

SEM-11

Harvard-CNS

Lon-in

1. Open the web browser
2. Click on CNS CLEAN
3. Select SEM11 from Room B15H
4. User type → User
5. Select “Have Reservation”
6. Choose your name
7. Enter password (cns2tafti)
8. Login

Harvard University
Center for
Nanoscale
Systems

Official CLEAN Time*: 2:31:13 PM (Thurs)
* This is the official time of record CNS will use for billing purposes.
Please ignore the local computer time.

SEM-4 - FESEM Ultra55

Tool Authorization: To enable this system, please select your use type (User/Staff/Assisted Use), then enter your password.
Billing will commence after successful authentication. You may log in now without a reservation, and a reservation will be created for you.
If you would like to consult the full scheduler first, [you may access it here.](#)

User ▼ Tafti, Fazel Have Reservation ▼ (for Walk-up Reservation)
..... <- enter your password.
login

This tool is currently not in use.

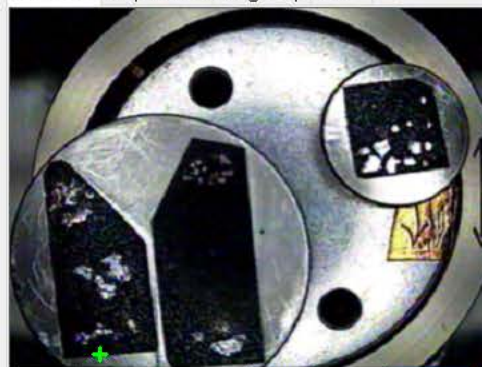
Document Repository for SEM-4
SOP: SOP055 Ultra55, Ultra Plus and Suora FESEM SOP: SOP078 Using the Ultra 55, Ultra Plus and Suora FESEMs

Up Coming (and Current) Reservations

Start Date and Time	End Date and Time	User	Staff	Notes
2018-05-03 14:00	2018-05-03 16:00	Fazel Tafti		Reservation made by Tim Cavanaugh.
2018-05-03 16:00	2018-05-03 16:30	Benjamin Zhang		
2018-05-03 17:00	2018-05-03 18:00	Ivo Stassen		
2018-05-03 18:00	2018-05-03 22:00	Henry Tsang CHEM165SP18		
2018-05-04 09:30	2018-05-04 10:30	Alexander Raymond		

System Log for Past Sessions since Mon, Jan 1, 2018
Click on (edit) to Edit a Comment.
Display logsheet

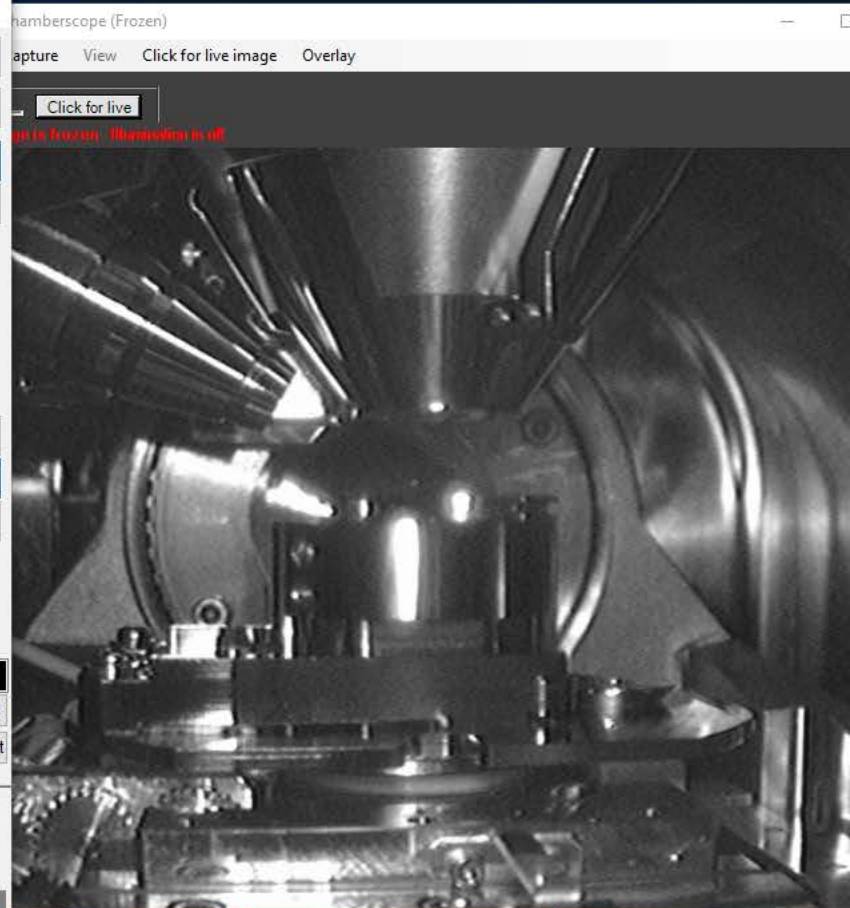
Use the mouse to drag the image to the desired location, or use the right click and select location.



Zoom SNS Save

X: 13.973 Y: 13.795 R: 0.0 Z: 13.7 T: 0.0

Full Image
Specimen
Observation
Multi View
Image File
Condition
Beam Align
ProbeCurrent
AbsorbCurrent



PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation Accel. Voltage Emission current

OFF ON 15.0kV 106.6 μA EMI Quick2 Fine1 CF Freeze Freeze Auto ACB Normal Shift0 ZFC Ruler Text SRT Cursor Spot

Probe Current Contrast Brightness Focus Magnification Stigma X Stigma Y D-Mag RDC

Navigator Step Control Stage Map LV

12/12/2019 15:40:35

×1,000 15.0kV LED SEM WD 10.0mm

Observation Mode

SEM LDF GB GBSH-S Recipe

Accel. Voltage (kV) 15.0

WD 10.0

Image Rotation 0.0

OLAP 1 4

Focus Depth 0

Probe Current 9

Detector LED

Filter LED 3

UED S3 300 V

Mesh Voltage 30

Focus Correct 0

OL Stigma X 231 Y -180

Dynamic Focus

Histogram Standard Histogram

SEM Monitor

Vacuum 9.6E-5 Pa

Gun RBED

Offset 0.0 mm

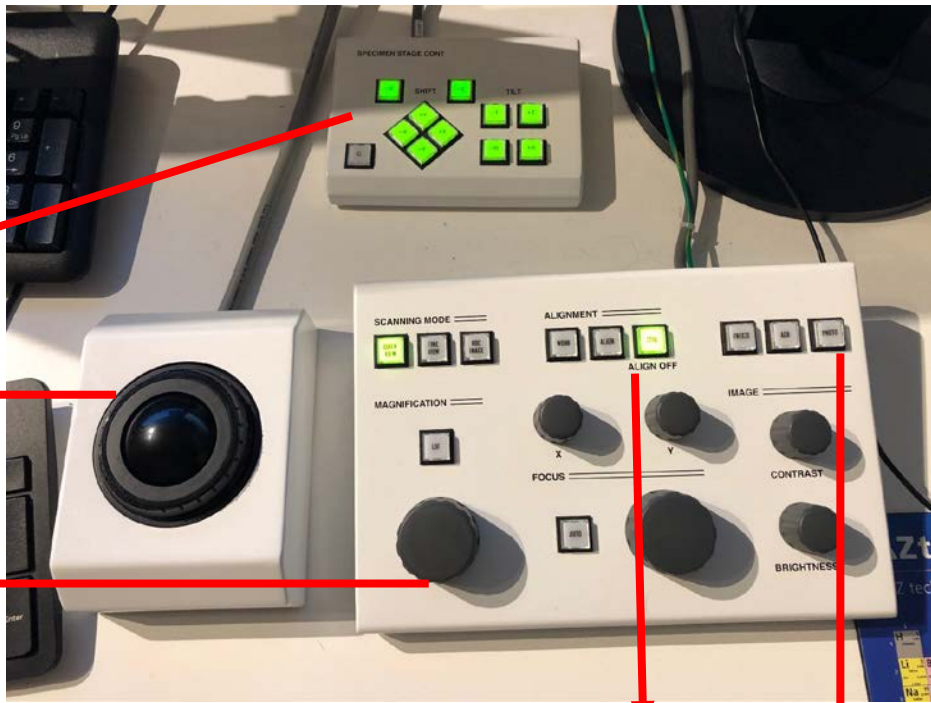
Spec. Exchange

Home Position

VENT EVAC

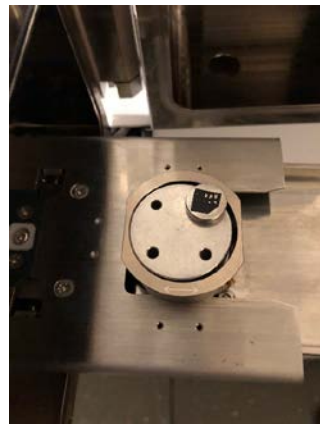
The specimen holder is on the specimen stage.

