

# **Cold FE-SEM User Manual(Eng.)**

### **UNIST Central Research Facilities UNIST Materials Characterization Lab**

### CONTACT

### **Ulsan National Institute of Science and Technology**

Address 50 UNIST-gil, Ulju-gun, Ulsan, 44919, Korea **Tel.** +82 52 217 0114 Web. www.unist.ac.kr UCRF

Bldg.102 209 **Tel.** +82 52 217 4028



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	UMCL

.....18 .....19 .....20 .....21 .....23 .....25 .....26 .....27 .....29 ....30 .....37 ...38



## Lab Safety

## **Compliance with lab safety rules**

If you do not follow the lab safety rules, access and use of the lab will be restricted, so we ask for your cooperation.



No Food or Drink

Wear Protective Clothes

Wear Foot Protection No Open-Toe Shoes

If you didn't bring your lab coat, please wear a shared lab coat <u>entrance side of the room 101-2 on the first</u> basement floor of 102 building.

Make sure to wear a lab coat and enter the lab of UCRF.

Make sure to keep the lab clothes you wore in their original place.



### Lab emergency evacuation





### **UCRF SEM Feature**

	High resolution imaging	EDS analysis	Specimen damage & charge-up	BSE detector	E-SEM	Reservation status	Introduction year	Fee(100%)
Verios FE-SEM	Õ	Õ	Slight	Ο	X	Not busy	2024	Undecided
SU8220 cold FE-SEM	Õ	Ο	Slight	X	X	Busy	2013	40,710wor /30min
SU7000 FE-SEM	Ο	Ο	Serious	X	X	Busy	2021	40,710wor /30min
Cold FE-SEM	Ο	Ο	Slight	X	X	Not busy	2011	31,320wor /30min
Quanta200 FE-SEM	X	$\bigtriangleup$	Slight	Ο	Ο	Not busy	2009	26,100wor /30min





## What to prepare for SEM imaging

### Fully dried samples 1.

### 2. A stub suitable for the equipment and measurement purpose

Туре	Α	В	С
Equipment	SU8220 Co SU7000 Cold F	old FE-SEM FE-SEM E-SEM	
Usage	General	Cross section	Gener
Picture (Front)			
Picture (Back)			

3. Conductive double-sided carbon tape for SEM







**SEM** stub Production - UDMC Cha Jae-hoon, Jeong Woohyun



## **Specimen Preparation**





- Sample preparation should be performed by 1. individual laboratories.
- 2. Wear appropriate safety gear.(goggles, gloves, etc.) **★**
- 3. Prepare completely dried specimens.
- Clean the stub with ethanol, etc. 4.
- Attach conductive double-sided tape to the stub 5. and fix a very small amount of specimen to the tape.(For powder samples, be sure to use carbon tape) <del>\*</del>
- Blow to remove dust from the specimen.  $\star$ 6.
- 7. Coat it if necessary.

## Coating

### Hitachi Sputter



- Coating rate
  - Pt target: 15 nm/min

<Condition>

- Sputter current: 40mA
- Distance between target and sample: 20 mm

ULUEL

- 1. Reserve and use the equipment.(Zero tolerance)
- 2. Turn the valve open.
- Open the column part and place the specimen in 3. the center.
- Make sure the specimen touches the Pt source. 3.
- 4. Press the touchscreen to view the coating parameters.
- If you want to change a parameter, press [Change]. 5.
- Tap each parameter and enter the desired value. 6.
- Press [Enter] [Back] [Start].
- When Processing finished appears on the screen, 8. open the column and remove the specimen.
- Press [Restart], then press [Stop] after 20 seconds. 9. 10. Turn the valve to [CLOSE].









### **Specimen Preparation**





- Prepare 4 items needed to assemble the 1. specimen holder. (If the screw does not come off from the holder, wrap tissue paper around the screw and loosen it with a long nose.)
- 2. Assemble the holder in the order shown in the photo below.
- 3. Check if the top and bottom direction of the specimen holder is correct.
- Check if the screw protrudes from the bottom. 4.
- 5. Adjust the specimen height so that the highest part of the specimen touches the height checker. ★





## **Loading the Holder**



![](_page_8_Picture_2.jpeg)

- -

![](_page_8_Picture_4.jpeg)

![](_page_8_Picture_5.jpeg)

- Press [AIR], wait until the buzzer sounds. 1.
- 2. Open the exchange chamber door. (Do not hold the exchange rod to open the door.)
- Insert the specimen stage onto exchange rod 3.
- Turn the knob counterclockwise to 4. lock.(LOCK←)★

![](_page_8_Picture_11.jpeg)

## Loading the Holder

![](_page_9_Picture_1.jpeg)

![](_page_9_Picture_2.jpeg)

![](_page_9_Picture_3.jpeg)

- 6. Press [EVAC], press the chamber door.
- Wait until buzzer sounds. 7.
- Press [OPEN], wait until buzzer sounds. 8.
- 9. Push the rod into the chamber.

(Do not forcibly insert the exchange rod.  $\bigstar$ )

![](_page_9_Picture_10.jpeg)

5. Press to close the specimen chamber door. (Do not hold the exchange rod.)

### Loading the Holder

![](_page_10_Picture_1.jpeg)

![](_page_10_Picture_2.jpeg)

10. Turn the specimen holder lock/unlock knob to UNLOCK position.
11. Pull out the rod all.★
12. Press [CLOSE], wait until the buzzer sounds.

![](_page_10_Picture_4.jpeg)

### **Starting Instrument**

![](_page_11_Picture_1.jpeg)

![](_page_11_Picture_2.jpeg)

1)		- ® 🞽			
	HOME	! STOP			
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	Close	>>			
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- 1. Click [PC\_SEM].
- 2. Enter your lab ID and PW.
- 3. Click [HOME].
- If a flashing message "Please Flash!!"
   appears, click the electron beam window.
- 5. Click [Flashing].
- 6. Click [Execute].

