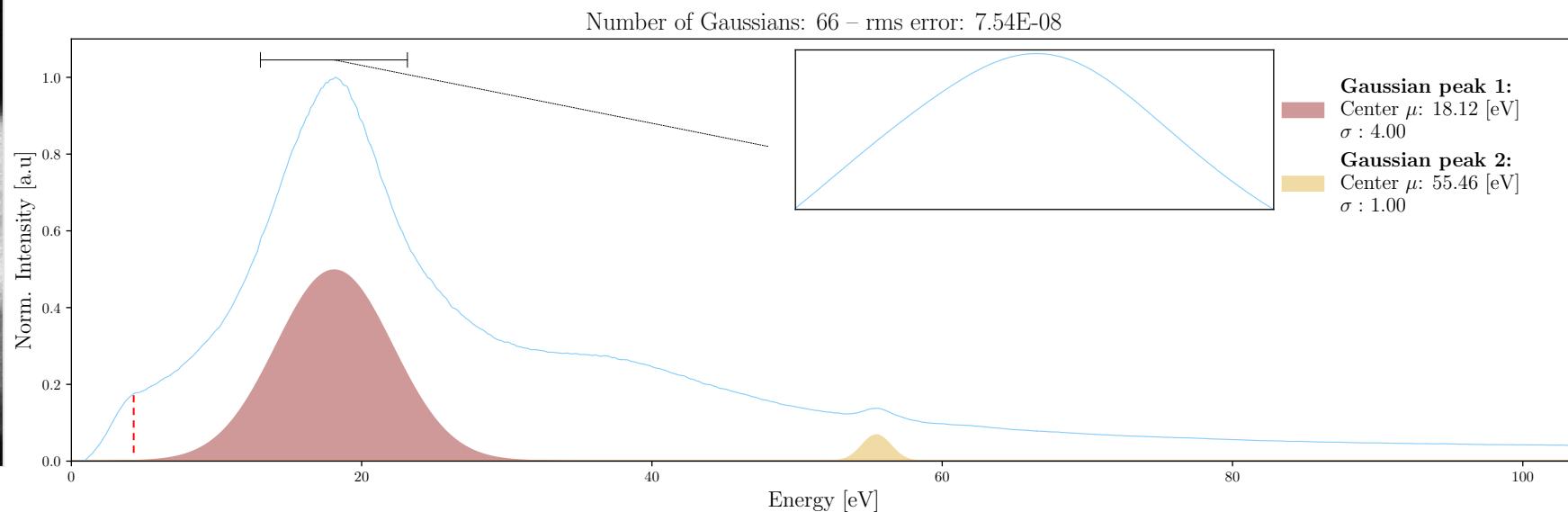


Low-loss spectra – Ge_ROI_1_POS_3

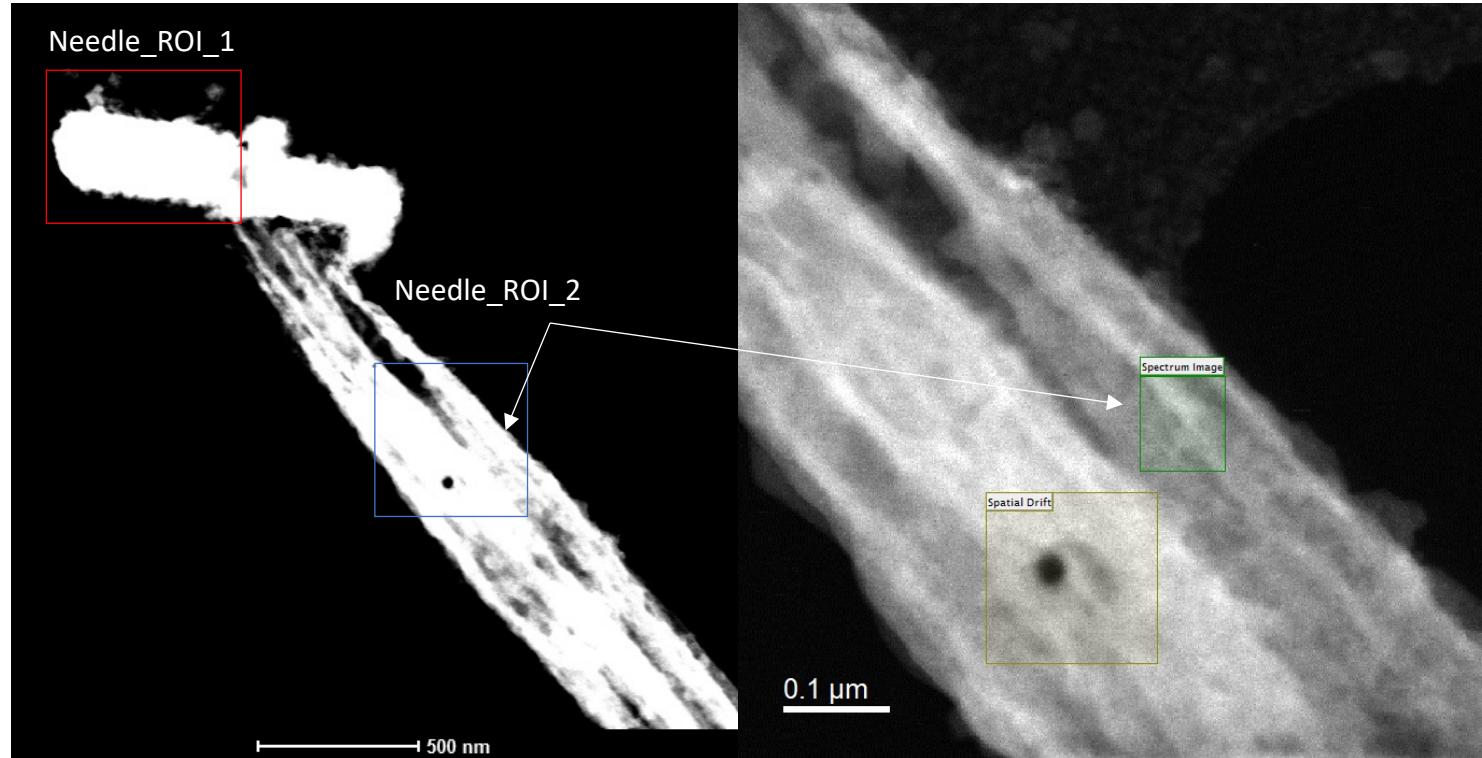


Main peak features:

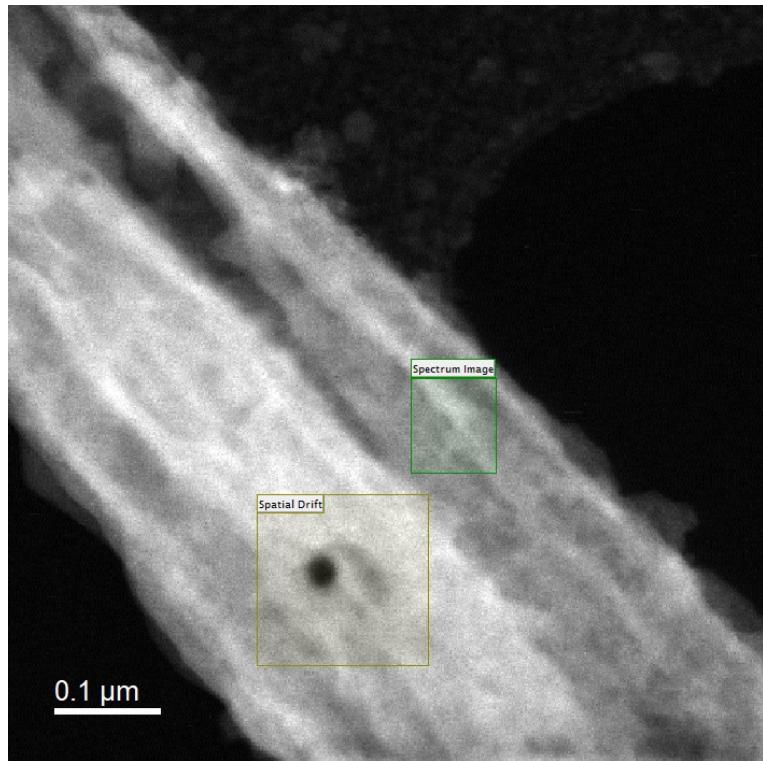
- Gaussian peak 1 (Plasmon peak):
 - Centered at 18.12eV
- Gaussian peak 2:
 - Centered at 55.46eV



ADF – Ge_ROI_2



Low-loss spectra – Ge_ROI_2



Main peak features:

- Gaussian peak 1:
 - Centered at 6.22eV
- Gaussian peak 3:
 - Centered at 17.14eV
- Gaussian peak 2 (Plasmon peak):
 - Centered at 14.18eV

