ULSAN NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY

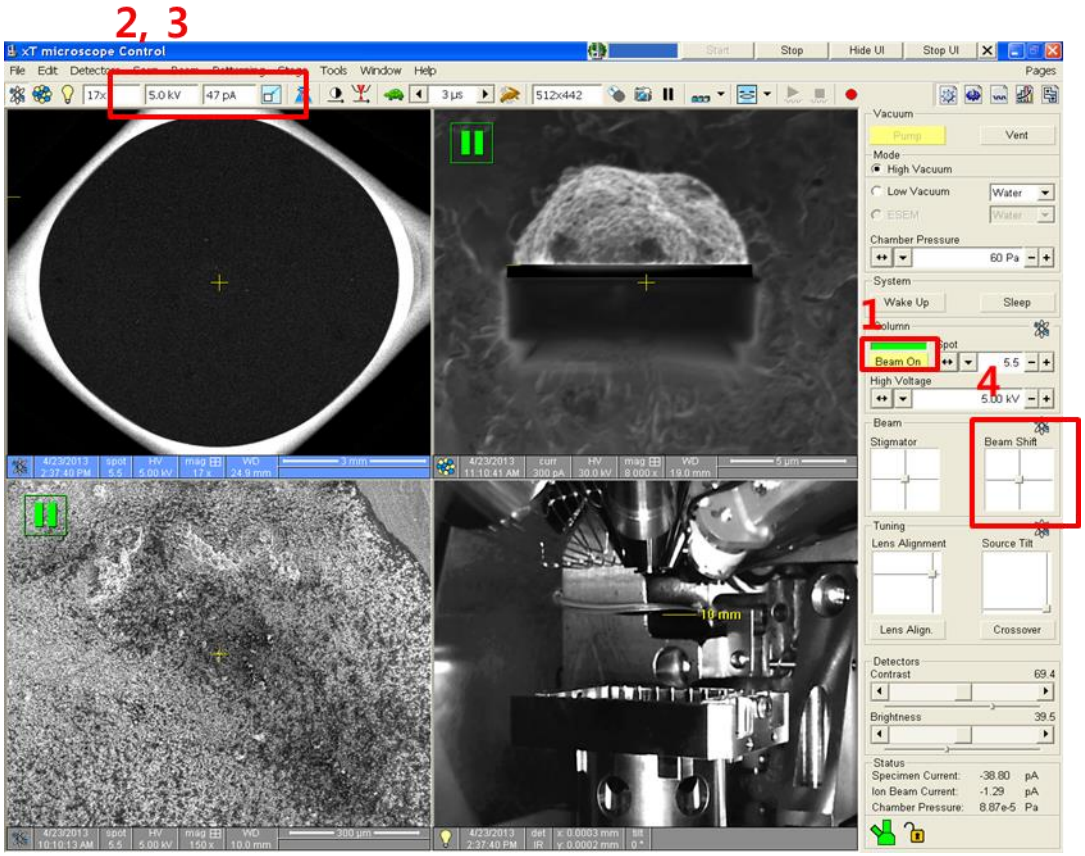
Dual Beam FIB

FIB Operation Training Course

1. Cross section

Beam On

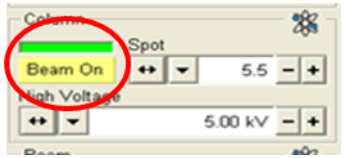
- Chamber를 열기 위해 Vent 한다. (약 3-5분 소요)
- Camber가 열리면 샘플을 넣고 고정 후 Pumping.
  (약 3-5분 소요)



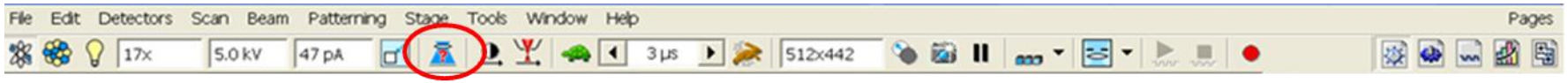
- Electron Column : 5.0 - 10kV
- Ion Column : 30.0kV, 0.10nA
- Ion Source : Beam On
- Beam Shift :

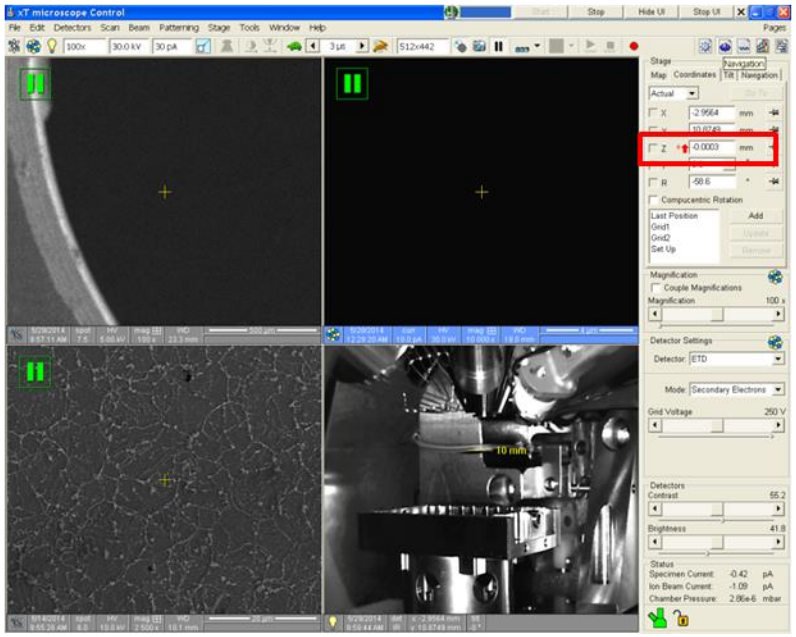
Zero (SEM, Ion column)

- SEM Column과 Ion Column 각각 Beam On.