## Size & Height of Stub

🞽 Hitachi S-4800 Scanning Electron Microscope	
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Start Hitachi 5-4800 Scanni	Deskto

![](_page_12_Picture_2.jpeg)

![](_page_12_Figure_3.jpeg)

- Click [Set]. 1.
- 2. For [Size] setting, select the diameter of the stub one size larger.
- 3. For Height setting, select Standard.
- Click [OK]. 4.

### **Acceleration Voltage**

👛 Hitachi S-480	0 Scanning Electron Microsco	pe							
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aturt									DOSIGO

![](_page_13_Picture_2.jpeg)

![](_page_13_Figure_3.jpeg)

- 1. Click the [Electron Beam].
- 2. Select the acceleration voltage in [Vacc].
- 3. Select beam current (7~10) in [Set le to].
- 4. Click [Close].

### **Probe Current**

Hitachi S-4800 Scanning Electron Micro	oscope	
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Hitachi S-4800 Scanni	V untitled - Paint	Desktop 🎽 🎇 🎇 11:41 AM

![](_page_14_Picture_2.jpeg)

- 1. Click the [SEM].
- 2. Select [Probe Current] appropriately.

### **Beam On**

🐮 Hitachi S-4800 Scanning Electron Microscope		
Eile Edit Setup Operate Scan Image Analysis Option Window Help Unc	do	
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FE-PC SE	M	D
s (* 1975) 1975 - 1975	ample Size: 2 inches Sample Height: Standard	25
	Current sample size is set above. Please set sample size with [STAGE] if the above setting is different from the actual one. Otherwise sample may touch to objective lens or other parts inside a specimen chamber.	<b>X</b> (m
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Hitachi S-4800 Scanni		Desktop

![](_page_15_Picture_2.jpeg)

![](_page_15_Figure_3.jpeg)

- Click [ON]. 1.
- Click [OK]. 2.
- If the screen is too dark or too bright, press 3. [ABC].(You can manually adjust the [Brightness] or [Contrast] knob individually.)  $\rightarrow$  This process can be performed at any time during image observation.

![](_page_15_Picture_7.jpeg)

## **Finding the Specimen**

🚰 Hitachi S-4800 Scanning Electron Microscope	
<u>File Edit Setup Operate Scan</u> Image <u>A</u> nalysis Option <u>W</u> indow <u>H</u> elp <u>U</u> ndo	
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🛃 start 👔 👔 Hitachi S-4800 Scanni	Desktop

![](_page_16_Picture_2.jpeg)

![](_page_16_Figure_3.jpeg)

Press the [TV1]. 1.

(SCAN SPEED: TV1>Fast1>Slow3)

- Click [H/L]. 2.
- If the image is blurry, use the [FOCUS] knob 3. to adjust the focus.
- Press the left silver mouse button four times. 4.
- Double click or drag to the desired area. 5.

![](_page_16_Picture_10.jpeg)

![](_page_17_Picture_0.jpeg)

The Lie the lie of the lie the	🕴 Hitachi S-480	O Scanning Electron Micro	scope							
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![](_page_17_Picture_2.jpeg)

![](_page_17_Figure_3.jpeg)

- 1. Click [H/L].
- Move the stage to the location you want to observe.
- Use the magnification knob to slowly raise the magnification to 5000 times and adjust the focus in between.
  - COARSE: fast adjustment
  - FINE: fine adjustment

![](_page_17_Picture_9.jpeg)

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## Stigmator

Hitachi S-4800 Scanning Electron Microscope		
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Start Hitachi S-4800 Scanni		Desktop

![](_page_18_Picture_2.jpeg)

![](_page_18_Figure_3.jpeg)

- Press [Red1]. 1.
- 2. Adjust the focus.
- Adjust the Stigma X and Y knobs one by one. 3.
- Adjust the focus. 4.
- 5. Press [TV1].

![](_page_18_Picture_9.jpeg)

### **Working distance**

💼 Hitac	hi S-4800 Scanning	Electron Microscope	)								
<u>File E</u> dit	: <u>S</u> etup <u>O</u> perate Sca <u>n</u>	<u>i</u> Image <u>A</u> nalysis Opt	ion <u>W</u> indow <u>H</u> elp <u>U</u>	ndo							
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![](_page_19_Picture_2.jpeg)

![](_page_19_Figure_3.jpeg)

- Check WD at the bottom of the screen. 1.
- Subtract the WD found in 8, and subtract that 2. value from the [Z] value.
- 3. Enter the calculated value in [Z].
- Click [Go]. 4.

BM-ALIGNMEN

MAGNIFICATION STIGMA/ALIGNMENT FOCUS

Adjust the focus. 5.

![](_page_19_Picture_10.jpeg)

## **Beam Alignment**

![](_page_20_Figure_1.jpeg)

- Click [Align] [Beam Align] and adjust the Stigr center.
- 2. Click [Aperture Align] and adjust the stigma X a place.(STIGMA X:  $\leftrightarrow$ , STIGMA Y:  $\ddagger$  )

![](_page_20_Picture_4.jpeg)

![](_page_20_Picture_5.jpeg)

1. Click [Align] - [Beam Align] and adjust the Stigma X and Y knobs one by one to bring the beam to the

2. Click [Aperture Align] and adjust the stigma X and Y knobs one by one so that the specimen moves in

## **Beam Alignment**

🞽 Hitachi S-4800 Scanning Electron Microscope	
Eile Edit Setup Operate Scan Image Analysis Option Window Help Undo	F ( ) ( ) (
SET     Vacc     le     Preset       OFF     10.0kV     6.2uA     Beam Monit     II     II     II     III     III     III     IIII     IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Beam HOME STOP
<pre>prr 10.0kV 8.2uA kind read to rea</pre>	EXC       Lock         C       Close       >>         SEM       STAGE       Utility         SPECIMEN       Standard         Set       EDX       BSE         Speed       S          Syseed       S       Assist         Z       D          Cooloo       Poinority       Z         Syseed       Reg          Syseed       Reg          Syseed       Reg          Sysei       Red
🛃 start 🔰 👔 Hitachi S-4800 Scanni	Desktop 🎽 💢 🔯 5:21 PM

- 1. place.(STIGMA X:  $\land \land$ , STIGMA Y:  $\nearrow \checkmark$ )
- place.(STIGMA X:  $\$   $\$ , STIGMA Y:  $\nearrow \checkmark$ ), and click [Close].