Before inserting the puck, make sure the IR camera is on, push on Sec. Exchange, and make sure $x=y=0$.



Either use the pad controls, or rotate the circle to adjust Z

Magnification



32 mm aluminum holder



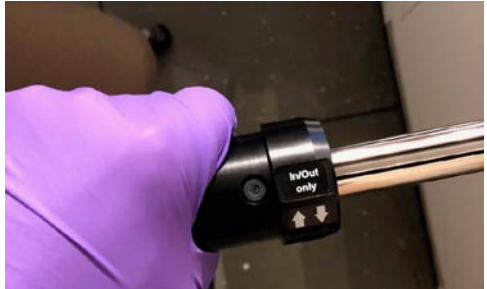
12.5 mm brass holder



double row brass holder



Change the lever from up/down to in/out



First adjust Sigma with X/Y, then adjust Wobble in the same way.

Backscattered mode requires a better control over brightness/contrast, but try using the ABC to start.

Hold 3 seconds on each switch to activate it when exchanging samples and pumping on the chamber. Wait until the light stops blinking.



PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation Accel. Voltage Emission current

OFF ON 5.0kV 102.0µA

Probe Current Contrast Brightness Focus Magnification Stigma X Stigma Y D-Mag RDC

Quick1 Fine2 CF Freeze Freeze Auto ACB HD Shift0 ZFC Ruler Text SRT Cursor Spot

Navigator Step Control Stage Map LV

Full Image Specimen Observation Multi View

Image File Condition Beam Align

ProbeCurrent AbsorbCurrent

SNS Save

Y: 0.000 R: 0.0 Z: 40.0 T: 0.0

Specimen Height Offset (mm) 0.0 OK Cancel

Observation Mode SEM LDF GB GBSH-S

Accel. Voltage (kV) 5.0

WD 9.8

Image Rotation 0.0

OLAP 1 4

Focus Depth 0

Probe Current 9

Detector LED

Filter LED 3

UED 0 0 V

Mesh Voltage 0

Focus Correct 0

Dynamic Focus

Vacuum 1.1E-3 Pa

Gun PCD RBED

Offset 0.0 mm

Spec. Exchange Home Position VENT EVAD

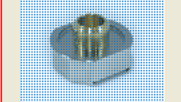

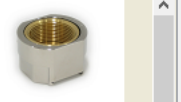






The specimen holder is on the specimen stage.

12.5mm holder for one brass puck,
2 bulk holder for many brass pucks,
32 mm holder for aluminum plugs

Usually the EDX program is open, but if not, double click on PC-SEM.

Select specimen holder

Specimen holder

 12.5mm	 TED holder	 32mm
 2 bulk holder	 SM-71250(SH)	 TS holder
 SM-71270(CH)	 TED	 SM-71110(2BH)

Only one log-in is enough for both SEM and EDX:
User: ftafti
ID: cns2tafti



To do backscattering, check the box for the BED detector and make sure it is inserted fully.

PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation Accel. Voltage Emission current

OFF ON 5.0kV 102.2 μA EMI Quick1 Fine2 CF Freeze Freeze Auto ACB HD Shift0 ZFC Ruley Text SRT Cursor Spot

Probe Current Contrast Brightness Focus Magnification Stigma X Stigma Y D-Mag RDC Navigator Step Control Stage Map LV

Zoom SNS Save

× 60 5.0kV LED SEM WD 9.8mm 9/10/2019 13:19:24 X: 8.935 Y: -8.591 R: 0.0 Z: 40.0 T: 0.0

Observation Mode SEM LDF GB GBSH-S Recipe

Accel. Voltage (kV) 5.0

WD 9.8

Image Rotation 0.0

OLAP 1 4

Focus Depth 0

Probe Current 9

Detector LED

Filter LED 3 UED 0 0 V Mesh Voltage 0

Focus Correct 0

OL Stigma X -9 Y 35

Dynamic Focus

SEM Monitor Vacuum 4.4E-4 Pa

Offset 0.0 mm

Spec. Exchange Home Position VENT EVAD

Gun PCD RBED

The specimen holder is on the specimen stage.

Image File Observation Condition Electron Beam Alignment

Right click on this image and select the field of view or simply drag the green cross.

Choose the voltage (usually 15) and current (9 for SEM and 12 for EDX) and the detector (usually LED or BED) and work distance = 10mm.

Deben Chamberscope

Setup Capture View Freeze Overlay

Illumination 1 Freeze

Full Image Specimen Observation Multi View

Image File Condition Beam Align

ProbeCurrent AbsorbCurrent

Standards...

PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation ON 15.0kV 102.6 μA

Quick Fine2 CF Freeze Freeze Auto ACB HD Shift0 ZFC Ruler Text SRT Cursor Spot

Full Image Specimen Observation Multi View

Image File Condition Beam Align

ProbeCurrent AbsorbCurrent

Observation ON means the gun is on.

File → Save Figure as Click on Setup → Operation Settings → adjust the scan speeds as you wish.

You could change XYZ here. Usually put Z to 10 to start.

9/10/2019 13:29:37 X: 9.558 Y: -8.122 R: 0.0 Z: 14.1 T: 0.0

SEM Monitor Vacuum 9.6E-5 Pa

Offset 0.0 mm

Spec. Exchange Home Position VENT EVAD

The specimen holder is on the specimen stage.

Observation Mode SEM LDF GB GBSH-S Recipe

Accel. Voltage (kV) 15.0

WD 10.0

Image Rotation 0.0

OLAP 4

Focus Depth 0

Probe Current 9

Detector LED

Filter LED 3 UED 0 Mesh Voltage 0

Focus Correct 0

OL Stigma X 84 Y -89

Dynamic Focus

Histogram Standard Histogram

Image File Observation Condition Electron Beam Alignment

Deben Chamberscope

Setup Capture View Freeze Overlay

Illumination 1 Freeze

Operation Settings

Scan Settings Auto function Photo & Print Data Extended Photo Data Preset Detector name ST

Scan/AVE	Speed	Ave.
Quick1	1	1
Quick2	5	1
Fine1	7	1
Fine2	9	2
CF1	2	10s
CF2	2	30s

Photo button

Photo Setting Type Normal

Speed Fine1 S/N 1 Image Freeze

Use Integration Function

Auto Save

Execute auto save

The file name for auto save image

Image format for save image BMP Other

Type Normal Other

Integration

Freeze button set to Integration

Number of Frames

Quick 125 Fine 10

Save Load Set

Mouse without Borders
Connecting to OXFORD-QROAKICC
Mouse without Borders

PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation Accel. Voltage Emission current

OFF ON 15.0kV 102.6 μA EMI Quick2 Fine2 CF Freeze Freeze Auto ACB HD Shift0 ZFC Ruler Text SRT Cursor Spot

Probe Current Contrast Brightness Focus Magnification Stigma X Stigma Y D-Mag RDC Navigator Step Control Stage Map LV

Full Image Specimen Observation Multi View Image File Condition Beam Align

ProbeCurrent AbsorbCurrent

Report Search Reset search Save Load Update

By right clicking and choosing Set Conditions, you can recover the conditions that you used to take this image.

100 μm 9/10/2019 13:29:37 x230 15.0kV LED SEM WD 10.0mm X: 9.558 Y: -8.122 R: 0.0 Z: 14.1 T: 0.0

Move this image point
Move this image point(XYR)
Set Conditions
Set Conditions(Selective)..
Rename
Move to the Recycle Bin

Date 10/9/2019 Accv.Voltage 15.0KV Observation Mode SEM WD 10.0mm
Operator Guest Magnification x230 Detector LED Vacuum 9.6E-5Pa
Folder Z:\JEOL 7900 SEM\Tafti Lab

Deben Chamberscope

Setup Capture View Freeze Overlay

Illumination 1 Freeze

Operation Settings

Scan Settings Auto function Photo & Print Data Extended Photo Data Preset Detector name ST

Scan/AVE	Speed	Ave.
Quick1	1	1
Quick2	5	1
Fine1	7	1
Fine2	9	2
CF1	2	10s
CF2	2	30s

Photo button
Photo Setting Type Normal
Speed Fine1 S/N 1 Image Freeze
 Use Integration Function

Auto Save
 Execute auto save
The file name for auto save image
Image format for save image BMP
 Save as export images
Color Black and White Co
Type Normal Ext

Save Load Set

PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation Accel. Voltage Emission current

OFF ON 15.0kV 102.6 μA EMI Quick2 Fine1 CF Freeze Freeze Auto ACB HD Shift0 ZFC Ruley Text SRT Cursor Spot

Probe Current Contrast Brightness Focus Magnification Stigma X Stigma Y D-Mag RDC Navigator Step Control Stage Map LV

Full Image Specimen Observation

Image File Condition Beam Align

Zoom SNS Save

ProbeCurrent AbsorbCurrent

Prepare for EDX, turn off (freeze) the IR camera.