- 배율 X5000 이상에서 Focusing후 Z to FWD눌러서 Z값을 10





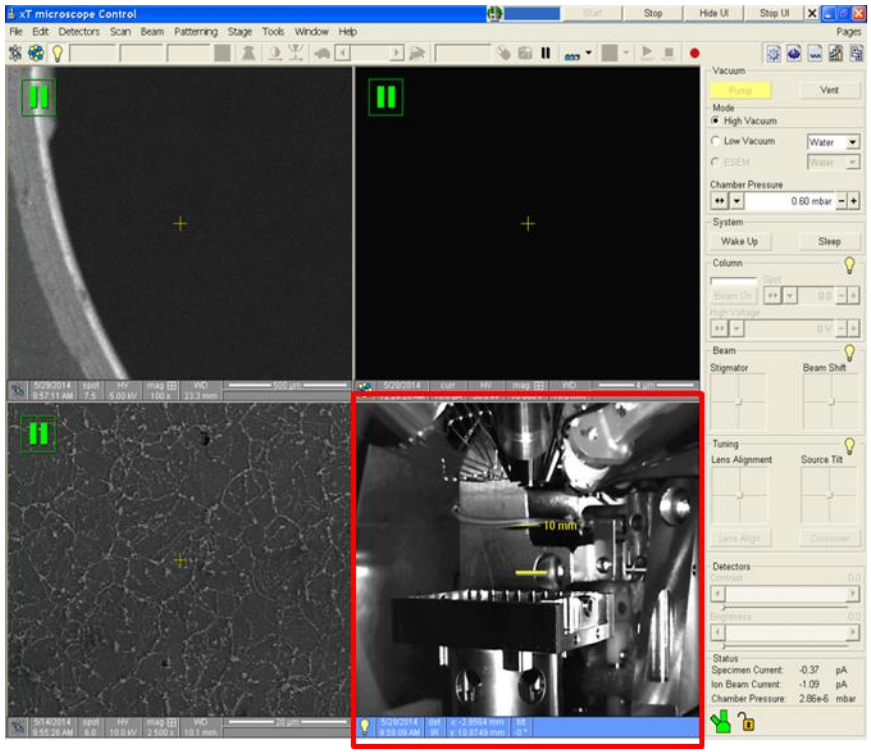
- 한번 더 눌러서 Z값 10 확인.

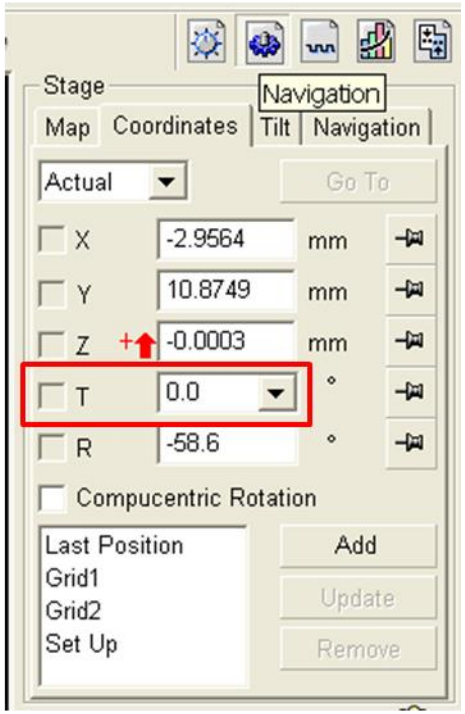
- Sampling하는 위치로 이동.
- Eucentric position

  - Navigation → T → 7°, 52° stage Tilting 하면서 위치를 조절한다.

  (CCD창  mouse ball로 stage 위치 조절)