![](_page_21_Picture_4.jpeg)

![](_page_21_Picture_5.jpeg)

Click [Stigma Align.X], and adjust the stigma X and Y knobs one by one so that the specimen moves in

2. Click [Stigma Align.Y], and adjust the stigma X and Y knobs one by one so that the specimen moves in

## Saving the Image

🐱 Hitachi S-4800 Scanning Electron Microscope	
Ele Edit Setup Operate Scan Image Analysis Option Window Help Undo         SET       Vacc       Ie       Image Analysis Option Window Help Undo         OFF       10.0kV 6.2uA       Beam Monit       II       Image Analysis Option Window Help Undo	Beam HOME STOP
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Freeze	Speed S · · · · F X / Y / R
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	X (mm) Y (mm) -0.005 -0.010 ✓ Eucentric
	Rotation     (deg)       Image: Constraint of the second se
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	Navigate > Memory >
	Guide Setup SDM
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Start Hitachi S-4800 Scanni	Desktop 🎽 💢 🔯 5:23 PM

![](_page_22_Picture_2.jpeg)

- 1. Move to the location you want to observe.
- Adjust the magnification slightly higher than the magnification you want to observe.
- 3. Click [Red1].
- 4. Adjust the knobs [FOCUS]-[STIGMA X, Y]-[FOCUS].
- 5. Adjust to desired magnification.
  - 7. Click [Slow3].

![](_page_22_Figure_9.jpeg)

8. Click [Save] or [1280].

an

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## **Saving the Image**

File Edit Setup Operate Scan Image Analysis Option Window Help Undo	- 7 ×
SET Vacc le DFF 10.0kV 6.2uA Beam Monit Run TV1 Fast1 Slow3 Red1 ABC AFC Align MonitF X20.0k H/L 1280 Save Layout	Beam HOME STOP
	K       Close       >>         SEM       STAGE       Utility         SPECIMEN       Standard         Size       Height         2 inches       Standard         Set       EDX       BSE         Speed       S       -         Speed       S       -         Speed       S       -         St       Y / R       -25         St       Y / R       -25         St       Y / R       -25         St       Memory       Reg         Assist       -26       Assist         25       0       -25       Assist         26       0       -26       Assist         27       0       -26       Assist         26       0       -25       Assist         27       0.00       -0.00       -0.0         Calba       Rel       00       -7         Continuous       Go       Co       -7         Z       (mm)       1.5 ~ 40.0mm       -7.5         Tilt       (deg)       -4.9 ~ 30.0]deg       -0.0         Continuous       Go       Eucentric Tilt       SDM

![](_page_23_Picture_2.jpeg)

- Click [Select]. 1.
- 2. Create a folder.(Desktop-SEM data-Analysis year-Professor folder-Personal folder-Date folder)
- 3. Enter a sample name in [Image Name].
- 4. Enter 1 in [Quick Save No.]
- Click [Save]. 5.
- Click [Run]-[TV1]. 6.
- 7. Repeat steps 1 in the previous slide to 6 in this slide.

![](_page_24_Picture_0.jpeg)

🔹 Hitachi S	S-4800 Scanning F	Electron Microsco	pe								
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![](_page_24_Picture_2.jpeg)

![](_page_24_Figure_3.jpeg)

- 1. Click [H/L].
- 2. Click [Home].
- 3. Wait for the green light to stop flashing.
- 4. Click the [OFF].★
- 5. Click [EXC].★
- 6. Wait for the green light to stop flashing.
- 7. Click [X] to close the program.
- 8. Click [OK].

## **Retrieving the Holder**

- Press [OPEN], wait until the buzzer sounds. 1.
- Push the rod into the chamber.
- Turn the specimen holder lock/unlock knob to 3. LOCK position.
- 4. Pull out the rod all.  $\star$
- Press [CLOSE], wait until the buzzer sounds. 5.
- Press [AIR], wait until the buzzer sounds. 6.
- Open the exchange chamber door. (Do not hold the exchange rod to open the door.)
- Turn the knob clockwise to release. 8.

![](_page_25_Picture_9.jpeg)

- 9. Remove the specimen stage from the exchange rod.
- 10. Close the exchange chamber door.
- 11. Press [EVAC], wait until the buzzer sounds.

![](_page_25_Picture_13.jpeg)

![](_page_25_Picture_15.jpeg)

### **Transfer SEM data**

UCRESERVER - Synology DiskSt: × +

주의 요함 | 10.24.9.32:5000

UNIST Portal 🛞 Microsoft PowerPo.

![](_page_26_Figure_4.jpeg)

![](_page_26_Picture_5.jpeg)

### 1. Do not use USB when transferring SEM data.

- 2. Double-click the web browser.(Chrome, etc..)
- 3. Enter 100.100.100.30. in the address bar. (Enter 10.24.9.32 when downloading from Lab)
- 4. Enter your Lab ID and password.
- 5. Find your professor's folder and create your own folder.
- Drag the SEM data into your own folder. 6.
- 7. Close the window when the move is complete.
- UCRF server manager: Park Ji-hye(052-217-4035)

![](_page_26_Figure_18.jpeg)

![](_page_26_Figure_19.jpeg)

![](_page_26_Figure_20.jpeg)

![](_page_26_Figure_21.jpeg)

![](_page_26_Figure_22.jpeg)

## **Daily Checklist in Lab**

- 1. Put the specimen holder back in place.  $\star$
- When using weekends or holidays, check the
   [Daily checklist in lab] and sign the checker's signature.
- 3. Enter the name of your advisor and submit it in the original place with your signature or stamp.★