Change detector from LED (lower el. Det.) to BED for backscattered imaging.

10 μm 9/10/2019 13:36:53

×950 15.0kV LED-C SEM WD 10.0mm X: 9.554 Y: -8.191 R: 0.0 Z: 13.9 T: 0.0

Observation Mode SEM LDF GB GBSH-S Recipe

Accel. Voltage (kV) 15.0

WD 10.0

Image Rotation 0.0

OLAP 4

Focus Depth 0

Probe Current 9

Detector BED-C

Filter LED 3 UED 0 Mesh Voltage 0

Focus Correct 0

OL Stigma X 84 Y -89

Dynamic Focus

SEM Monitor Vacuum 9.6E-5 Pa

Offset 0.0 mm

Spec. Exchange Home Position VENT EVAD

The RBED is in.

Deben Chamberscope (Frozen)

Setup Capture View Click for live image Overlay

Illumination 1 Click for live

Image is frozen. Illumination is off.

Operation Settings

Scan Settings Auto function Photo & Print Data Extended Photo Data Preset Detector name ST

Scan/Ave.	Speed	Ave.
Quick1	1	1
Quick2	5	1
Fine1	7	1
Fine2		2
CF	2	10s
	2	30s

Photo button

Photo Setting Type Normal

Speed Fine1 S/N 1 Image

Use Integration Function Freeze

Auto Save

Execute auto save

The file name for auto save image

Image format for save image BMP

Save as export images

Color Black and White Co

Type Normal Ext

Integration

Freeze button set to integration

Number of Frames

Quick 125 Fine 10

Save Load Set

you need to insert the RBED detector and turn off the IR camera for the backscattered imaging mode, and reduce the scan speed.

EDS-SEM

Map

Describe Specimen

AZtecLive

Scan Image

Acquire Map Data

Construct Maps

Report Results

Guided

Custom

Specimens in '10092019'

+ New Specimen

Specimen 1

Site 1

A new project is named after a new specimen. You can choose multiple sites for each specimen (project).

Summary Specimen Geometry Pre-defined Elements

Project Notes

Click here to begin entering notes about your project.

Select the analysis mode and continue through the steps. Usually the AZtecLive is useless.

Specimen Notes for 'Specimen 1'

Click here to begin entering notes about your specimen.

Input \propto probe current
 Output \propto process time
 Dead time = [Input - Output]/Input
 DT must be less than 50% (usually 10-30%)
 Live Time (LT) = 1/DT

Site Notes for 'Site 1'

Click here to begin entering notes about this site.

For EDX, make sure the detector is cold and fully inserted. If the counts are low, it is probably out.

Search Help

Project Data

Current Site Data Tree

10092019

Specimen 1

Site 1

Site 1

Mini View Ratemeter

Input Count Rate (cps)	Total:	20223
Output Count Rate (cps)	Total:	17150
Dead Time		14%

EDS Detector Control: Ultim Max

Thermal

Insertion

State: Fully Inserted

Activity: Not Moving

Interlock State: Allow Movement

In Out Stop

Analyzer mode

EDS-SEM | Map | Describe Specimen | AZtecLive | Scan Image | Acquire Map Data | Construct Maps | Report Results | Guided | Custom

Specimens in '10092019'

+ New Specimen

- Specimen 1
 - Site 1

Summary | Specimen Geometry | Pre-defined Elements

Project Notes

[Click here to begin entering notes about your project.](#)

Specimen Notes for 'Specimen 1'

[Click here to begin entering notes about your specimen.](#)

Site Notes for 'Site 1'

[Click here to begin entering notes about this site.](#)

Search Help

Project Data

Current Site | Data Tree

- 10092019
 - Specimen 1
 - Site 1

Site 1

Mini View

Ratemeter

Input Count Rate (Ratemeter)

Output Count Rate

Dead Time: 13%

Recommended WD 10.0 mm

Accelerating Voltage (kV): 15.0

Energy Range (keV): Auto

Number of Channels: Auto

Process Time: 4

- Default
- 1
- 2
- 3
- 4
- 5
- 6

The process time can be tuned. Default is 4.



EDS-SEM

Analyzer

Describe Specimen AZtecLive Acquire Spectra Confirm Elements Calculate Composition

Compare Spectra Report Results

Guided Custom

Acquire Spectrum **START** **STOP** Settings

Hand icon
Magnifying glass icon
Circle icon
Info icon

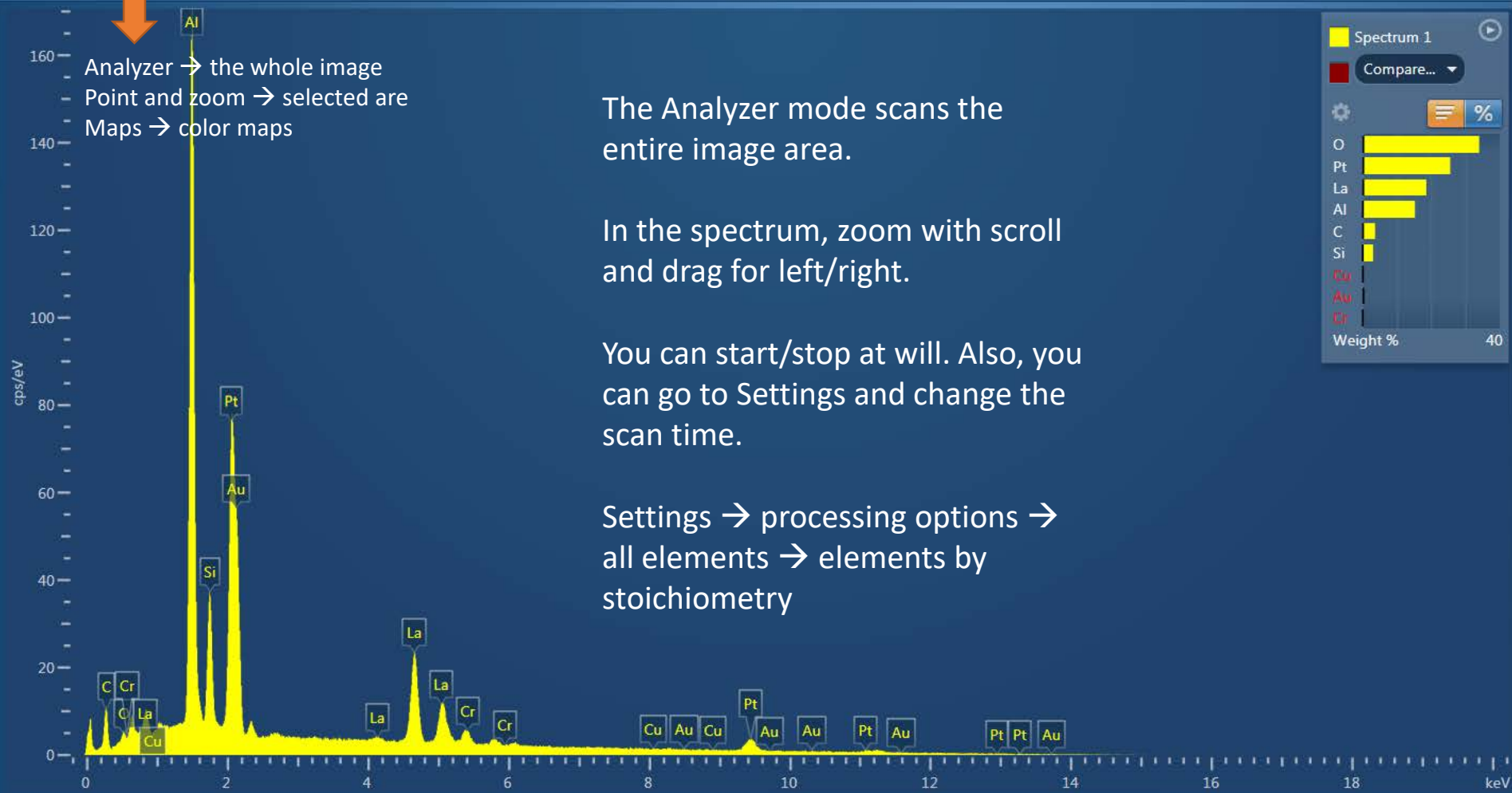
Analyzer → the whole image
Point and zoom → selected are
Maps → color maps

The Analyzer mode scans the entire image area.

