

# Dual Beam FIB

## FIB Operation Training Course



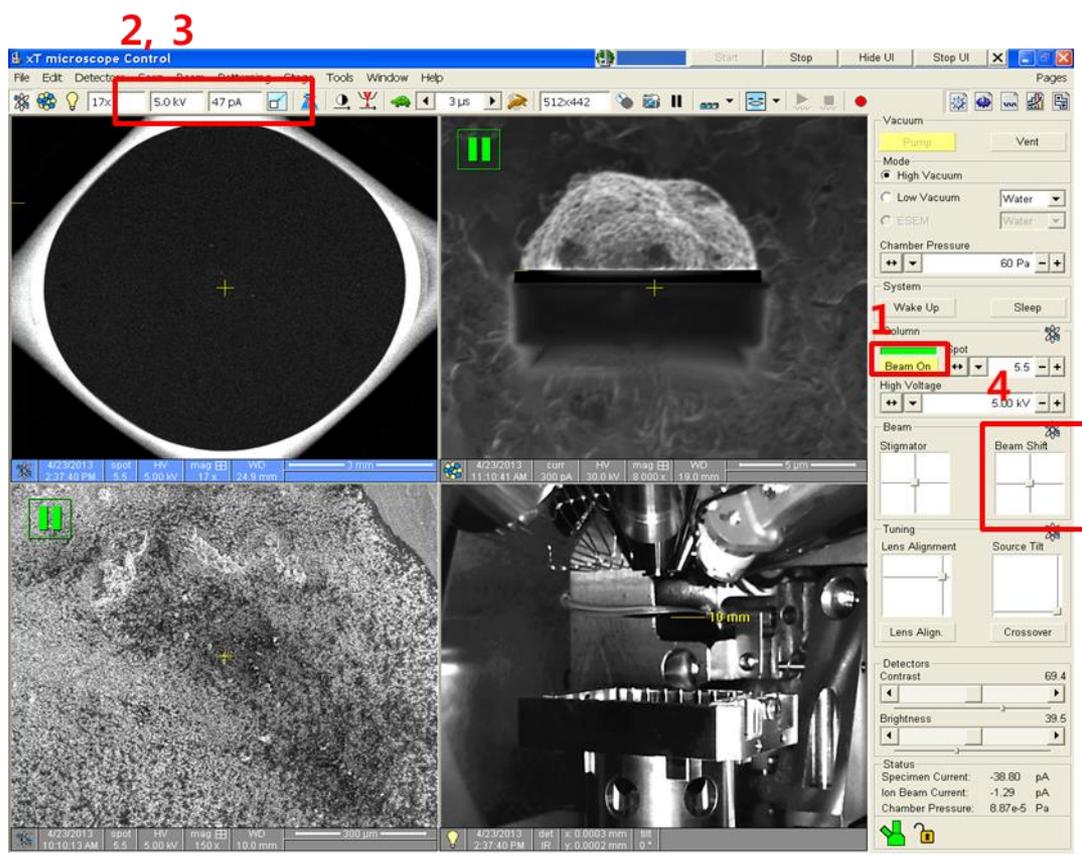
# 1. Cross section

---

**UNIST**

ULSAN NATIONAL INSTITUTE OF  
SCIENCE AND TECHNOLOGY

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

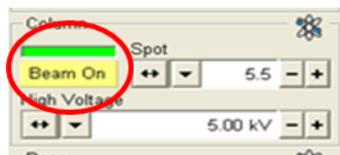


- Electron Column : 5.0 - 10kV
- Ion Column : 30.0kV, 0.10nA
- Ion Source : Beam On
- Beam Shift :