![](_page_27_Picture_4.jpeg)

### Daily checklist in lab.

Lab title	Electron Microscopy Preparation	Bldg./NO.	102-B115	5	Date		
Division		ch	eckpoint				check
	Laboratory o	verall cleanlines	s condition	ı.			
General Safety	Smoking or br	inging food into th	e lab.				
	Management regulations, aid, etc.	status of experi safety signs, pe	mental eq ersonal pro	uipmer otective	nt suc e equi	ch as safety ipment, first	
	Checking the	presence of a pre	-hazard ris	k analy	ysis rej	port.	
	Checking the equipment and	e power supp nd checking for	oly status overloaded	of i outle	unuse ets.	d electrical	
Electric	Using grour coating of ele	ided outlets, c ctric wiring, elec	hecking da tric wiring	mage arrang	on th ement.	e insulating	
	Checking gro disturbances	ound conditions of the instrume	for preve nt.	enting	exterr	nal or static	
	Non-load sta	tus around elec	tric panelb	oards.			
	Fire extingui inspection st	isher sign, proj atus.	per fire e	xtingui	isher	and regular	
Fire	Emergency exits, escape routes, and any obstacle blocking the passage.						
	Storage of foreign substances around fire hydrant and fire extinguishers.						
	Outdoor storage of gas containers, no risk of tipping over, and checking ventilation conditions.						
	Corrosion, deformation, nozzle lock status on the exterior of the gas containers and checking the packing time limit of gas containers.						
Gas	Checking installation and operational status of gas leakage detection alarm, anti-backflow/anti-backfire prevention devices, neutralizing decontamination devices.						
	Attachment of pipe marks, gas facility boundaries/warning marks and operation status of regulators and valves.						
	Safe separation distance from surrounding fire hazards.						
	Keeping hazar MSDS.	dous factors har	idling and i	manage	ement	registers and	
Chemical	Categorizing o in safety cabi	themicals by desc nets.	ription and	storing	g chen	nical reagents	
Equipment check	SU8220 Cold F	FE-SEM user∹ Che	ck the pres	sure of	f nitrog	en gas	
C~	nfirm	Inspector	Signature				(sign)
		Lab Director	Signature				(sign)

## If you encounter a problem while using SEM

### When [ON] is not activated

🗰 Hitachi S-4800 Scanning Electron Microscope	
Eile Edit Setup Operate Scan Image Analysis Option Window Help Undo	
ON Vacc le Beam II II II II II II VACC VACC VACC VACC V	x1.00k H/L 1280 Save Lavout ► Exc Lock
Vacuum Reserve	
	SPECIMEN SPECIMEN
	Warning D. 1×10. 8 Size Height Standard
RUN	1. 0x10 - 7 Speed
	X/Y/R
	PeG-1 -25 Disp
Apt	Assist
Heater	25 0 -25
	PiG-2 (mm) (mm) (0.000 (0.206
	Eucentric Retation
	Z (mm) [1.5 ~ 40.0]mm I x10- 1
	Air Open Oclose
OCRF 0.0kV 8.0mm x1.00k SE(0) OBJ lens cool	ling water
	Eucentric Tilt
	1 2 3L/Min
Save	
	Guide Setup SDM
	Captured Mainte. Help
🛃 start 🧿 🖮 🎯 🎽 👔 Hitachi S-4800 Scanni	Desktop 🎽 💢 🐺 2:57 PM

![](_page_28_Picture_3.jpeg)

- 1. Clcik [Mainte.]
- Wait until the value of PeG-1 becomes <1x10-3 (green)</li>
- 3. [ON] is activated.

### **Energy Dispersive Spectroscopy**

Hitachi S-4800 Scanning Electron Micr	r <mark>oscope</mark> veis Option Window Help Undo	- 7 🗙
ON Vacc le OFF 20.0kV 0.0uA	II III IIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Beam HOME STOP
		Close   SEM   SIGNAL SELECT   SE   SE   SE   SE   SE   Wix   Upper   Lower   WD   10.0   I   E   SCAN MODE   Implex   Implex   Vorm   Line   Scan Size   Full   Dual   Suide   Setup   SDM   Guide   Setup   SDM   Copy   CopyText   OptSetup   Captured   Mainte
Hitachi S-4800 Scanni	🦉 untitled - Paint	Desktop 🎽 🂢 👺 11:41 AM

![](_page_29_Picture_2.jpeg)

- Click the [Electron Beam] 1.
- 2. Select the acceleration voltage in [Vacc.].  $\star$ (1.5 times kV of the x-ray value of the element to be observed or unknown specimens: 20 kV)
- 3. Select beam current (15~20) in [Set le to]
- Click [Close] 4.
- 5. Select [High] in [Probe Current].
- Adjust WD to 15. 6.
- Move to the position of the specimen to be 7. measured and adjust the magnification.

![](_page_29_Picture_13.jpeg)

## **Energy Dispersive Spectroscopy**

![](_page_30_Picture_1.jpeg)

- 1. Double click [Aztec]
- 2. Click [예(Y)]
- 3. Click [EDS Detector Control] [Thermal] [Operate]
- 4. Click [Insertion] and click [In]

![](_page_30_Picture_6.jpeg)

![](_page_30_Picture_7.jpeg)

![](_page_30_Picture_10.jpeg)

## **Energy Dispersive Spectroscopy**

• AZtec - Project 1		_
File View Techniques Tools Help	ire Map Construct Maps Phases	Search Help Project Data Report Results Guided Current Site Data Tree Topject 1
Specimens in 'Project 1'  New Specimen  Specimen 1  Site 1	Summary         Pre-defined Elements           Project Notes         Click here to begin entering notes about your project.	Site 1
	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.	Microscope Control
(5	Specimen Coating Information:	iolumn       DefaultMPO         Stage       Magnification:         500       500         Working Distance (mm):       15         15       15         Accelerating Voltage (kV):       20.0
Mag: 500 x AV: 20.0kV WD: 15 mm Input Rate: 1470 cps Output R	Ate: 1430 cps Dead Time: 0 % Process Time: 1 Recommended WD: 15 mm	

- 1. Click [Microscope Control]
- 2. Click [Column]
- 3. Enter the magnification, WD, and acceleration voltage and click [Set]
- If the specimen is coated, check and select coating material. 4.