< Snap shot > SEM : F4, Ion : ctrl + F4



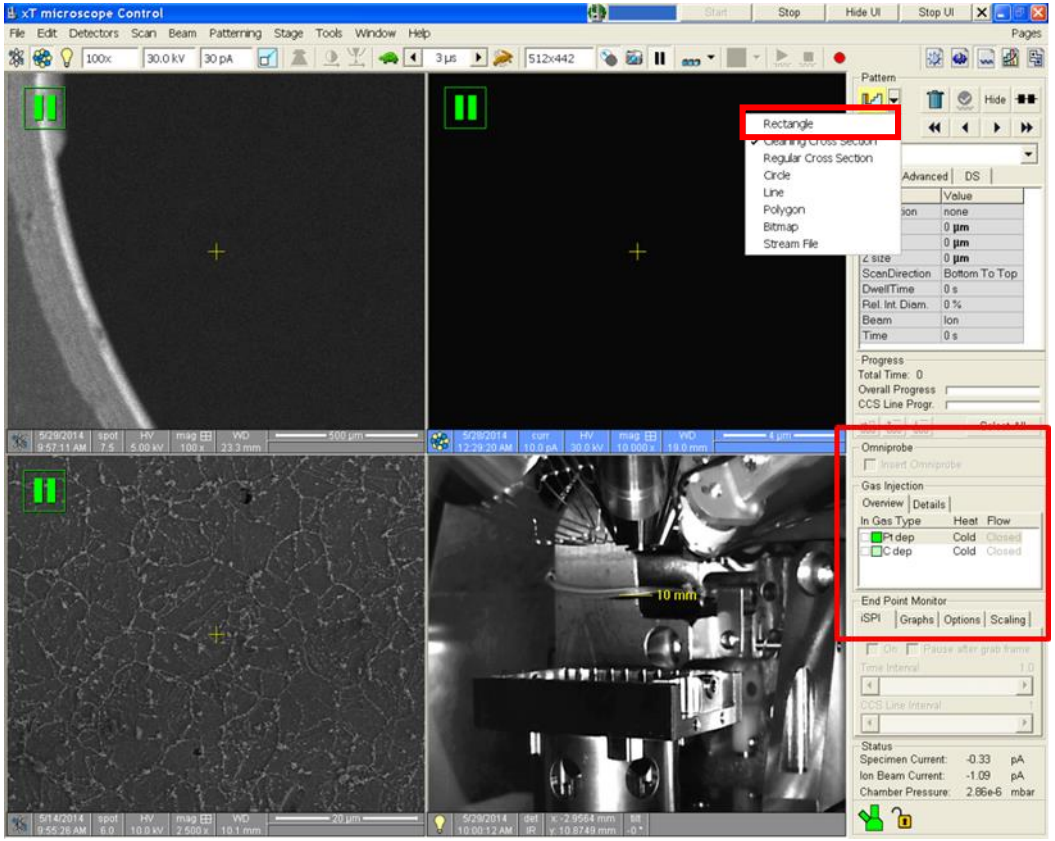


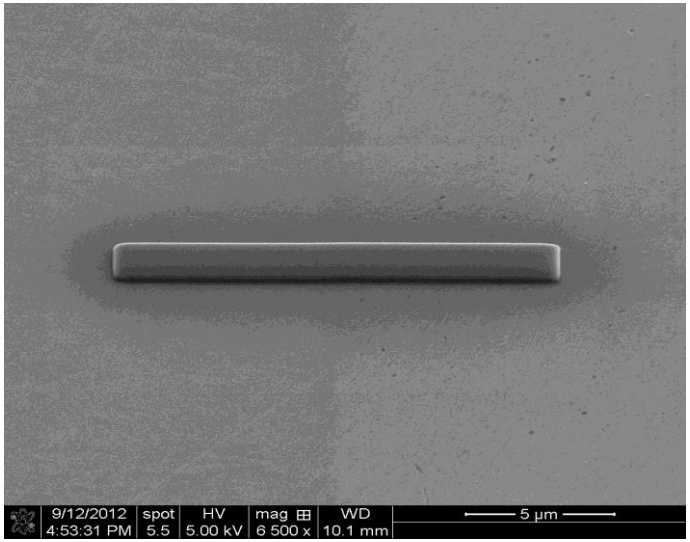
- C or Pt Deposition

- C dep, Pt dep cold → warm으로 heating

- Ion 조건 : 30kV, 0.10nA 혹은 그 이하로 ,

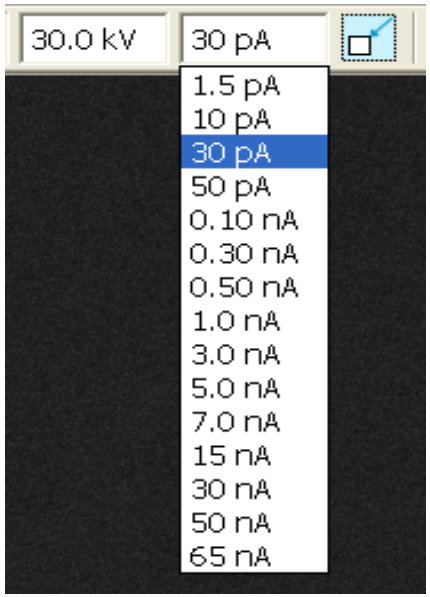
- X는 배율에 따라 조절 약 10um, Y=1um, Z=0.5-1um, 소요시간 1~2분

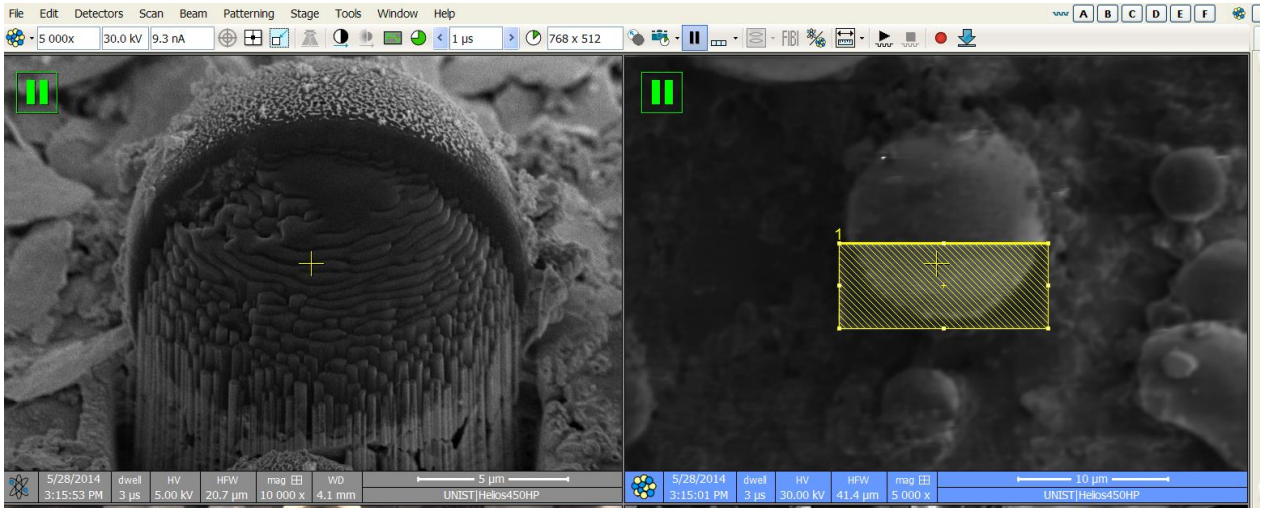


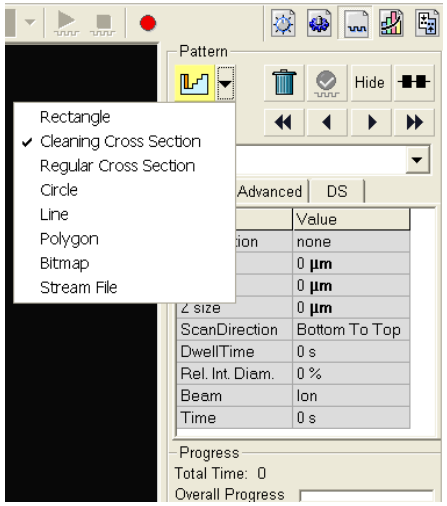


<Powder> 3.0nA 이상 Current, Rectangle, milling

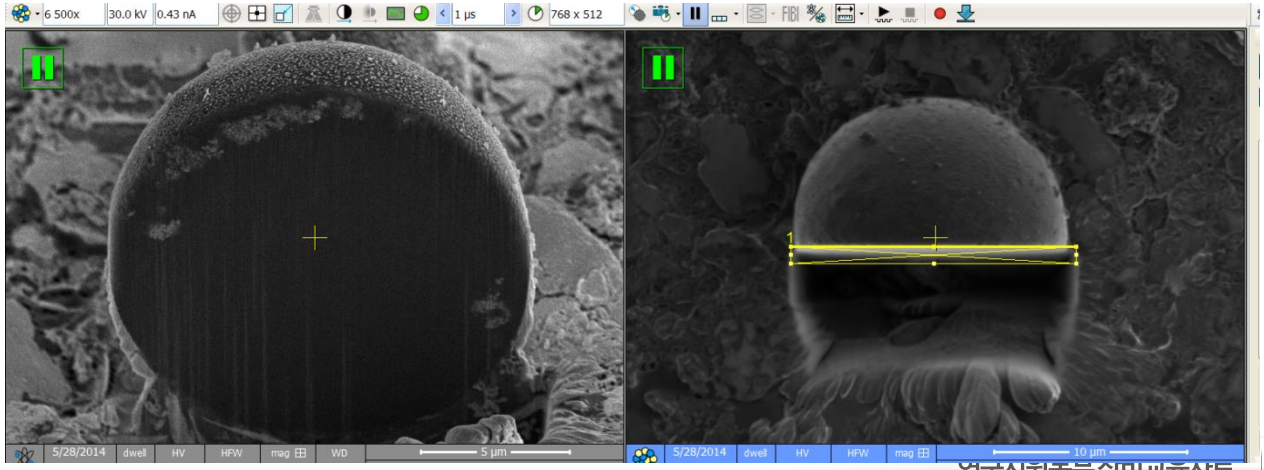
<Thin film> Regular Cross Section으로 milling