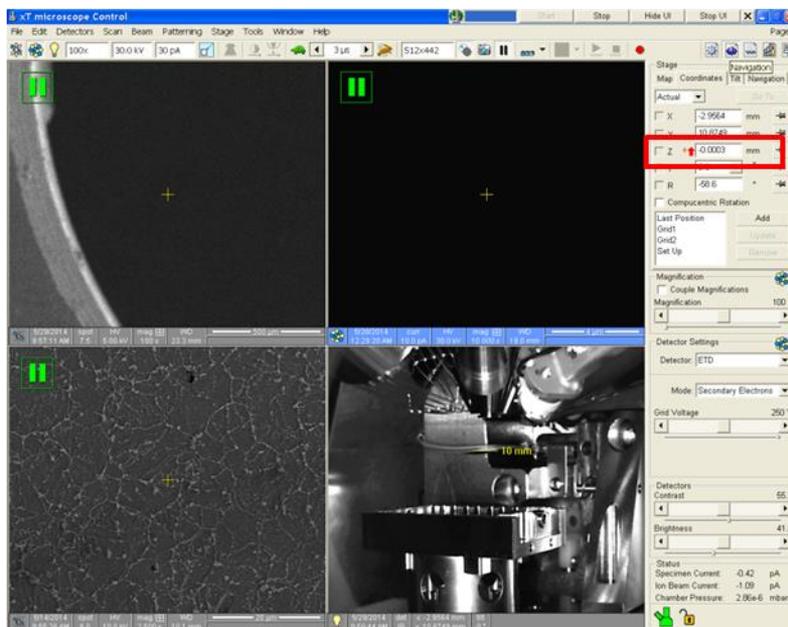
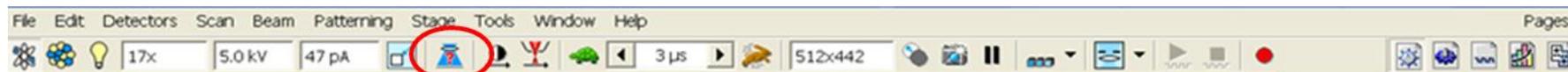


Zero (SEM, Ion column)

- SEM Column과 Ion Column 각각 Beam On.



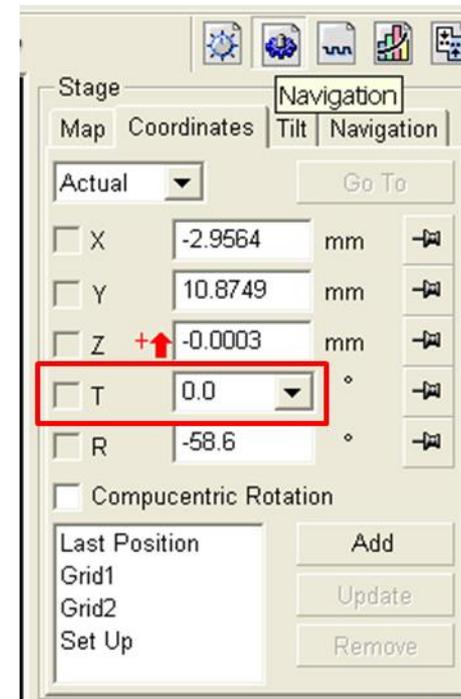
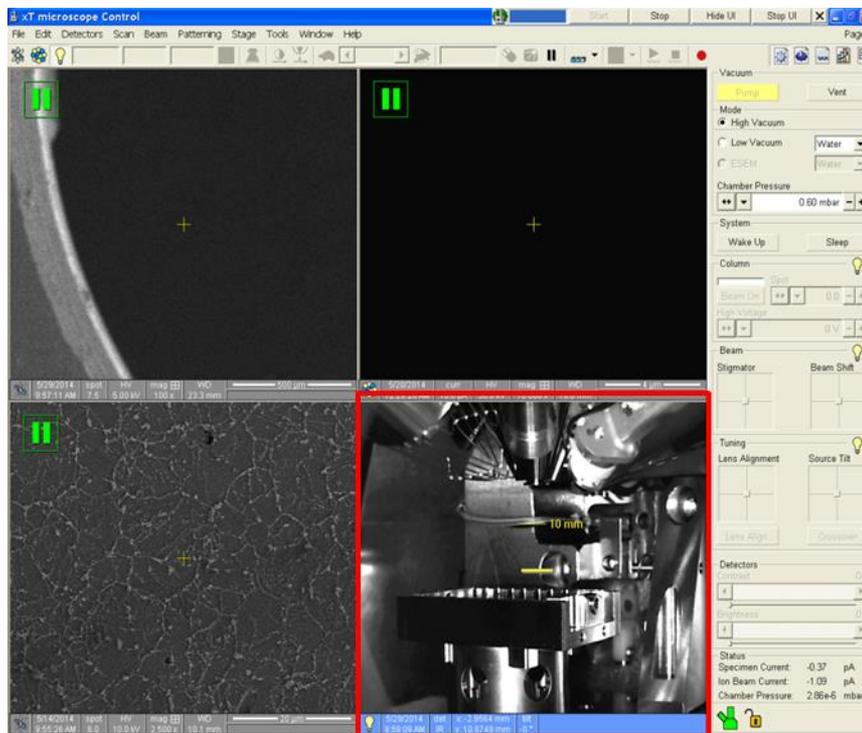
- 배율 X5000 이상에서 Focusing후 Z to FWD눌러서 z값을 10