![](_page_31_Picture_6.jpeg)

![](_page_31_Picture_7.jpeg)

đ

![](_page_31_Picture_11.jpeg)

![](_page_32_Picture_0.jpeg)

![](_page_32_Picture_1.jpeg)

- 1. Select [Map]
- 2. Click [Scan Image]
- 3. Click [Setting]
- 4. Click [START]

![](_page_32_Picture_6.jpeg)

![](_page_32_Picture_7.jpeg)

![](_page_32_Picture_9.jpeg)

![](_page_33_Picture_0.jpeg)

![](_page_33_Picture_1.jpeg)

- 1. Click [Acquire Map Data]
- 2. Click [Setting]
- 3. Choose your analysis time
- 4. Click [START]

![](_page_33_Picture_6.jpeg)

![](_page_33_Figure_7.jpeg)

![](_page_33_Picture_9.jpeg)

### Мар

![](_page_34_Figure_1.jpeg)

- 1. Click [Construct Maps]
- 2. Click on the desired element to make it green
- 3. Click the arrow next to [Report Results]
- 4. Click [Report Templates]

UNIST

![](_page_34_Figure_7.jpeg)

### FIRST IN 35

### Мар

![](_page_35_Figure_1.jpeg)

- 1. Click [EDS Detector Control] [Insertion] [Out] [Thermal] [Standby]
- 2. Click [X] and click [예(Y)]
- 3. Click [Browse] and create a folder
- 4. Click [OK]

![](_page_35_Picture_6.jpeg)

![](_page_35_Picture_9.jpeg)

## If you encounter a problem while using EDS

AZtec - Project 1						_
	O User Profile				Search Help	
EDS-SEN Describe	Profile		🧭 'Ba	ckup of settings, 07/12/2024 11:29:25.' on 2024-07-12	at 오전 11:29. All Settings 🔻 ject	Data Tree
Specimens in 'Project 1'	EDS Acquire Line Data Settings EDS Acquire Map Data Settings EDS Acquire Spectrum Settings EDS AutoPhaseMap Settings EDS Device Settings EDS Element Settings EDS Peak Label Settings EDS-SEM Quant Settings Scan Image Settings Specimen Coating Information	Quant Processing Setup       Element list         Processing options <ul> <li>All Elements</li> <li>Element by Difference</li> <li>Combined element:</li> <li>Oxygen by Stoichiometry</li> <li>Number of ions:</li> <li>3.00</li> </ul> Normalize results           Correct for window artefacts	Deconvolution elements	Quant standardizations • Factory: Quant Standardizations • User: Quant Standardizations Quant Standardizations Quant Standardizations Threshold quantitative results • Enable thresholding Sigma level: 3.0	Extended Set)	
					4	
	Restore Defaults		Load Save As		OK Cancel	
					¢ <sup>t</sup> Site 1 ▼	
Mag: 400 x AV: 15.0 kV WD: 15 mm AutoLock	c: Off Input Rate: 0 cps Output	Rate: 0 cps Dead Time: 100 % Process Time:	Recommended WD: 15 mm			
						یم <sup>و</sup> ∧ ۲ <sub>8</sub> ق A <sub>2024-0</sub>

![](_page_36_Picture_2.jpeg)

- 1. EDS connection problem
  - 1) Shut down the EDS PC.
  - 2) 2) Turn off the switch on the back of the controller on the EDS PC, and turn it back on after 10 seconds.
  - 3) 3) Use after booting the EDS PC.PC PW: ucrfumcl1!
- 2. When only some elements are analyzed
  - Click [Tools] [User profiles]
     Click [Deconvolution elements] [Clear All]
     Click [Quant stadardizations] [Factory] [Quant Stadardizations[Extended Set]] [OK]

٥r

\_\_\_\_\_

## **Create Account**

### www.ucrf.unist.ac.kr

![](_page_37_Picture_2.jpeg)

- 1. Click [Sign up]
- 2. Click [UNIST Member]
- 3. Input [Portal ID/PW]  $\rightarrow$  Click [Confirm] Please check your information
- 4. Input professor name in [Principal Investigation  $\rightarrow$  [Professor search]  $\rightarrow$  professor name
- 5. Click [Create Account]

![](_page_37_Picture_8.jpeg)

-		
orgot your password   KOR	ENG	
Participation Space	Q	
-		
[ו		

			۲F	
UNIST member		ndustry member	External member	
ID/E-mail	m	n*k*m @ unist.a	ic.kr	-
Password	**:	******	Confirm	]
Name	Į	홍길동		
Department		연구지원본부		
Student ID No. / Professor ID No. / Staff ID No.		20*39		
Contact	Extension	4064		
	Cell phone	010 *	* **	
Principal Investigator	Select	김교수	Professor Search	] '
		Create Account	5	

## **Access Permissions Application**

### www.ucrf.unist.ac.kr

![](_page_38_Picture_2.jpeg)

- Click [Participation Space]
- Click [Access permissions Application] 2.
- Fill out the UCRF(UMCL) Access Application form 3.
- Click [Apply] 4.