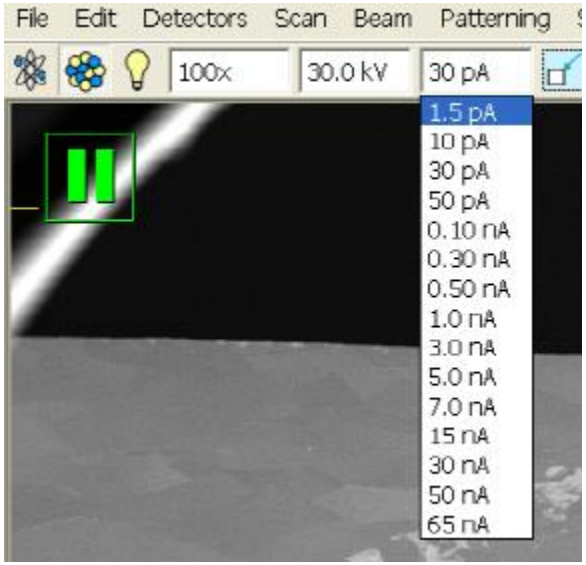




0.50nA 이하 Current 에서 Cleaning Cross Section으로 milling



FIB Aperturte Setting



Aperture	Use
• 1.5 pA	High resolution imaging
• 10 pA	High resolution imaging
• 30 pA cleaning	High resolution imaging, small cross-section
• 50 pA	General imaging, cross-section cleaning
• 0.1 nA	General imaging, cross-section cleaning
• 0.3 nA	Imaging, cross-section cleaning
• 0.5 nA	Cross-section cleaning
• 1 nA	Medium bulk mill or large cross-section cleaning
• 3 nA	Large cross-section bulk milling
• 7 nA	Rough bulk milling for large cross-sections
• 15 nA	Extremely rough bulk milling for large cross-sections
• 30 nA	Extremely rough bulk milling for large cross-sections
• 65 nA	Extremely rough bulk milling for large cross-sections

Beam Off

- 0 ° tilt
- Beam shift zero (SEM, Ion column 둘다)
- Ion Column : 30.0kV, 30.0pA
- Chamber를 열기 위해 Vent 한다. (약 3-5분 소요)
- Ion Source Sleep

2. Omniprobe

Omniprobe

- Sample Lift up (Omniprobe에 붙이기)
  - Tilt 0°에서 Omniprobe insert
  - GIS(Pt dep) insert