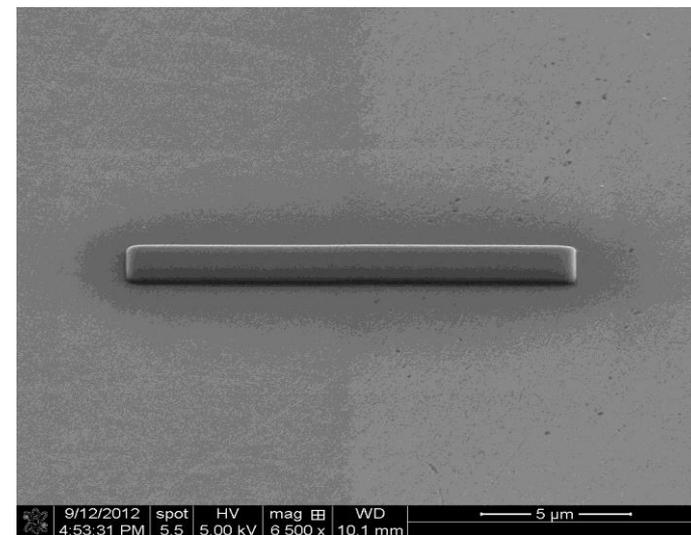
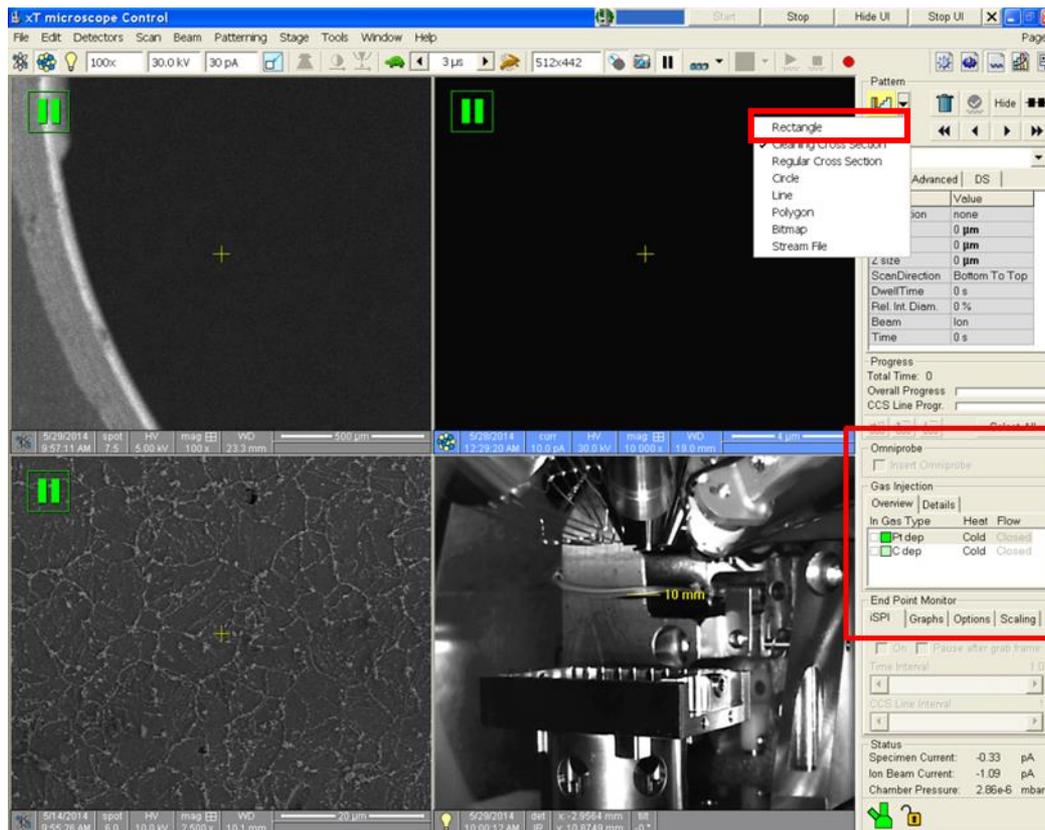
- 한번 더 눌러서 z값 10 확인.