![](_page_38_Picture_7.jpeg)

UNIST	Central Resear	ch <b>F</b> acilities	About U	CRF Equipment Status	s Data Room	Participation Space	Q
Participa	tion Space	Access Permi	ssions Applic	cation	♠ > Participa	tion Space > Access Permissions App	lication
UNIST Central Rese	arch Facilites	UCRF(UMCL)	Access Applic	ation			~
Notice							_
Education &	Seminar 🗸 🗸	Date for entrance					
Tour Applica	tion 🗸		Department		Advisor	신태주	
Access Perm	issions Application \vee		Name	이경애			
Q&A		Applicant	Student ID No. (Staff ID No.)	24186			
FAQ(TEST)			Office	Select 🔶 -	-		
			E-mail	kalee	@ unist.ac.kr		
		Equipment for use					
		Reason of					

- When reissuing the ID card, you must apply for access again on UCRF website.
- Access authorization officer: -Kang Yeong-bi(052-217-4168)

![](_page_38_Picture_12.jpeg)

![](_page_38_Picture_13.jpeg)

### **Request for Self-user**

추가					$\bigcirc$	
			Welcom	e 이경애 LOGOUT My Page	Edit profile   KOR ENG	
LITIIST Central Re	search <b>F</b> acilities	About UCRF	Equipment Status	Data Room Pa	rticipation Space <b>Q</b>	22
My Page	Status of analy	ysis request				
Request for Self-user	Equipment	Status	Application date	Result of analysis	Print Cancel	
Status of analysis request	Re	equest for Self-use	r			
Status of settlements	Materials	Characterization Lab	× 3			
Status of education application	Electron N	licroscopy	<u> </u>			
Status of tour application	SU7000 FE	E-SEM	<u> </u>			
Status of access permissions application		Apply				
Status of penalty						
ර Favorites						

![](_page_39_Picture_2.jpeg)

### After pass the test,

Login UCRF website 1.

www.ucrf.unist.ac.kr

- 2. Click [My Page]
- 3. Click [Request for Self-user].
- 4. Select [Materials Characterization Lab]
- 5. Select [Electron Microscopy]
- 6. Select [Cold FE-SEM]
- 7. Click [Apply]

### Reservation

### portal.unist.ac.kr – Research Equipment – Equipment reservation/input result

2 Reserve Equipment - UNIS	ST Por × +	• - • ×
$\leftarrow$ $\rightarrow$ C $\cong$ portal.	unist.ac.kr/irj/portal	★ 경애 :
ULIIZL	연구지원본부 기술지원팀 이경애님   Switch Position   Settings   Site map   Log out Q	KOR ENG
Home Human Reso	ources Research Project General Admin. Integrated Settlement Research Admin. Bulletin Board U-Click Settings	
연구장비 장비투어	Intellectual Property Research Equipment(Common)	
<ul> <li>To-Do List</li> <li>Reserve Equipment</li> </ul>	Apply for Equipment Reservation Pull-down Search Menu	I Help
• 자율사용 장비 현황 • Equipment Status • 담당자 일정 조회 • 운영비 지출	Q View   Reservation Date:   2021.01 □   2021.10 □   Apply for Reservation □ Input Results □ Completed □ AI □ 청구완료 □ 반려   1st Classification:   UMCL - 기기분석실   2nd Classification:   ✓   Equipment Name:   ✓   본인 장비만 보기	
	List of Equipment Reservations	_
	····································	9 예약번호

![](_page_40_Picture_3.jpeg)

### Reservation

### portal.unist.ac.kr – Research Equipment – Equipment reservation/input result

방비예약									
💾 신청 🛛 🔻	접기<->펼치기 윊 사	H로고침							
장비선택									
회원ID:	kalee@unist.ac.kr	[	글 24186 / 이경애				예약자:	24186 이경이	H
대분류:	UMCL - 기기분석실	~	중분류:	Electron Micr	roscopy	~	소분류 <sup>:</sup> SL	17000 FE-SEM	
기준일자:	2021.07.22								
예약제어정보	1								
시간/날짜	07/22(목)	07/23(금)	07/24(토)	07/25(일)	07/26(윌)	07/27(화)	07/28(수)	07/29(목)	0
09:00~09:	30								
09:30~10:	00								
10:00~10:	30								
10:30~11:	00								
11:00~11:	30								
11:30~12:	00								
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12:30~13:	00 🔽	✓							
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14:00~14:	30 🔽	✓	✓		√				
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18:30~19:	00 🔽								
19:00~19:	30 🔽								
19:30~20:	00 🔽								

![](_page_41_Picture_3.jpeg)

![](_page_41_Figure_4.jpeg)

- 1. Select the classification and equipment
- 2. Select the time you want on white box
  - Yellow box : my reservation
  - Red box : others reservation
- 3. Click [Application]

### **Reservation cancel**

### portal.unist.ac.kr – Research Equipment – Equipment reservation/input result

UCIIST										연구지	원본부 기술	지원팀 <mark>이경애</mark> 님	Switch Positio	n   Settings   Sit	e map   Log	out		۹	KOR ENG
Home Human Reso	ources	Rese	arch Project	Genera	l Admin.	Integrated Settleme	nt <b>Researc</b>	h Admin.	Bulletin Board	ł	J-Click	Settings							
연구장비 장비투어	Intellect	ual Prop	perty Rese	arch Equipm	ent(Common	)													
<ul> <li>To-Do List</li> <li>Reserve Equipment List</li> </ul>	<b>장비</b> 조회조	<b> 예약{</b> 5건	신청																④ 도움말
<ul> <li>자율사용 장비 현황</li> <li>Equipment Status</li> <li>담당자 일정 조회</li> </ul>	Q 조 예약일 대분류	전회 실자: 202 <sup>-</sup> 4: UMC	1.07 1 ~ 2 CL - 기기분석실	2021.07 <b>1</b>	<b>√</b> 예약 중분류:	신청 🗌 실적입력 🗌 담당 Electron Microscopy	장비망 ▼ 장비당	승인 🗌 청- 명: SU7000	구완료 ☐ 반려 FE-SEM ❤	<b>V</b>	본인 장비만 5	보기							
• 운영비 지출	관리자	ŀ																	
	장비여	<b> 약리스</b> □⊾	트	2	제 📝 실적	입력 🥔 변경 🛛 ✔ 승	:인 🔀 실적요청	🗔 예약공	공지										_
	선택	메모	상태	신청구분	장비명	의뢰자명	연구책임자 (	예약일자	예약시간	사용료	예약자명	중분류명	대용	분류명	면제 구분	장기입실	신청일자	예약번3	Ξ.
	1 🔽		예약신청	Self	SU7000 FE-SE	M	2	2021.07.22	22:00~24:00	0		Electron Micro	oscopy UN	ICL - 기기분석실			2021.07.22 12:24	202106	1388
			예약신청	Self	SU7000 FE-SE	M	2	2021.07.22	20:00~22:00	0		Electron Micro	oscopy UN	ICL - 기기분석실			2021.07.20 21:17	202106	0863
			예약신청	Self	SU7000 FE-SE	M	2	2021.07.22	18:00~20:00	0		Electron Micro	oscopy UN	ICL - 기기분석실			2021.07.22 09:00	202106	1306
		G	예약신청	Self	SU7000 FE-SE	Μ	2	2021.07.22	15:00~16:00	0		Electron Micro	oscopy UN	ICL - 기기분석실			2021.07.21 12:09	202106	0969