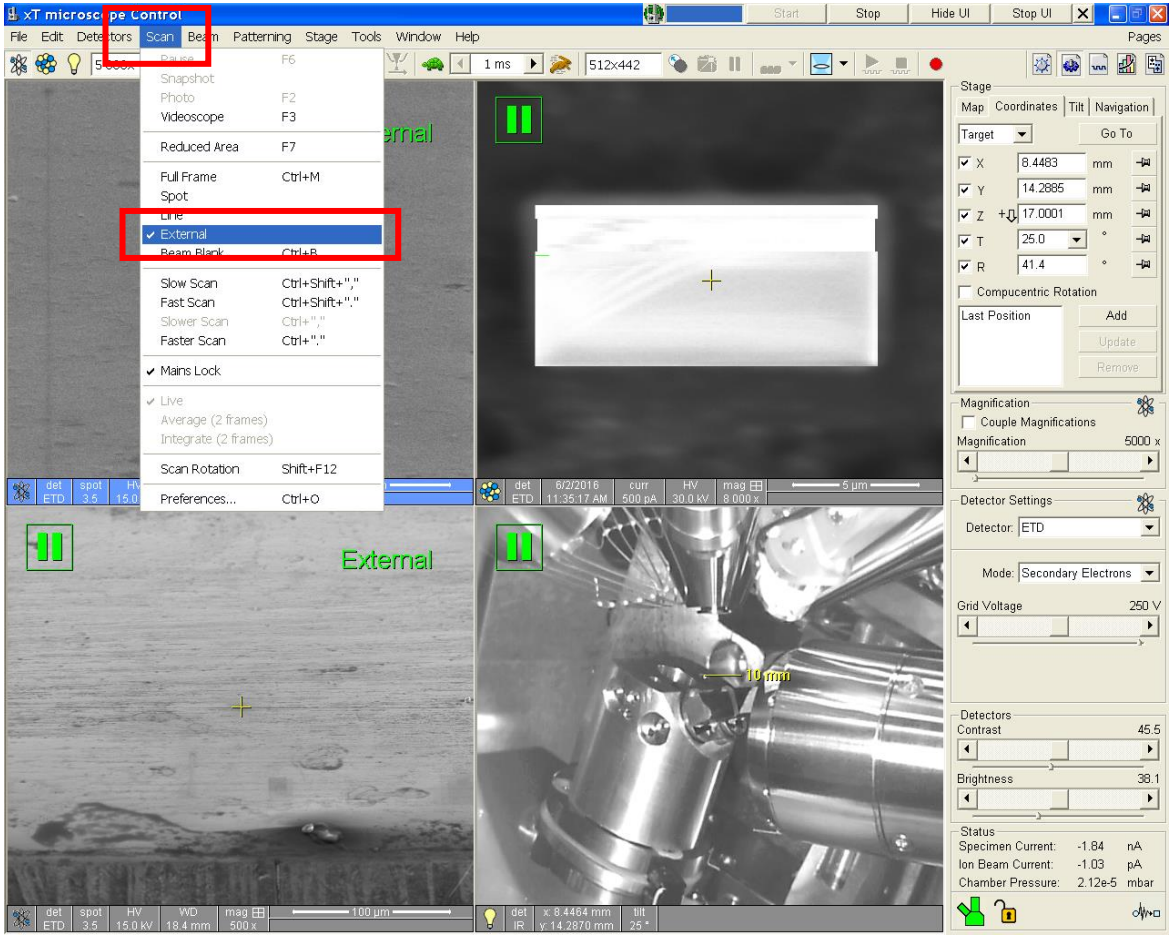
Electron

Ion

3. EDS

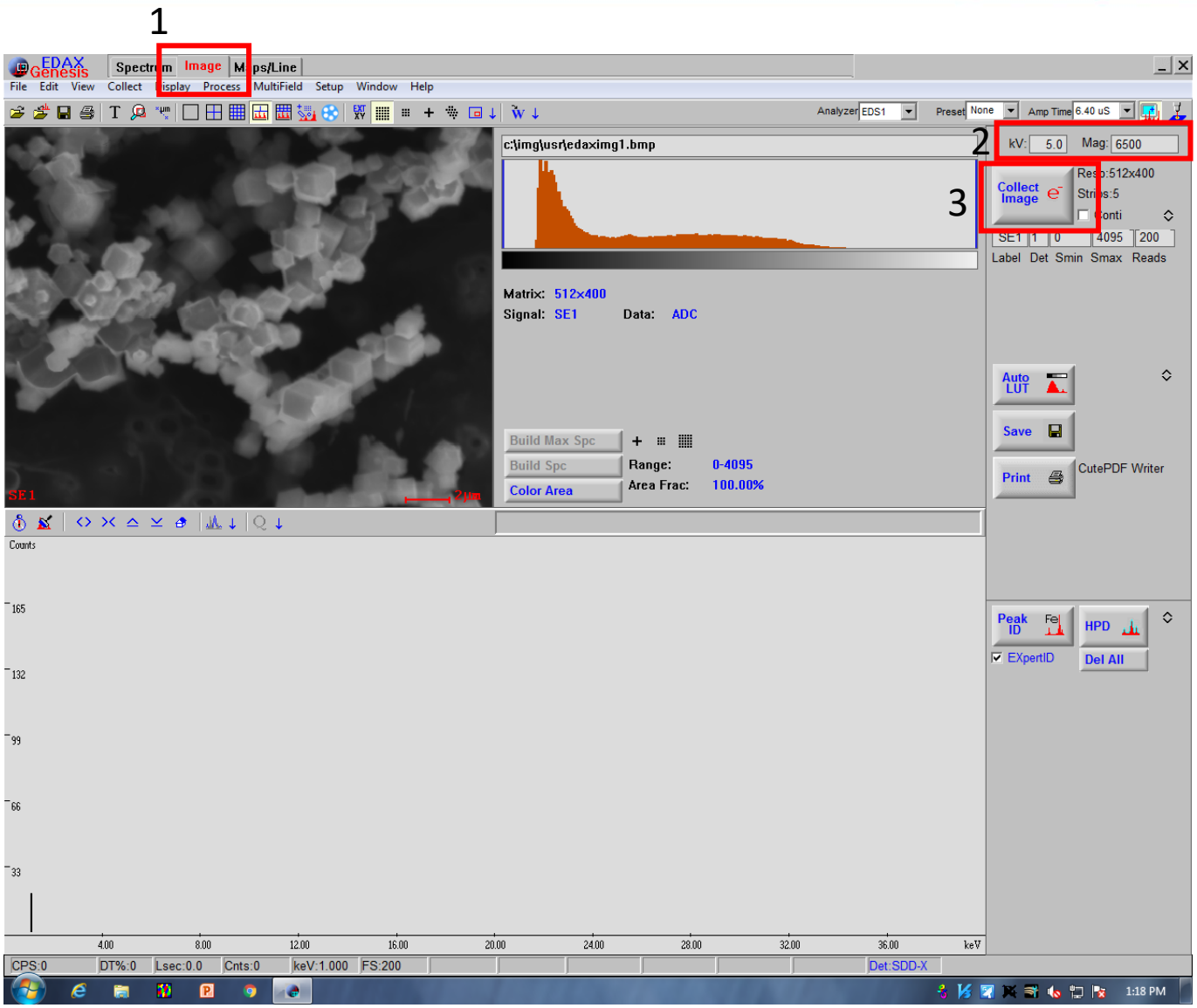
ULSAN NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY

EDS

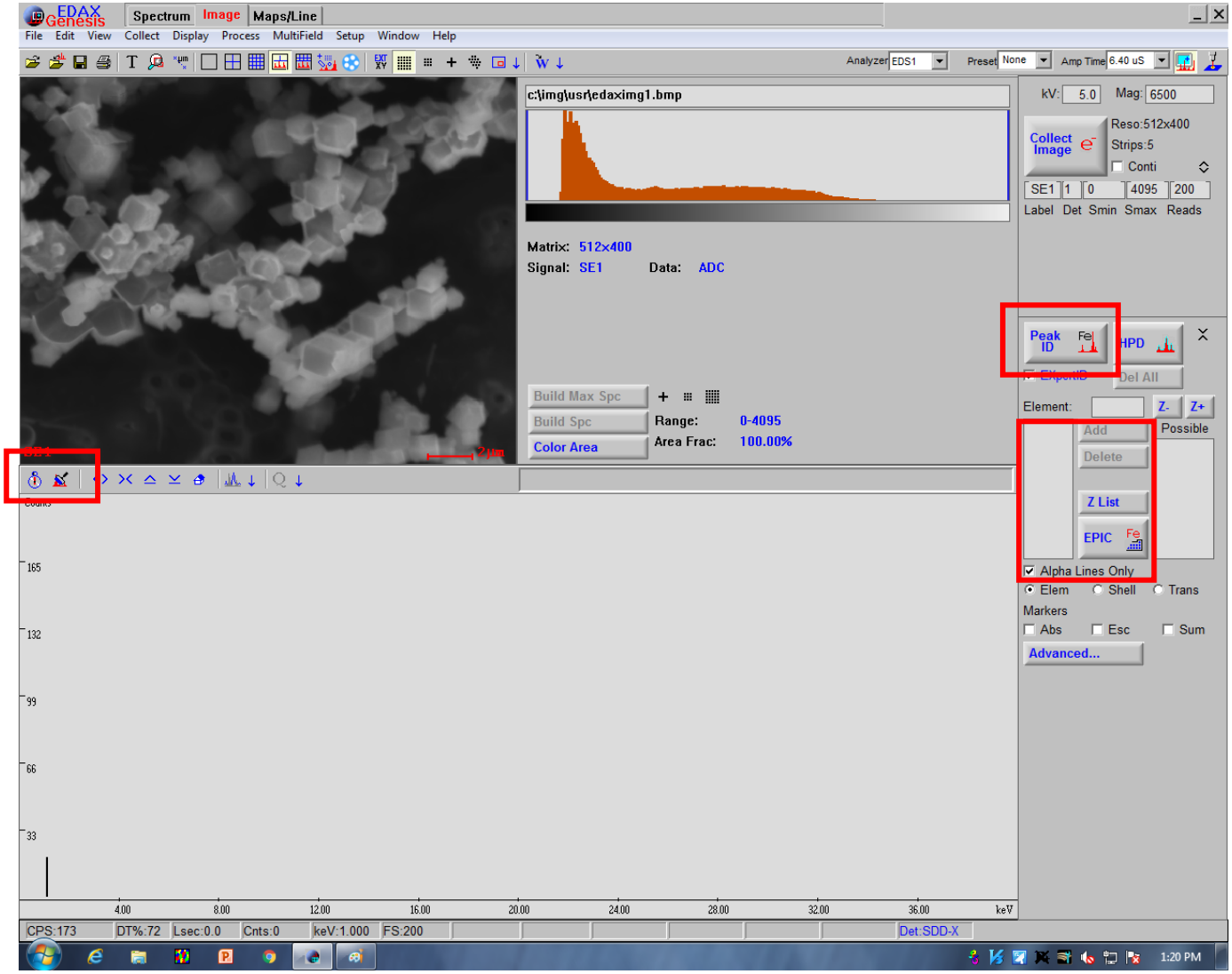

Scan
Snapshot
Photo
Videoscope
Reduced Area
Full Frame
Spot
Line
External
Slow Scan
Fast Scan
Slower Scan
Faster Scan
Mains Lock
Live
Average (2 frames)
Integrate (2 frames)
Scan Rotation
Preferences...
External
10 mm
Stage
Map
Coordinates
Tilt
Navigation
Target
Go To
Compucentric Rotation
Last Position
Add
Update
Remove
Magnification
Couple Magnifications
Detector Settings
Detector: ETD
Mode: Secondary Electrons
Grid Voltage
Detectors
Contrast
Brightness
Status
Specimen Current: -1.84 nA
Ion Beam Current: -1.03 pA
Chamber Pressure: 2.12e-5 mbar