- Sampling하는 위치로 이동.
  - Eucentric position
    - Navigation → T → 7°, 52° stage Tilting 하면서 위치를 조절한다.
- (CCD창  mouse ball로 stage 위치 조절)

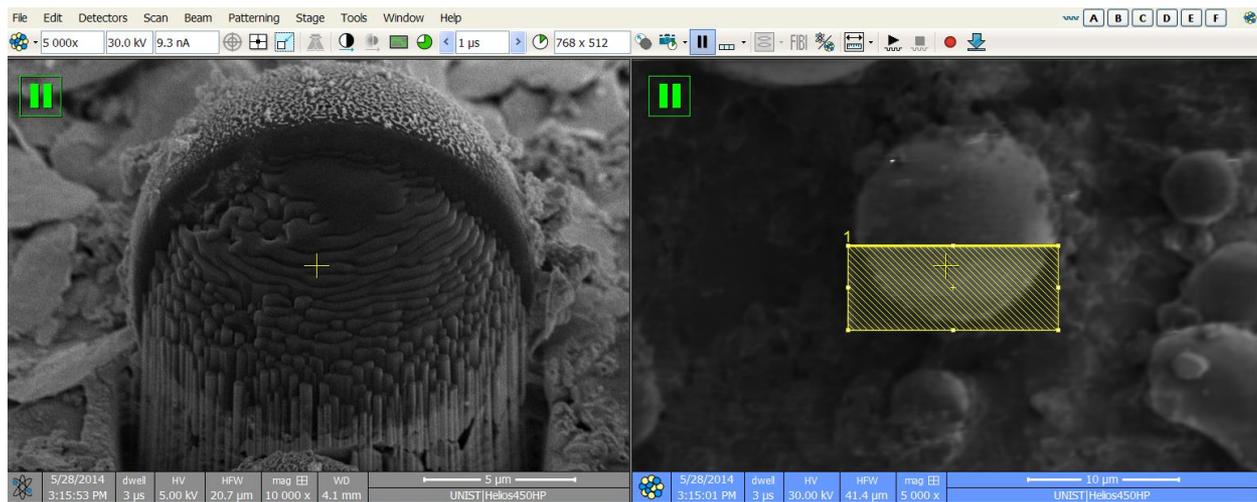
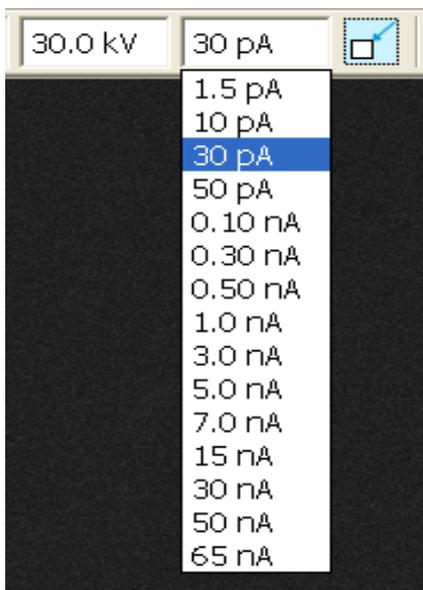
< Snap shot > SEM : F4, Ion : ctrl + F4