![](_page_42_Picture_3.jpeg)

Ľ		

약시간	사용료	예약자명	중분류명	대분류명	면제 구분	장기입실	신청일자	예약번호
2:00~24:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.22 12:24	2021061388
0:00~22:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.20 21:17	2021060863
8:00~20:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.22 09:00	2021061306
5:00~16:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.21 12:09	2021060969

## Input result

### After measurement, you have to input result instead of filling in log sheet UCIST

Home	Human Res	ources	Rese	arch Project	Genera	l Admin.	Integrat	ted Settlem	ent Rese	arch Admin.	
연구장비	장비투어	Intellectu	al Prop	erty Resea	arch Equipm	ent(Commo	n)				
	•										
• To-Do L	ist	장비	예약신	신청							
Reserve	Equipment	조회조	건								
<ul> <li>Reserve</li> </ul>	d Equipment Lis										
• 자율사용	응 장비 현황	Q 조	회								
• Equipme	ent Status	예약일기	다: 2021	1.07 1 ~ 2	2021.07 1	🗸 બીર	약신청 🗌 🕯	실적입력 🗌 담	당자승인 🗌 책	임자승인 🗌 청국	구왼
• 담당자 (	일정 조회	대분류:	UMC	XL - 기기분석실	~	중분류	Electron	Microscopy	¥ 3	당비명: SU7000	) FE
• 으여비 :	지츠										
포장미가	12	관리자									
		장비예	약리스	E		2					
			5	이 신청 🛛 🧪	수정 📑 삭기	제 🧳 실적	적입력 🥖	변경 🗸	승인 🔯 실적	요청 🙀 예약:	공지
		선택	메모	상태	신청구분	장비명		의뢰자명	연구책임자	예약일자	0
		1 🔽		예약신청	Self	SU7000 FE-S	EM			2021.07.22	2
				예약신청	Self	SU7000 FE-S	EM			2021.07.22	2
				예약신청	Self	SU7000 FE-S	EM			2021.07.22	1
				예약신청	Self	SU7000 FE-S	EM			2021.07.22	1

- Select the reservation 1.
- 2. Click the [Input result]
- 3. Check the information and click [Save]

UCIST

연	구지원본부 기술지	원팀 <mark>이경애</mark> 님	Switch Positio	on   Settings	Site map   Log out	Q	KOR ENG	
Bulletin Board	U-Click	Settings						
							🔞 도움말	
							_	-
·료 □반려 -SEM V	✔ 본인 장비만 보기	7						
								1
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약시간	사용료	예약자명	중분류명	대분류명	면제 구분	장기입실	신청일자	예약번호
2:00~24:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.22 12:24	2021061388
0:00~22:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.20 21:17	2021060863
8:00~20:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.22 09:00	2021061306
5:00~16:00	0		Electron Microscopy	UMCL - 기기분석실			2021.07.21 12:09	2021060969

![](_page_43_Picture_11.jpeg)

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![](_page_43_Picture_14.jpeg)

### **Article 1. Access**

(1) A person who wishes to be authorized access to UMCL must obtain approval from the manager in charge after submitting an application form to "Access Permissions Application" of the "Participation Space" menu on the UCRF homepage (http://ucrf.unist.ac.kr).

(2) A person who wishes to enter UMCL without access authority shall be accompanied by the equipment manager or shall obtain approval for access from the equipment manager. ③ Each user must enter (exit) individually using the pass card with their own identity, and it is prohibited to enter using another person's pass or to enter together without permission. ④ A person who uses UMCL at night (PM18-AM09 on the next day) or on holiday must enter after establishing personal safety and protection rules (accompanying 2 or more people, preparing for an emergency contact, etc.) for lab accidents.

(5) A person who violates above paragraph  $(1) \sim (4)$  regarding access to UMCL shall be obligated to compensate for all safety and property damage caused by the violation.

### **Article 2. Use of laboratory space**

(1) A UMCL user must understand and follow the common safety rules for the laboratory (Attachment 1).

![](_page_44_Picture_7.jpeg)

② A UMCL user on weekends or holidays must fill out the laboratory daily checklist (Attachment 2) provided in each laboratory room, and must submit it to equipment manager, with the signature of the professor(or supervisor) within 3 days from the date of use.
 ③ A UMCL user should clean up the area after using the equipment, and must promptly notify the equipment manager if there is any problem with the equipment or environment. Violation of the notification obligation may result in restrictions on the use of the equipment.

### **Article 3. Use of Equipment**

A person who wishes to use the equipment of UMCL must make a reservation and use the equipment after completing the training of the equipment manager, assessment test, and acquiring self-user qualification. (Analysis or process request is irrelevant to equipment training and qualification evaluation.)
 A user who completes the regular or occasional training (including practice) by the equipment manager can receive practical training from the senior student of his or her laboratory to improve proficiency before the assessment test. The qualification of the senior must be at least 1 year of experience (more than 5 times in the previous 6 months) in using the equipment. The laboratory is responsible for all safety and property issues arising from the practical training conducted by the senior student.