In the spectrum, zoom with scroll and drag for left/right.

You can start/stop at will. Also, you can go to Settings and change the scan time.

Settings → processing options → all elements → elements by stoichiometry



Search Help

Project Data

Current Site Data Tree

10092019

Specimen 1

Site 1

Spectrum 1

Percent Complete: 29%
Remaining Time: 0:00:34
Run Time: 0:00:14
Live Time: 0:00:08
Area Counts: 579932

Site 1

Mini View Ratemeter

Input Count Rate (cps) Total: 65906

Output Count Rate (cps) Total: 40670

Dead Time 38%

Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0

EDS-SEM

Analyzer

Describe Specimen

AZtecLive

Acquire Spectra

Configure Elements

Available Templates

Summary Table - Single Spectrum
 Comparison of Results - Two Spectra
 Summary Table - Multiple Spectra
Full Results Table (customizable) - Single Spectrum
 Spectrum Details - Details
 Spectrum Processing - Processing

Quant Result Details

Label:
 Element List Type:
 Processing Option:
 Specimen Coating:
 Beam Calibration Element Coating:
 Automatic Line Selection:
 Normalization:

Copy

Quant Results View

Viewed Data: Spectrum 1

Processing Option Used: Oxygen by Stoichiometry (Normalized)

Element	Line Type	Apparent Concentration	k Ratio	Wt%	Wt% Sigma
C	K series	0.31	0.00311	3.67	0.07
O				34.13	
Al	K series	4.88	0.03501	15.17	0.05
Si	K series	0.95	0.00755	3.06	0.02
Cr	K series	0.00	0.00000	0.00	0.04
Cu	L series	0.00	0.00000	0.00	0.05
La	L series	5.50	0.04939	18.32	0.10
Pt	M series	6.32	0.06318	25.65	0.11
Au	M series	0.00	0.00000	0.00	0.13
Total				100.00	

Select result WORD
 template.

EDS-SEM Quant Settings

Processing options

- All Elements
 Element by Difference
 Element by Stoichiometry
 Combined element: Oxygen
 Number of ions: 3.00

- Normalize results
 Correct for window artefacts

Deconvolution elements

Carbon
 Add element
 Remove element
 Clear All

Quant standardizations

- Factory: Quant Standardizations
 User:

Threshold quantitative results

- Enable thresholding
 Sigma level: 2.0

Element list

- Current Spectrum
 Fixed List
 Fixed List and Current Spectrum

Element List

Quant Element List Details

Periodic table showing elements H through Rn. H is highlighted.

In the quant setting select All Elements for usual EDS but if you want to be more careful about oxygen content, choose Element by Stoichiometry as shown here.

- Automatic line selection for all elements

Element Details for Hydrogen

- Fixed weight %: 0.00
 Valency: 1.00

Apply and Save Save Close

Quant Table Layout Editor

Column Name	Show Column
Line Type	<input checked="" type="checkbox"/>
Apparent Concentration	<input checked="" type="checkbox"/>
Intensity Correction	<input checked="" type="checkbox"/>
k Ratio	<input checked="" type="checkbox"/>
Wt%	<input checked="" type="checkbox"/>
Wt% Sigma	<input checked="" type="checkbox"/>
Atomic %	<input checked="" type="checkbox"/>
Oxide	<input type="checkbox"/>
Oxide %	<input checked="" type="checkbox"/>
Oxide % Sigma	<input type="checkbox"/>
Number of Ions	<input type="checkbox"/>
Type of Ion	<input type="checkbox"/>
Standard Label	<input checked="" type="checkbox"/>
Factory Standard	<input checked="" type="checkbox"/>
Standard Calibration Date	<input checked="" type="checkbox"/>

Describe Specimen AZtecLive Acquire Spectra Confirm Elements Calculate Composition Compare Spectra Report Results

Guided Custom

Calculate Composition Settings

Quant Result Details

Label: Spectrum 1
 Element List Type: Current Spectrum
 Processing Option: Oxygen by Stoichiometry
 Specimen Coating: Off
 Beam Calibration Element Coating: Off
 Automatic Line Selection: Enabled
 Normalization: Enabled

Copy Requantify

Change the setting of the table as you wish.

Search Help

Project Data

Current Site Data Tree

- 10092019
 - Specimen 1
 - Site 1
 - Spectrum 1

Quant Results View

Viewed Data: Spectrum 1

Processing Option Used: Oxygen by Stoichiometry (Normalized)

Edit Columns ...

Select the columns to show or hide.

Element	Line Type	Apparent Concentration	k Ratio	Wt%	Wt% Sigma	Atomic %	Oxide %	Standard Label	Factory Standard	Standard Calibration Date
C	K series	0.31	0.00311	3.67	0.07	9.05	13.44	C Vit	Yes	
O				34.13		63.24				
Al	K series	4.88	0.03501	15.17	0.05	16.67	28.67	Al2O3	Yes	
Si	K series	0.95	0.00755	3.06	0.02	3.23	6.55	SiO2	Yes	
Cr	K series	0.00	0.00000	0.00	0.04	0.00	0.00	Cr	Yes	
Cu	L series	0.00	0.00000	0.00	0.05	0.00	0.00	Cu	Yes	
La	L series	5.50	0.04939	18.32	0.10	3.91	21.49	LaB6	Yes	
Pt	M series	6.32	0.06318	25.65	0.11	3.90	29.85	Pt	Yes	
Au	M series	0.00	0.00000	0.00	0.13	0.00	0.00	Au	Yes	
Total				100.00		100.00	100.00			