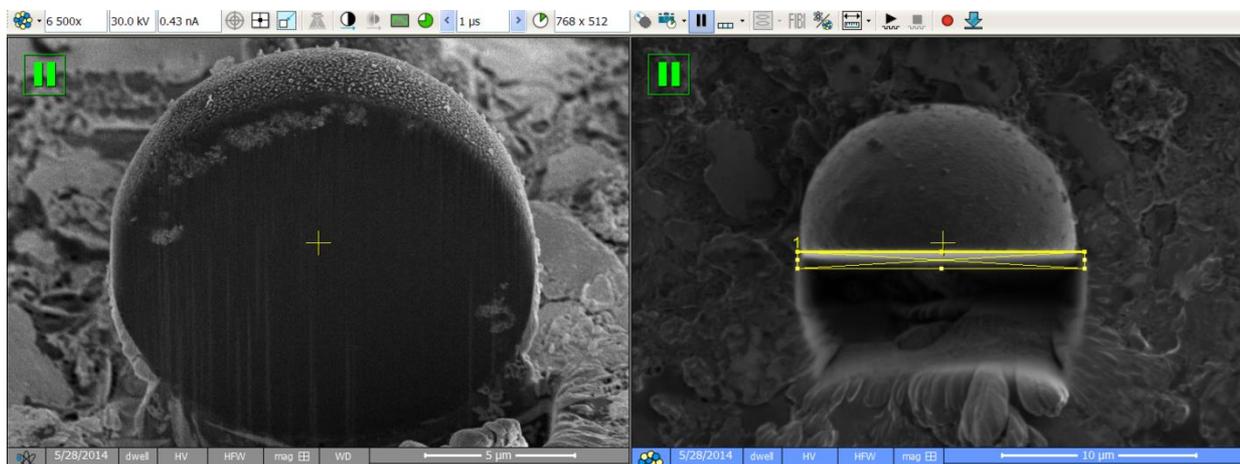
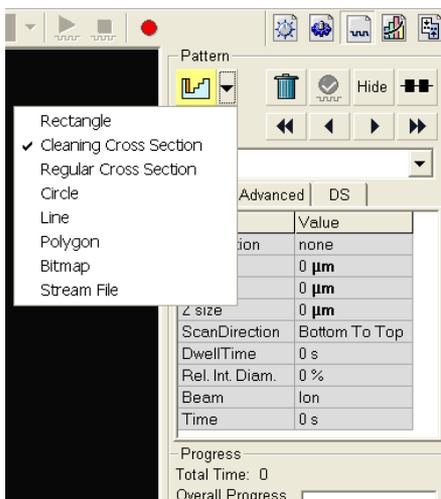
- C or Pt Deposition
  - C dep, Pt dep cold → warm으로 heating
  - Ion 조건 : 30kV, 0.10nA 혹은 그 이하로 ,
  - X는 배율에 따라 조절 약 10um, Y=1um, Z=0.5-1um, 소요시간 1~2분