EDAX
AMETEK

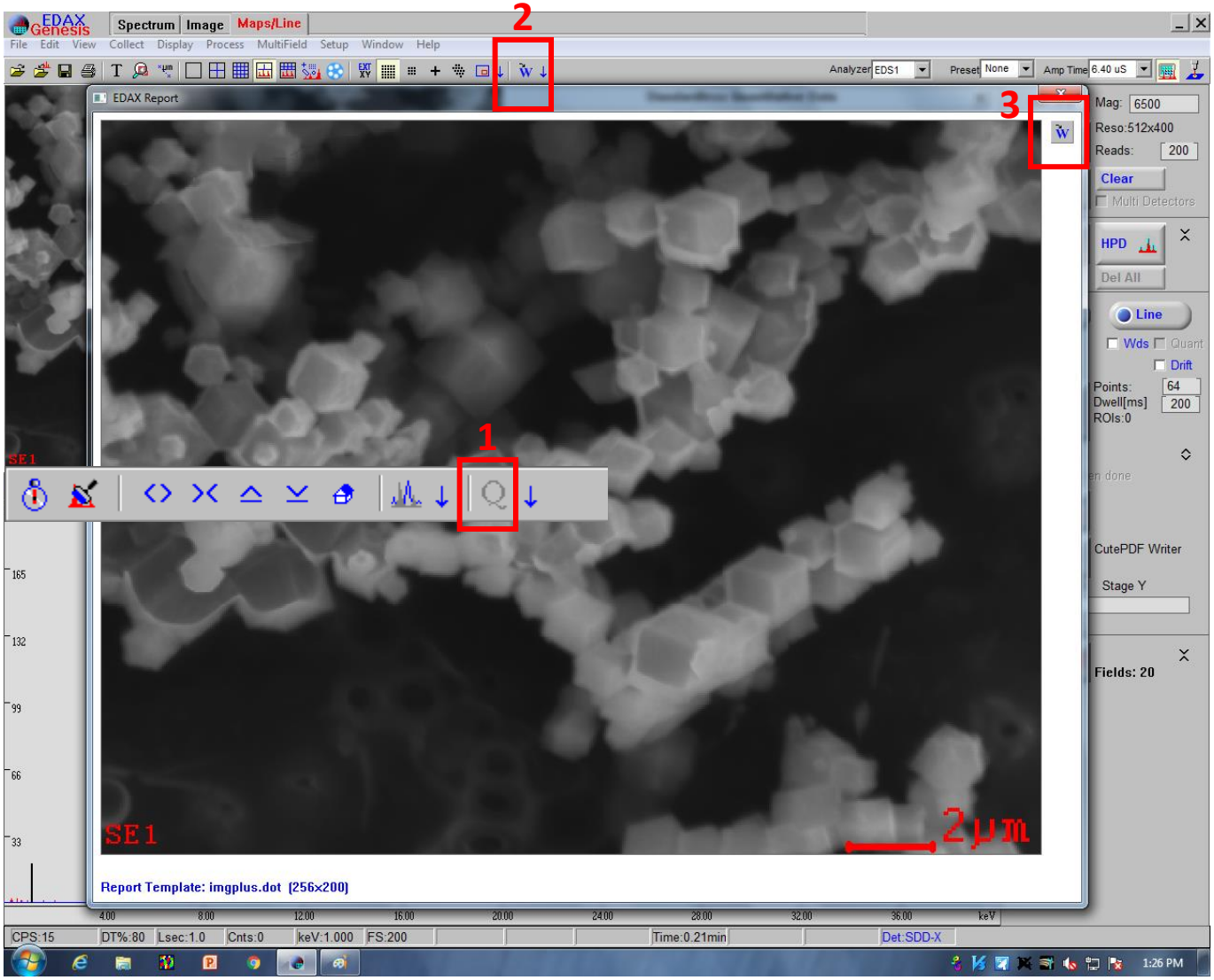
EDS


1
EDAX Genesis
Spectrum
Image
Maps/Line
File Edit View Collect Display Process MultiField Setup Window Help
Analyzer EDS1
Preset None
Amp Time 6.40 uS
c:\img\usr\edaximg1.bmp
2
kV: 5.0
Mag: 6500
3
Collect Image
Res:512x400
Strips:5
Conti
SE1 1 0 4095 200
Label Det Smin Smax Reads
Matrix: 512x400
Signal: SE1
Data: ADC
Build Max Spc
Build Spc
Color Area
Range: 0-4095
Area Frac: 100.00%
Auto LUT
Save
Print
CutePDF Writer
SE1
2 µm
Counts
165
132
99
66
33
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
keV
Peak ID
Fe
HPD
EXpertID
Del All
CPS:0
DT%:0
Lsec:0.0
Cnts:0
keV:1.000
FS:200
Det:SDD-X
1:18 PM

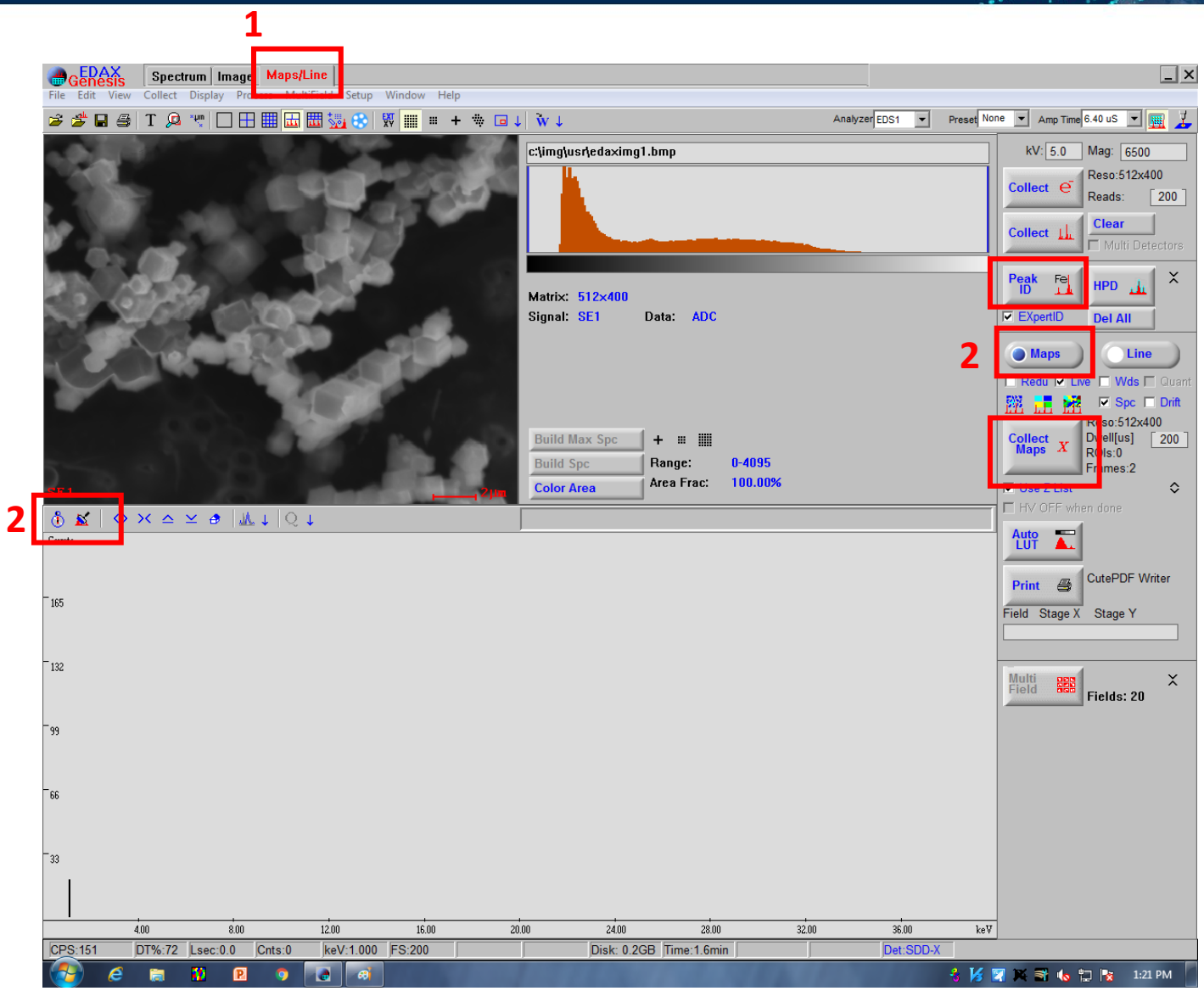
Point & Area


EDAX Genesis
Spectrum
Image
Maps/Line
File Edit View Collect Display Process MultiField Setup Window Help
c:\img\usr\edaximg1.bmp
Matrix: 512x400
Signal: SE1 Data: ADC
Build Max Spc
Build Spc
Color Area
Range: 0-4095
Area Frac: 100.00%
kV: 5.0
Mag: 6500
Collect Image
Reso:512x400
Strips:5
Conti
SE1 1 0 4095 200
Label Det Smin Smax Reads
Peak ID
HPD
Del All
Element:
Z- Z+
Add
Delete
Possible
Z List
EPIC
Alpha Lines Only
Elem Shell Trans
Markers
Abs Esc Sum
Advanced...
CPS:173 DT%:72 Lsec:0.0 Cnts:0 keV:1.000 FS:200 Det:SDD-X
1:20 PM