Site 1

Mini View Ratemeter

Input Count Rate (cps) Total: 65842

Output Count Rate (cps) Total: 40860

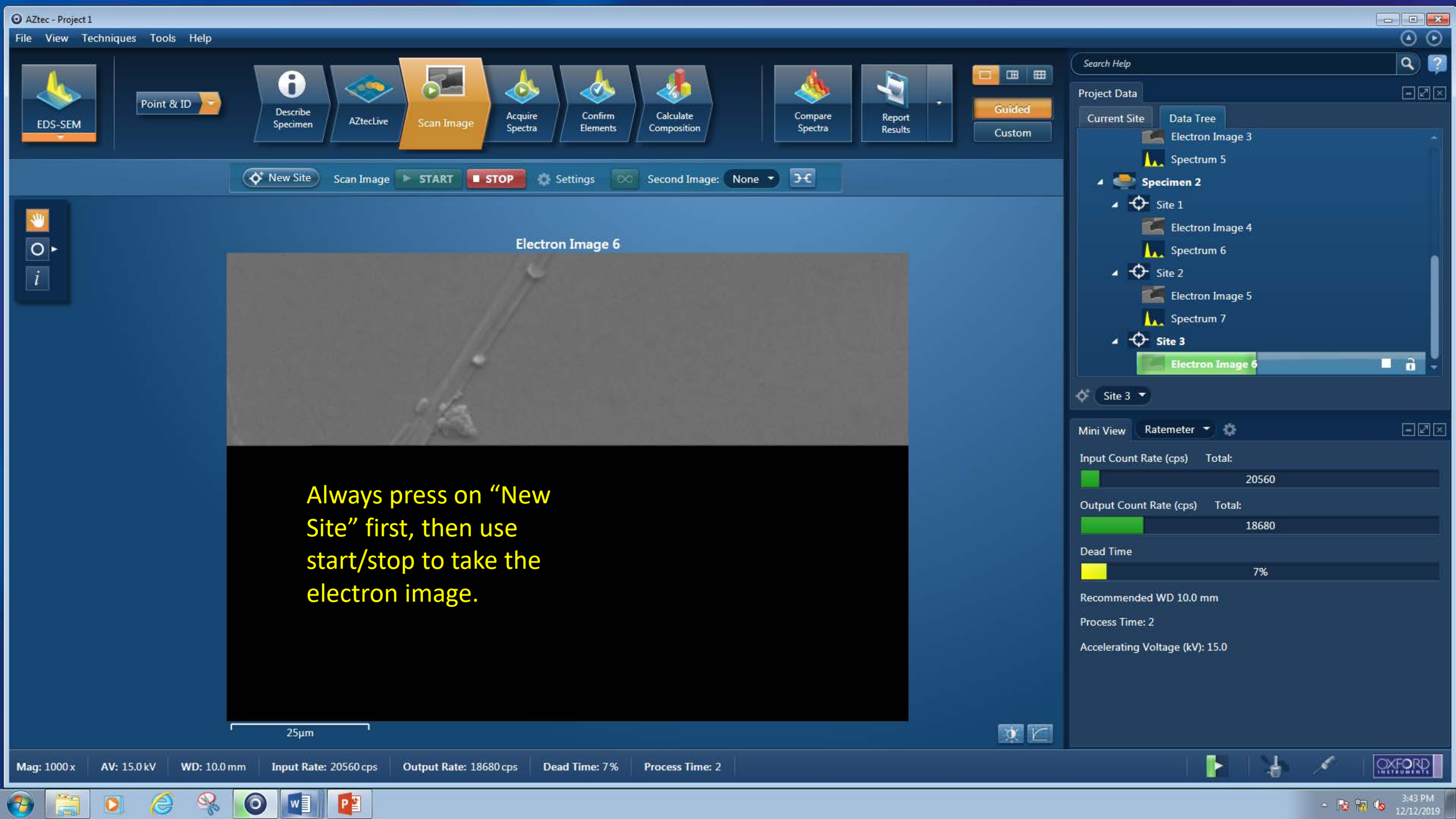
Dead Time 36%

Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0

Point and ID mode



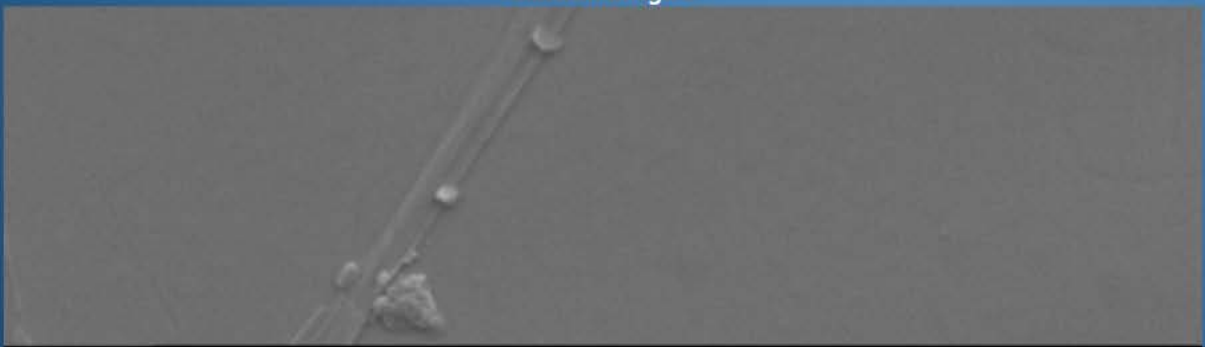
Point & ID



New Site Scan Image START STOP Settings Second Image: None



Electron Image 6



Always press on "New Site" first, then use start/stop to take the electron image.

25µm

Search Help

Project Data

Current Site Data Tree

- Electron Image 3
- Spectrum 5
- Specimen 2
 - Site 1
 - Electron Image 4
 - Spectrum 6
 - Site 2
 - Electron Image 5
 - Spectrum 7
 - Site 3
 - Electron Image 6

Site 3

Mini View Ratemeter

Input Count Rate (cps)	Total:
	20560
Output Count Rate (cps)	Total:
	18680
Dead Time	7%

Recommended WD 10.0 mm
Process Time: 2
Accelerating Voltage (kV): 15.0

Mag: 1000 x AV: 15.0 kV WD: 10.0 mm Input Rate: 20560 cps Output Rate: 18680 cps Dead Time: 7% Process Time: 2



EDS-SEM

Point & ID

Describe Specimen

AZtecLive

Scan Image

Acquire Spectra

Confirm Elements

Calculate Composition

Compare Spectra

Report Results

Guided

Custom

Acquire Spectrum

START

STOP

Settings

Second Image: None

Hand icon

Zoom in icon

Zoom out icon

Home icon

Refresh icon

Undo icon

Redo icon

Info icon

Use "Settings" to change the acquisition time, select an area, use start/stop to acquire the spectrum, point and id is the best mode.

EDS Acquire Spectrum Settings

Energy Range (keV): Auto

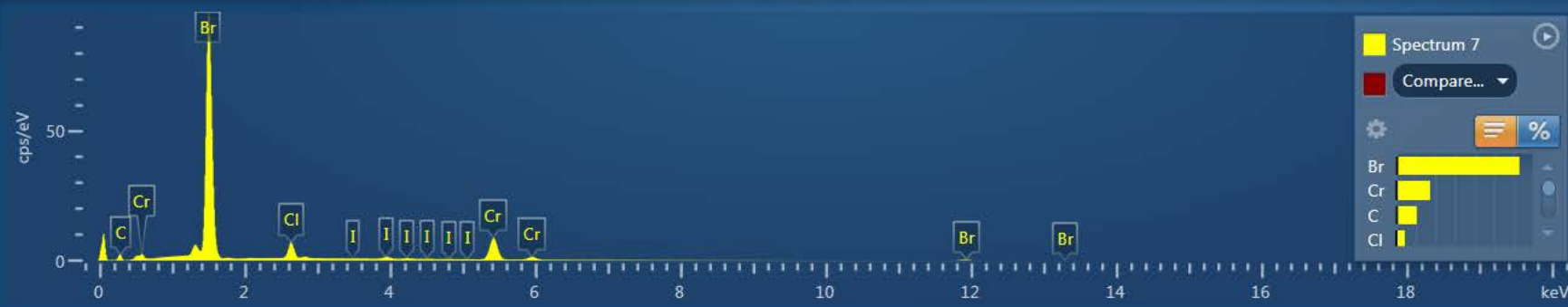
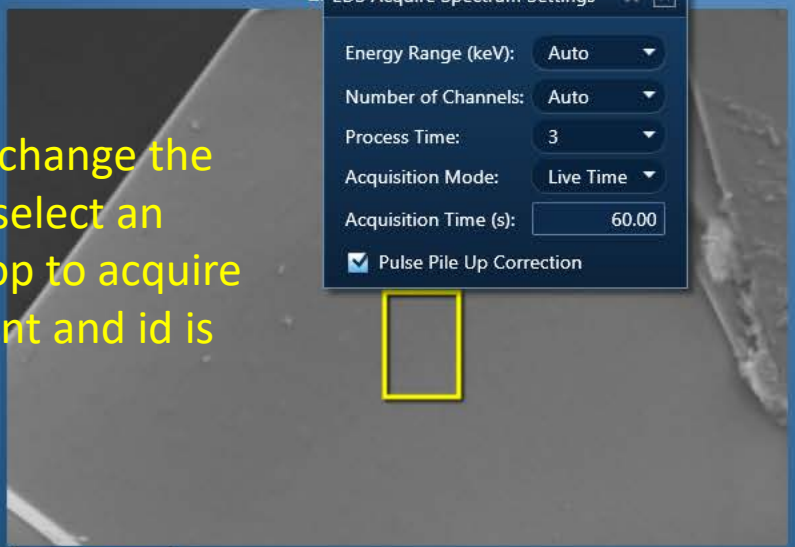
Number of Channels: Auto

Process Time: 3

Acquisition Mode: Live Time

Acquisition Time (s): 60.00

Pulse Pile Up Correction



Search Help

Project Data

Current Site

Data Tree

- Electron Image 2
- Spectrum 4
- Site 3
- Electron Image 3
- Spectrum 5
- Specimen 2
 - Site 1
 - Electron Image 4
 - Spectrum 6
 - Site 2
- Electron Image 5