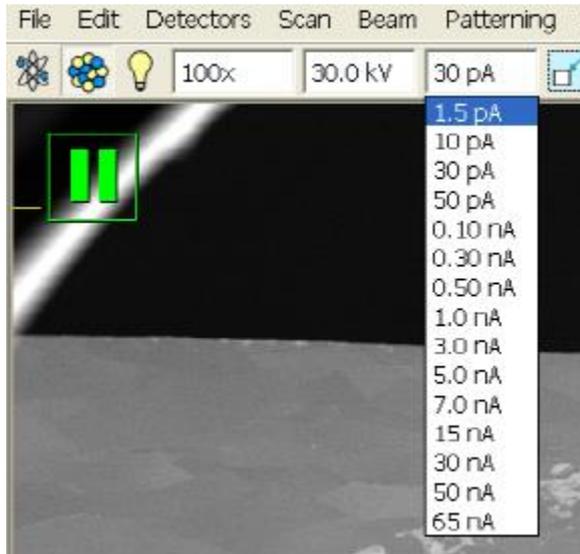


<Powder> 3.0nA 이상 Current, Rectangle, milling  
<Thin film> Regular Cross Section으로 milling



0.50nA 이하 Current 에서 Cleaning Cross Section으로 milling





## Aperture

## Use

- 1.5 pA High resolution imaging
- 10 pA High resolution imaging
- 30 pA High resolution imaging, small cross-section cleaning
- 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

- 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**

---

**UNIST**

ULSAN NATIONAL INSTITUTE OF  
SCIENCE AND TECHNOLOGY

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

## Electron



## Ion



# 3. EDS

---

The logo for UNIST (Ulsan National Institute of Science and Technology) is displayed in a stylized, glowing blue font. The letters are blocky and have a slight 3D effect with a bright light source behind the 'I' and 'S', creating a lens flare effect. The background of the slide is a dark blue gradient with a complex pattern of concentric circles and radial lines of small dots, resembling a digital or scientific visualization.

**UNIST**

ULSAN NATIONAL INSTITUTE OF  
SCIENCE AND TECHNOLOGY

The screenshot displays the 'xT microscope Control' software interface. The 'Scan' menu is open, showing options like 'External' (highlighted in red), 'Beam Blank', 'Slow Scan', 'Fast Scan', 'Slower Scan', 'Faster Scan', 'Mains Lock', 'Live', 'Average (2 frames)', 'Integrate (2 frames)', 'Scan Rotation', and 'Preferences...'. The main view shows a microscope column with a 10 mm scale bar. Two inset images show a specimen surface. The right-hand side contains control panels for Stage (Map, Coordinates, Tilt, Navigation), Magnification (5000 x), Detector Settings (Mode: Secondary Electrons, Grid Voltage: 250 V), Detectors (Contrast: 45.5, Brightness: 38.1), and Status (Specimen Current: -1.84 nA, Ion Beam Current: -1.03 pA, Chamber Pressure: 2.12e-5 mbar).