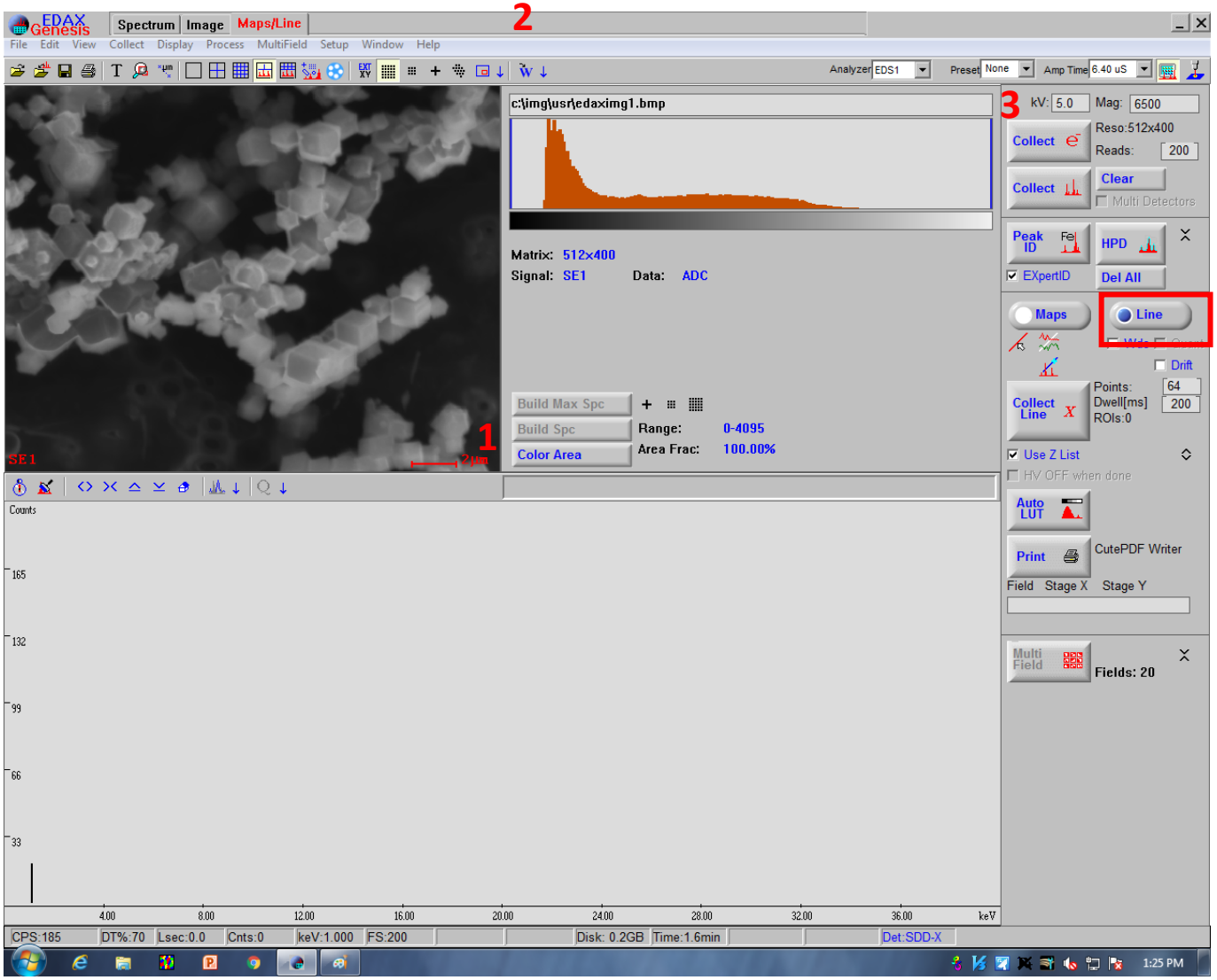
Data


EDAX Genesis
Spectrum
Image
Maps/Line
File Edit View Collect Display Process MultiField Setup Window Help
Analyzer EDS1
Preset None
Amp Time 6.40 uS
EDAX Report
Mag: 6500
Reso:512x400
Reads: 200
Clear
Multi Detectors
HPD
Del All
Line
Wds Quant
Drift
Points: 64
Dwell[ms] 200
ROIs:0
CutePDF Writer
Stage Y
Fields: 20
SE1
2 µm
Report Template: imgplus.dot (256x200)
CPS:15
DT%:80
Lsec:1.0
Cnts:0
keV:1.000
FS:200
Time:0.21min
Det:SDD-X
1:26 PM
1
2
3

Mapping


1
Spectrum
Image
Maps/Line
File Edit View Collect Display Setup Window Help
Analyzer EDS1
Preset None
Amp Time 6.40 uS
c:\img\usr\edaximg1.bmp
Matrix: 512x400
Signal: SE1
Data: ADC
Build Max Spc
Build Spc
Color Area
Range: 0-4095
Area Frac: 100.00%
kV: 5.0
Mag: 6500
Collect
Reso:512x400
Reads: 200
Collect
Clear
Multi Detectors
Peak ID
HPD
EXpertID
Del All
2
Maps
Line
Redu Live Wds Quant
Spc Drift
Collect Maps
Reso:512x400
Dwell[us] 200
Rois:0
Frames:2
HV OFF when done
Auto LUT
Print
CutePDF Writer
Field Stage X Stage Y
Multi Field
Fields: 20
2
165
132
99
66
33
4.00 8.00 12.00 16.00 20.00 24.00 28.00 32.00 36.00 keV
CPS:151 DT%:72 Lsec:0.0 Cnts:0 keV:1.000 FS:200 Disk: 0.2GB Time:1.6min Det:SDD-X
1:21 PM

Line


2
Spectrum
Image
Maps/Line
File Edit View Collect Display Process MultiField Setup Window Help
Analyzer EDS1
Preset None
Amp Time 6.40 uS
c:\img\usr\edaximg1.bmp
3
kV: 5.0
Mag: 6500
Collect
Reso:512x400
Reads: 200
Collect
Clear
Multi Detectors
Peak ID
HPD
EXpertID
Del All
Maps
Line
Drift
Points: 64
Dwell[ms] 200
ROIs:0
Collect Line
Use Z List
HV OFF when done
Auto LUT
Print
CutePDF Writer
Field Stage X Stage Y
Multi Field
Fields: 20
Matrix: 512x400
Signal: SE1
Data: ADC
Build Max Spc
Build Spc
Color Area
Range: 0-4095
Area Frac: 100.00%
1
SE1
2µm
Counts
165
132
99
66
33
4.00 8.00 12.00 16.00 20.00 24.00 28.00 32.00 36.00 keV
CPS:185 DT%:70 Lsec:0.0 Cnts:0 keV:1.000 FS:200 Disk: 0.2GB Time:1.6min Det:SDD-X
1:25 PM

Thank you.

Contact: UCRF Lee Sunyi

(ssun295@unist.ac.kr / 217-4023)