Site 2

Mini View

Ratemeter

Input Count Rate (cps)	Total
20193	20193

Output Count Rate (cps)	Total
17710	17710

Dead Time: 9%

Recommended WD 10.0 mm

Process Time: 3

Accelerating Voltage (kV): 15.0

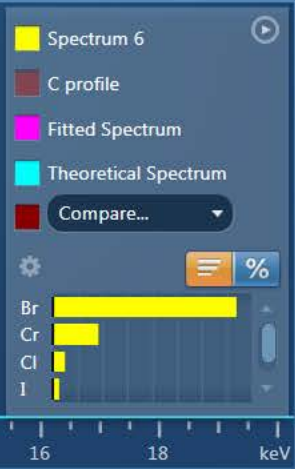
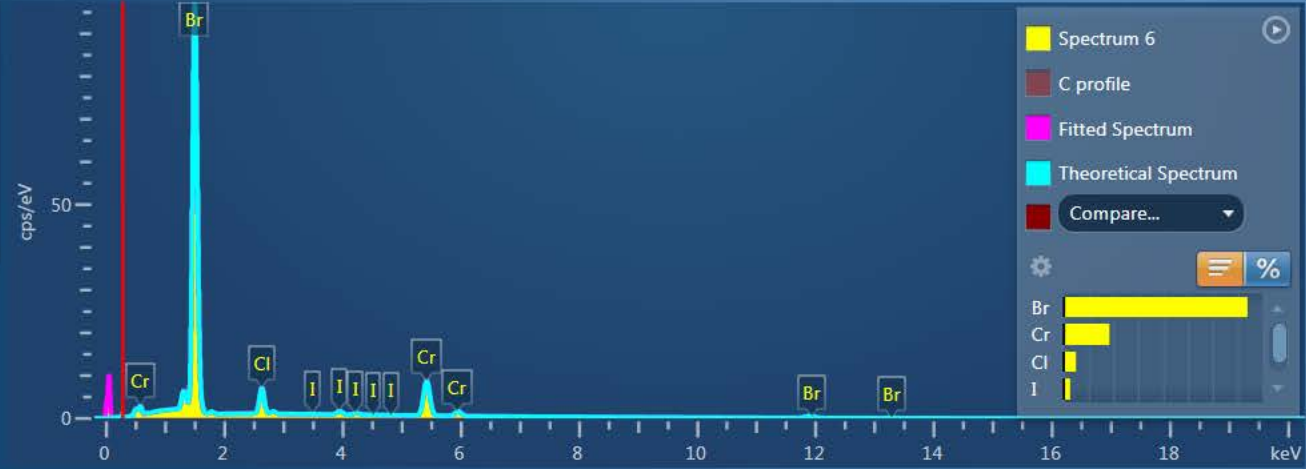


Point & ID



Guided
Custom

Confirm Elements Settings



Candidate Elements

Spectrum Height: [Slider]

Double Click on a spectrum peak using the Show Candidate Elements tool.

?

Periodic Table Element List Peak Labels

H																			He
Li	Be							B	C	N	O	F	Ne						
Na	Mg							Al	Si	P	S	Cl	Ar						
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
Fr	Ra	Ac																	

AutoID Pre-defined Clear all

Search Help

Project Data

Current Site Data Tree

- Spectrum 2
- Spectrum 3
- Site 2
 - Electron Image 2
 - Spectrum 4
- Site 3
 - Electron Image 3
 - Spectrum 5
- Specimen 2
 - Site 1
 - Electron Image 4

Mini View Ratemeter

Input Count Rate (cps) Total: 19815

Output Count Rate (cps) Total: 17460

Dead Time: 9%

Recommended WD 10.0 mm

Process Time: 3

Accelerating Voltage (kV): 15.0

EDS-SEM

Point & ID

Describe Specimen AZtecLive Scan Image Acquire Spectra Confirm Elements Calculate Composition

Compare Spectra Report Results

Guided Custom

Calculate Composition Settings

- ### Available Templates
- Summary Table - Single Spectrum
 - Comparison of Results - Two Spectra
 - Summary Table - Multiple Spectra
 - Full Results Table (customizable) - Single Spectrum
 - Spectrum Details - Details
 - Spectrum Processing - Processing

Quant Result Details

Label: Spectrum 6

Element List Type: Current Spectrum

Processing Option: All Elements

Specimen Coating: Off

Beam Calibration Element Coating: Off

Copy

Rogers Template

- Save As...
- Append...
- Print
- Email...
- Site Report...
- Report Templates...

Search Help

Project Data

Current Site Data Tree

- Spectrum 2
- Spectrum 3
- Site 2
 - Electron Image 2
 - Spectrum 4
- Site 3
 - Electron Image 3
 - Spectrum 5
- Specimen 2
 - Site 1
 - Electron Image 4

Quant Results View

Viewed Data: Spectrum 6

Processing Option Used: All Elements Processed (Normalized)

Edit Columns ...

Element	Line Type	Apparent Concentration	k Ratio	Wt%	Wt% Sigma	Atomic %	Standard Label	Factory Standard	Standard Calibration Date
Cl	K series	1.21	0.01058	4.93	0.05	9.66	NaCl	Yes	
Cr	K series	5.39	0.05394	18.44	0.11	24.62	Cr	Yes	
Br	L series	20.25	0.18134	74.03	0.14	64.30	KBr	Yes	
I	L series	0.62	0.00622	2.59	0.10	1.42	I (v)	Yes	
Total				100.00		100.00			

Site 1

Mini View Ratemeter

Input Count Rate (cps) Total: 18215

Output Count Rate (cps) Total: 15890

Dead Time: 9%

Recommended WD 10.0 mm

Process Time: 3

Accelerating Voltage (kV): 15.0

Color map mode

EDS-SEM

Map

Describe Specimen AZtecLive Scan Image Acquire Map Data Construct Maps

Report Results

Guided Custom

Project Data

Current Site Data Tree

- Site 2
 - Electron Image 2
 - Map Data 1
 - EDS Data
 - Map Sum Spectrum
 - Si Kα1
 - La Lα1
 - Pt Mα1
 - Al Kα1
 - Spectrum 3
 - Spectrum 4**

Hand icon

Zoom in

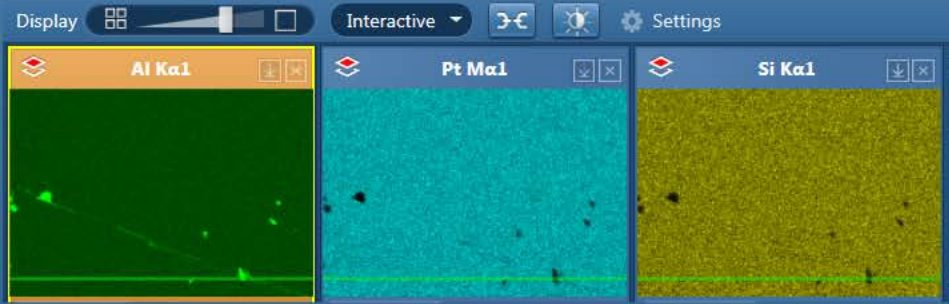
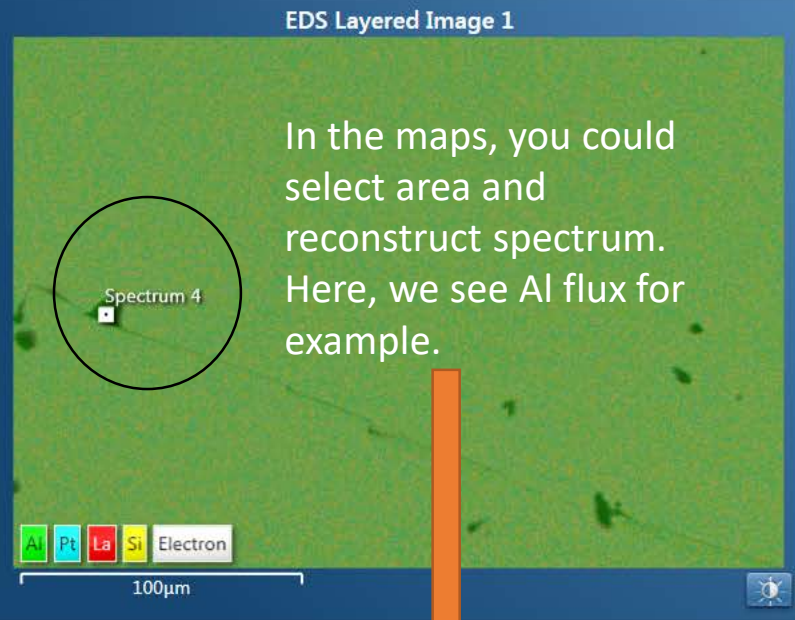
Zoom out

Refresh

Undo

Redo

Info



Minimized Maps Map Display Type: Weight % Binning Factor: 1

Map Details

Save Settings to Profile Apply Profile Settings

H	He																
Li	Be	B	C	N	O	F	Ne										
Na	Mg	Al	Si	P	S	Cl	Ar										
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu				
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr				

AutoID Include Exclude Clear Clear All Predefin

Selected Element Details



Site 2

Mini View Ratemeter

Input Count Rate (cps) Total: 66580

Output Count Rate (cps) Total: 40760

Dead Time 38%

Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0



Map

Describe Specimen AZtecLive Scan Image Acquire Map Data Construct Maps

Use the Tools menu for most manipulations.

Report Results

Guided Custom

Search Help

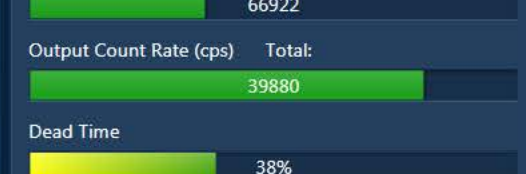
Project Data

Current Site Data Tree

- Site 2
 - Electron Image 2
 - Map Data 1
 - EDS Data
 - Map Sum Spectrum
 - Si Kα1
 - La Lα1
 - Pt Mα1
 - Al Kα1
 - Spectrum 3
 - Spectrum 4

Site 2

Mini View Ratemeter



Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0

Information

Reconstruct Spectrum Finished

Construct Maps Map TruMap QuantMap

EDS Layered Image 1



Images and results can be saved by right clicking on the image, or by a "batch export" function from here, or "set report" for each site (WORD).