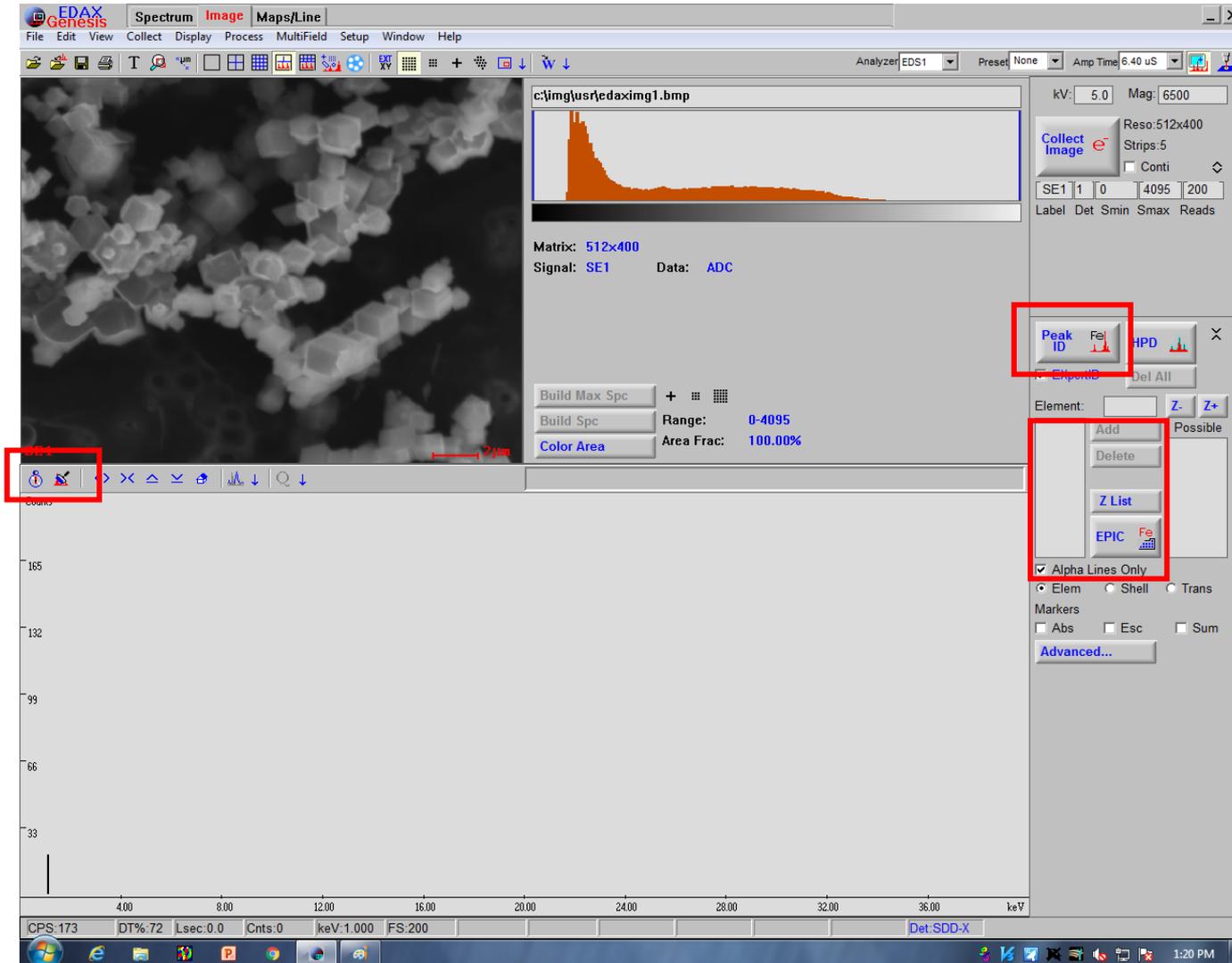
1

The screenshot displays the EDAX Genesis software interface. The main window is titled "EDAX Genesis" and has a menu bar with "Spectrum", "Image", and "Maps/Line" highlighted. The "Image" menu is open, showing options like "Collect", "Display", and "Process".

The interface is divided into several sections:

- Top Left:** A secondary electron image (SEI) showing a cluster of particles. A scale bar indicates 2 μm.
- Top Right:** A control panel with "kV: 5.0" and "Mag: 6500" highlighted by a red box. Below it, a "Collect Image" button is also highlighted by a red box. Other parameters include "Res: 512x400", "Strms: 5", and "Conti".
- Middle Right:** A table with columns "Label", "Det", "Smin", "Smax", and "Reads".
- Bottom Right:** Buttons for "Auto LUT", "Save", "Print", "Peak ID", and "HPD".
- Bottom Left:** A plot area showing "Counts" on the y-axis (ranging from 33 to 165) and "keV" on the x-axis (ranging from 4.00 to 36.00). A sharp peak is visible at approximately 5.0 keV.
- Bottom Center:** A status bar showing "CPS: 0", "DT%: 0", "Lsec: 0.0", "Cnts: 0", "keV: 1.000", "FS: 200", and "Det: SDD-X".