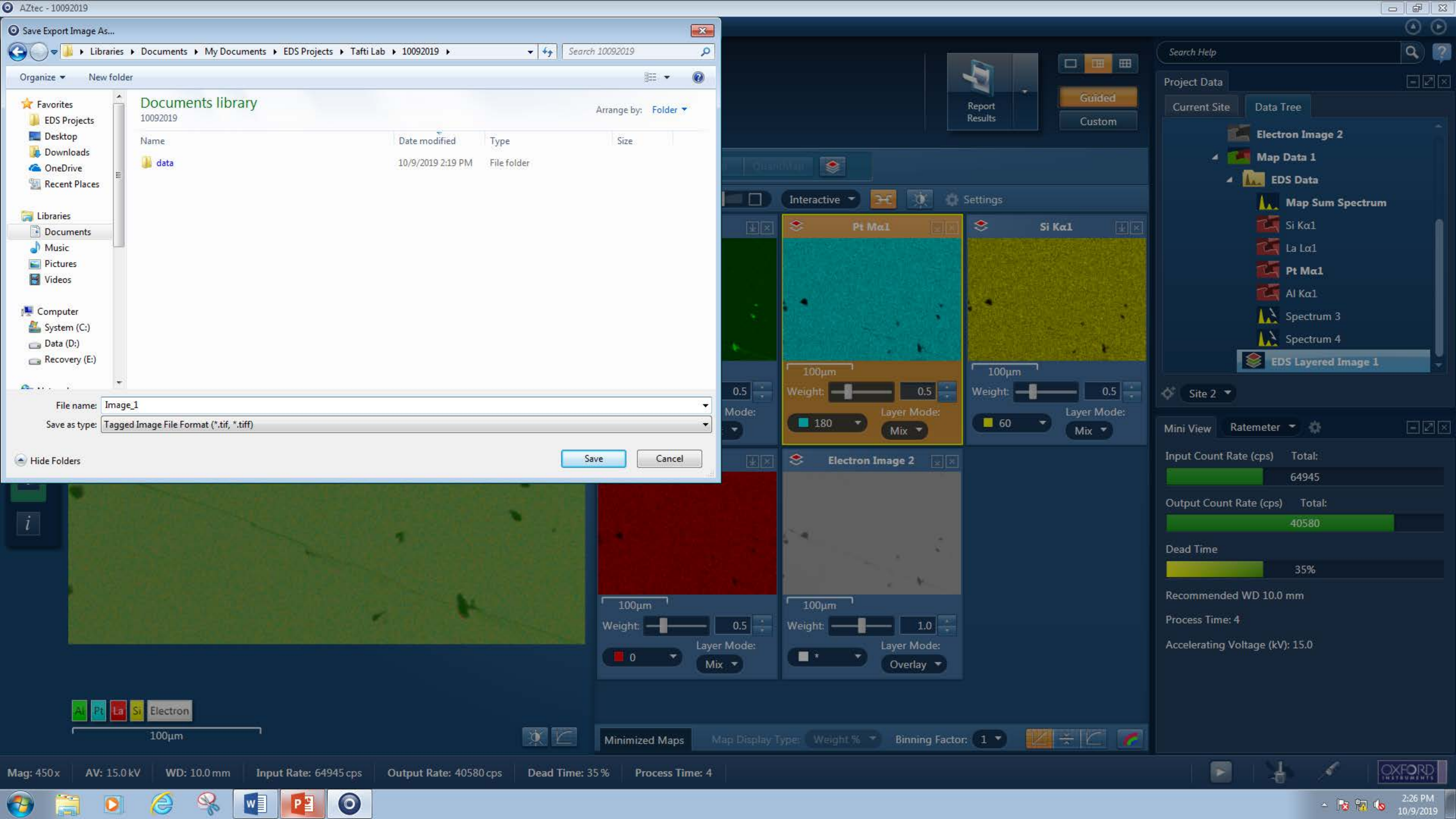
Display Interactive Settings

<p>Al Kα1</p> <p>25µm</p> <p>Weight: 120</p> <p>Layer Mode: Mix</p>	<p>Pt Mα1</p> <p>Weight: 0.5</p> <p>Layer Mode: Mix</p>	<p>Si Kα1</p> <p>100µm</p> <p>Weight: 0.5</p> <p>Layer Mode: Mix</p>
<p>La Lα1</p> <p>100µm</p> <p>Weight: 0.5</p> <p>Layer Mode: Mix</p>	<p>Electron Image 2</p> <p>100µm</p> <p>Weight: 1.0</p> <p>Layer Mode: Overlay</p>	



Minimized Maps Map Display Type: Weight % Binning Factor: 1

Map Details AutoID



Save Export Image As...

Libraries > Documents > My Documents > EDS Projects > Tafti Lab > 10092019

Documents library

Name	Date modified	Type	Size
data	10/9/2019 2:19 PM	File folder	

File name: Image_1

Save as type: Tagged Image File Format (*.tif, *.tiff)

Save Cancel

Report Results Guided Custom

Interactive Settings

Pt Ma1 Si Ka1

100µm Weight: 0.5 Layer Mode: Mix

100µm Weight: 0.5 Layer Mode: Mix

100µm Weight: 0.5 Layer Mode: Mix

100µm Weight: 1.0 Layer Mode: Overlay

Electron Image 2

Minimized Maps Map Display Type: Weight % Binning Factor: 1

Search Help

Project Data

Current Site Data Tree

- Electron Image 2
 - Map Data 1
 - EDS Data
 - Map Sum Spectrum
 - Si Ka1
 - La La1
 - Pt Ma1
 - Al Ka1
 - Spectrum 3
 - Spectrum 4
 - EDS Layered Image 1

Site 2

Mini View Ratemeter

Input Count Rate (cps) Total: 64945

Output Count Rate (cps) Total: 40580

Dead Time: 35%

Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0

Mag: 450x AV: 15.0 kV WD: 10.0 mm Input Rate: 64945 cps Output Rate: 40580 cps Dead Time: 35% Process Time: 4

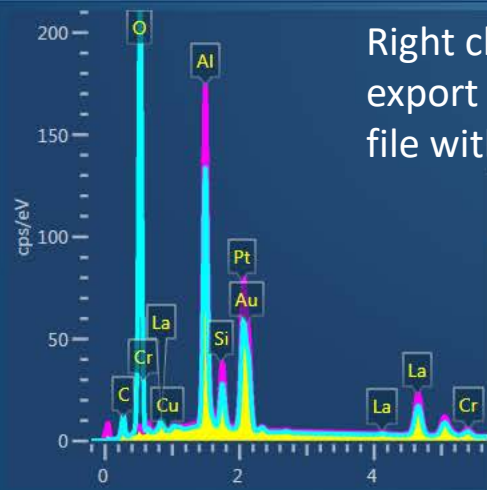
EDS-SEM

Analyzer

Describe Specimen AZtecLive Acquire Spectra **Confirm Elements** Calculate Composition

Compare Spectra Report Results **Guided** Custom

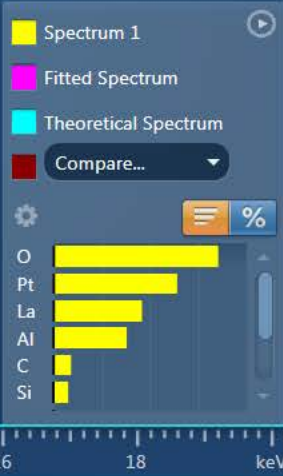
Confirm Elements Settings



Right click on the spectrum and choose to export data as EMSA which will be a text file with the spectrum data.

- Reset scales
- Export**
 - Save As...
 - EMSA...**
 - Copy
 - Print
 - Email...
 - Settings...
- Peak Labels
- Annotations
- X Axis
- Y Axis
- Normalize
- Noise Peak
- Spectrum Display
- Details...

- Save As...
- EMSA...**
- Copy
- Print
- Email...
- Settings...



Candidate Elements

Spectrum Height: [Slider]

Double Click on a spectrum peak using the Show Candidate Elements tool.

Periodic table with highlighted elements: H, Li, Be, Na, Mg, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Cs, Ba, La, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Rn, Fr, Ra, Ac, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr.