# Point & Area



The screenshot displays the EDAX Genesis software interface. The main window is titled "EDAX Report" and shows a grayscale image of a sample with many small, irregular particles. A red box labeled "1" highlights a magnifying glass icon in the toolbar below the image. Another red box labeled "2" highlights a "W" icon in the top menu bar. A third red box labeled "3" highlights a "W" icon in the right-hand panel. The right-hand panel contains various settings and controls, including "Mag: 6500", "Reso: 512x400", "Reads: 200", and "Line" selection. A red scale bar labeled "2 μm" is visible in the bottom right corner of the image. The bottom status bar shows "CPS: 15", "DT%: 80", "Lsec: 1.0", "Cnts: 0", "keV: 1.000", "FS: 200", "Time: 0.21min", and "Det: SDD-X".

# Mapping

1

The screenshot shows the EDAX Genesis software interface. The main window is titled "c:\img\usr\edax\img1.bmp" and displays a spectrum plot. The x-axis represents energy in keV, ranging from 400 to 3600. The y-axis represents counts per second (CPS), ranging from 33 to 165. A red box labeled "1" highlights the "Maps/Line" menu item in the top toolbar. Another red box labeled "2" highlights the "Maps" button in the right-hand panel. Below the spectrum plot, there are several buttons: "Build Max Spc", "Build Spc", and "Color Area". The right-hand panel contains various controls, including "Collect", "Clear", "Peak ID", "HPD", "ExpertID", "Del All", "Maps", "Line", "Collect Maps", "Auto LUT", "Print", "Multi Field", and "Fields: 20". The status bar at the bottom shows "CPS: 151", "DT%: 72", "Lsec: 0.0", "Cnts: 0", "keV: 1.000", "FS: 200", "Disk: 0.2GB", "Time: 1.6min", and "Det: SDD-X".

2

The screenshot displays the EDAX Genesis software interface. The main window is titled "Spectrum Image Maps/Line". The top menu bar includes File, Edit, View, Collect, Display, Process, MultiField, Setup, Window, and Help. The toolbar contains various icons for file operations and analysis. The central area is divided into two main sections: a top-left image window showing a grayscale map of a sample with a red scale bar labeled "2µm" and a red "1" next to it, and a top-right spectrum window showing a plot of counts versus energy. The spectrum window is titled "c:\img\usr\edax\img1.bmp" and shows a peak at approximately 5.0 keV. Below the spectrum plot, the matrix is listed as "512x400", the signal as "SE1", and the data as "ADC". The range is "0-4095" and the area fraction is "100.00%". The bottom section of the interface is a large plot area with a y-axis labeled "Counts" and an x-axis labeled "keV". The y-axis has tick marks at 33, 66, 99, 132, and 165. The x-axis has tick marks at 400, 800, 1200, 1600, 2000, 2400, 2800, 3200, and 3600. The status bar at the bottom shows "CPS: 185", "DT%: 70", "Lsec: 0.0", "Cnts: 0", "keV: 1.000", "FS: 200", "Disk: 0.2GB", "Time: 1.6min", and "Det: SDD-X". The system tray at the bottom right shows the time as "1:25 PM".

2

3

1

2µm

Build Max Spc + # # #  
Build Spc Range: 0-4095  
Color Area Area Frac: 100.00%

Maps **Line**

Points: 64  
Dwell[ms]: 200  
ROIs: 0

Use Z List  
HV OFF when done

Auto LUT  
Print CutePDF Writer  
Field Stage X Stage Y

Multi Field Fields: 20

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