Confirmed Elements:

Carbon	Pre-defined
Oxygen	User
Aluminum	AutoID
Silicon	Pre-defined
Chromium	Pre-defined
Copper	Pre-defined
Lanthanum	User
Platinum	AutoID
Gold	Pre-defined

Buttons: Previous, Next, Include, Exclude, Peak Labels

AutoID Pre-defined Clear all

Search Help

Project Data

Current Site Data Tree

- 10092019
 - Specimen 1
 - Site 1
 - Spectrum 1
 - Electron Image 1
 - Spectrum 2
 - Site 2
 - Electron Image 2
 - Map Data 1
 - EDS Data
 - Map Sum Spectrum

Mini View Ratemeter

Input Count Rate (cps) Total: 66826

Output Count Rate (cps) Total: 40220

Dead Time 38%

Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0

EDS-SEM

Map

Describe Specimen AZtecLive Scan Image **Acquire Map Data** Construct Maps

Report Results

Guided Custom

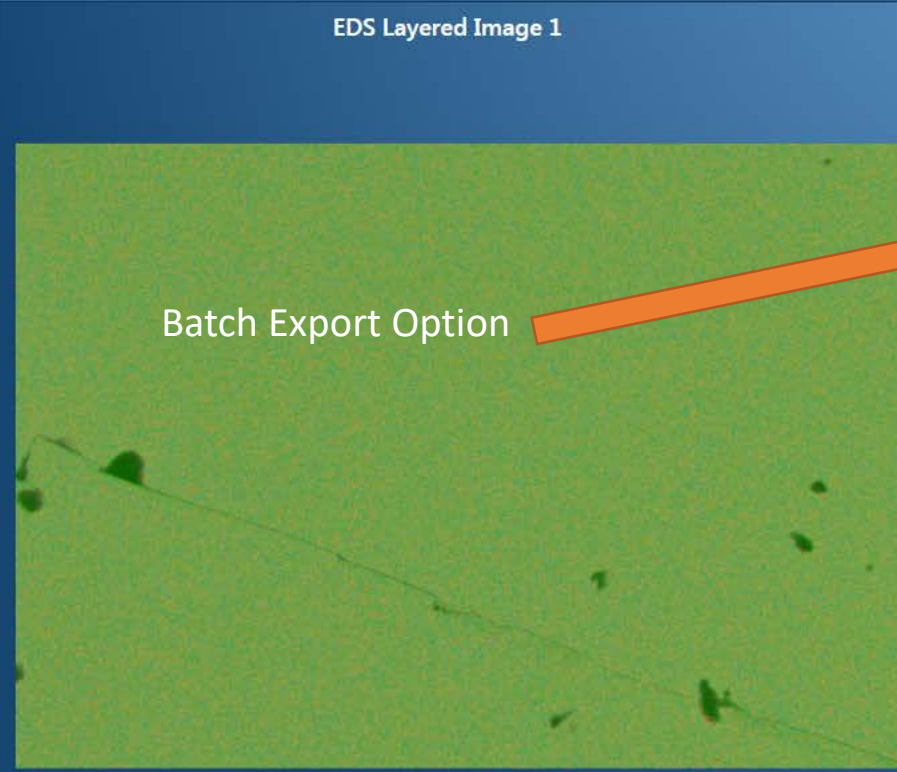
Acquire Map Data **START** STOP Settings Map TruMap QuantMap

Search Help

Project Data

Current Site Data Tree

- Electron Image 2
- Map Data 1
 - EDS Data
 - Map Sum Spectrum
 - Si Kα1
 - La Lα1
 - Pt Mα1
 - Al Kα1
 - Spectrum 3
 - Spectrum 4
 - EDS Layered Image 1



Display Interactive Settings

Al Kα1 Pt Mα1

100μm Weight: 0.5 Layer Mode: Mix

100μm Weight: 0.5 Layer Mode: Mix

100μm Weight: 0.5 Layer Mode: Mix

La Lα1 Electron Image 2

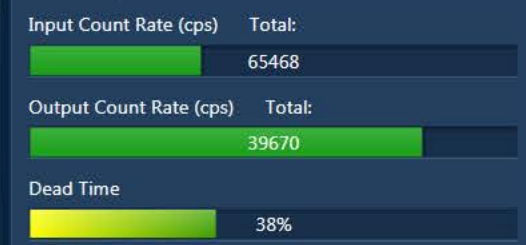
100μm Weight: 0.5 Layer Mode: Mix

100μm Weight: 1.0 Layer Mode: Overlay

- Rename
- Delete
- Copy map settings to specimen...
- Batch Export**

Site 2

Mini View Ratemeter



Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0



Minimized Maps Map Display Type: Weight % Binning Factor: 1

EDS-SEM

Map

Describe Specimen

AZtecLive

Scan Image

Acquire Map Data

Construct Maps

Report Results

Guided

Custom

Search Help

Project Data

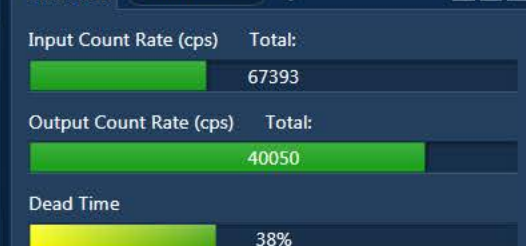
Current Site Data Tree

Electron Image 2

- Map Data 1
 - EDS Data
 - Map Sum Spectrum
 - Si K α 1
 - La L α 1
 - Pt M α 1
 - Al K α 1
 - Spectrum 3
 - Spectrum 4
 - EDS Layered Image 1

Site 2

Mini View Ratemeter



Recommended WD 10.0 mm

Process Time: 4

Accelerating Voltage (kV): 15.0

Batch Export

Group Options

- Images
- EDS Maps
- EBSD Maps

Image Export Options

Image Type:

- BMP
- PNG
- JPEG
- TIF
- TIF 16-bit Grayscale

- Create Image Folder
- Use Image Export Settings

Data Selector

- Map Data 1

1 items selected for export

Export Folder: C:\Users\Operator\Documents\EDS Projects\Tafti Lab\10092019

- Replace Greek Characters With English For Image Names
- Use SIF Naming Conventions For Files And Folders

Start Cancel

EDS Layered Image



Mag: 450x AV: 15.0 kV WD: 10.0 mm Input Rate: 67393 cps Output Rate: 40050 cps Dead Time: 38% Process Time: 4

Windows taskbar with icons for File Explorer, Edge, Word, PowerPoint, and AZtec.

PC-SEM

File (F) Edit (E) Function (O) Image Processing (I) Tools (T) Setup (S) Maintenance (M) Help (H)

Observation Accel. Voltage Emission current

OFF ON 15.0kV 103.0μA EMI Quick

Probe Current Contrast Brightness Focus Magnification Stigma X Stigma Y D-Mag RDC

Recipe (U) Operation Settings (W)

ACB HD Shift0 ZFC Ruley Text SRT Cursor Spot

Navigator Step Control Stage Map LV

Zoom SNS Save

× 1.000 15.0kV LED SEM WD 10.0mm 9/10/2019 15:06:17

X: 9.320 Y: -9.786 R:

Observation Mode SEM LDF GB GBSH-S Recipe

Accel. Voltage (kV) 15.0

WD 10.0

Image Rotation 0.0

OLAP 4

Focus Depth 0

Probe Current 11

Detector LED

Filter LED 3 UED 0 Mesh Voltage 0

Focus Correct 0

OL Stigma X 79 Y 1

Dynamic Focus

SEM Monitor Vacuum 9.6E-5 Pa

Offset 0.0 mm

Spec. Exchange

Home Position

VENT EVAD

Histogram Standard Histogram

Image File Observation Condition Electron Beam Alignment

Change "Operation Settings" such as scan speeds.

In the end, use specimen exchange to remove the sample.

Deben Chamberscope (Frozen)

Setup Capture View Click for live image Overlay

Illumination 1 Click for live

Image is frozen. Illumination is off.

Full Image Specimen Observation Multi View

Image File Condition Beam Align

Operation Settings

Scan Settings Auto function Photo & Print Data Extended Photo Data Preset Detector name Stage settings Mouse

Scan/Ave	Speed	Ave.
Quick1	1	1
Quick2	5	1
Fine1	7	1
Fine2	9	2
CF1	2	10s
CF2	2	30s

Photo button

Photo Setting Type Normal

Speed Fine1 S/N 1 Image Size 1280 x 960

Use Integration Function Freeze Time 3.3s

Auto Save

Execute auto save

The file name for auto save image

Image format for save image BMP JPEG TIFF

Save as export images

Color Black and White Color

Type Normal Extended

Integration

Freeze button set to Integration

Number of Frames Quick 125 Fine 10

Save Load Set Close

The PC detector is out.