![](_page_45_Picture_4.jpeg)

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3 If there is no record of equipment used in the last 90 days, the qualification for self-use ends. A person who wants to reacquire the self-user qualification must receive equipment training and pass the assessment test conducted by the equipment manager. The upgrading for self-user can be made on the website of UCRF. (http://ucrf.unist.ac.kr)

④ Equipment reservations or requests can be made on the UNIST Portal System and the website of UCRF, and the reservation time should not be unnecessarily occupied for a long time so it does not affect the opportunity for others.

(5) A user should be familiar with the safety rules for each equipment before using, and use the equipment after wearing appropriate safety gear.

6 Bringing chemicals and other items for personal use should be consulted with the equipment manager. ⑦ A user must check that there is no problem before using equipment, chemicals, and etc. If there is a problem before or after use, a user should promptly report to the equipment manager. (8) A user must thoroughly fill out the "Performance Records" after using the equipment. (9) A user must take safety measures by posting the contents of the experiment to deliver accurate information to others if he inevitably leaves his seat during the experiment. 1) The laboratory (in case of outsiders, affiliated institution) of self-user shall be obligated to compensate for all safety and property damage such as accidents (equipment damage, breakdowns, losses, etc.) caused by the negligence of the self-user.

![](_page_46_Picture_5.jpeg)

![](_page_46_Figure_9.jpeg)

![](_page_46_Figure_10.jpeg)

![](_page_46_Figure_11.jpeg)

![](_page_46_Figure_12.jpeg)

![](_page_46_Figure_13.jpeg)

![](_page_46_Figure_14.jpeg)

![](_page_46_Figure_15.jpeg)

![](_page_46_Figure_16.jpeg)

![](_page_46_Figure_17.jpeg)

![](_page_46_Figure_18.jpeg)

**Article 4. Cancellation after equipment reservation** (1) A self-user can cancel equipment reservation by himself up to 2 hours before equipment reservation time. However, TEM (HR-TEM, FE-TEM, Normal TEM, Bio-TEM) can be canceled up to 4 hours before. (X Cancellation is not possible after the cancellation deadline has passed.) 2 If a user has reserved an analysis request but wants to cancel it, he must notify the equipment manager at least 24 hours in advance. (However, in the case of NMR, notification would be allowed up to 1 hour left.) A user who does not appear at the reservation time without prior notice will be charged a usage fee for the reservation time.

### Article 5. Laboratory safety and user management

(1) A person who harms the safety of the laboratory or violates the rules of using the UMCL and damages the equipment use of another person, can be subject to penalties according to [Attached Table 1] and be taken appropriate action.

(2) If the violation of the rules is deliberately determined, the sanctions may be strengthened. If a user voluntarily declares after violating the rules, the sanctions may be eased. ③ If it is judged that the sanctions are difficult to be properly implemented due to the status of the violator (graduation or resignation), the user may be blocked from accessing UMCL.

![](_page_47_Picture_5.jpeg)

![](_page_47_Figure_12.jpeg)

④ A person who damages the property and facilities of UMCL by violating the rules shall be held liable to compensate for the damage.

(5) If a violator does not follow the sanctions, the advisor of the violator will be held jointly responsible. (In the case of an outsider, the supervisor in charge of the affiliated institution)

![](_page_48_Picture_3.jpeg)

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## **Self-user Penalty**

### **1. Criteria for penalty points**

A user shall be fined the penalty points in the event that any inappropriate behavior falls under the following.
 Each penalty item may be counted multiple times. (The expiration of penalty points is 1 year from the date of imposition.)

No.	Case description	Penalt points
1	Equipment is used by an unpermitted user who does not have a qualification of self-user.	5
2	Equipment is used without reservation (Including excessive use of equipment without additional reservation	3
3	A user operates an unpermitted function of the equipment	3
4	An abnormality or malfunction discovered before or after using the equipment did not immediately reported to the manager	3
5	Damage, malfunction, and loss of equipment due to user negligence (* The user is responsible for all costs incurred due to the negligence. *)	5
6	A user does not provide the accurate information of the sample to the equipment manager, which is essential for protecting the safety, equipment or facilities	3
7	A person causes the leakage of a harmful substance, gas, or any risk of fire	5
8	A person uses or occupies the public items and other person's items without prior consent	1
9	A person leaves the laboratory without switching off the lights, locking the doors, <b>tidying up the area</b> , etc. after using equipment	1
10	A person does not follow the common lab safety rules(including clothing, prohibition of eating, etc.)	1

![](_page_49_Picture_4.jpeg)

![](_page_49_Picture_6.jpeg)

## **Self-user Penalty**

### 2. Actions taken after subjecting penalty points

1 If the cumulative penalty points exceed a certain criterion, the action corresponding with the table below will be taken.

② When a user violates the rule, an official letter from UCRF is sent to the department or institution(in case of the user outside) of the violator.

③ Even if the following actions have been taken due to the sum of the penalty points, the penalty points within the validity period(1 year) are effective.

Туре	Penalty points	
Total penalty points awarded	5 points or more	- The user i - When the assessmen
to 1 user	8 points or more	- The user - When the assessmen
Total penalty points awarded to 1 laboratory for 1	12 points or more	- Notify the than 15 pe for 1 mon
equipment	15 points or more	- The mem - Send an c

![](_page_50_Picture_6.jpeg)

### Action is prohibited from using the equipment for 1 month. e prohibition period is finished, the user must complete the training and at again. is prohibited from using the equipment for 3 months. e prohibition period is finished, the user must complete the training and at again. e user and the advisor(supervisor) by e-mail that "If the penalty score is more

oints, the members of your laboratory are prohibited from using the equipment of the interview of the equipment of the second seco

bers of the laboratory are prohibited from using the equipment for 1 month official letter of action to the affiliated department(institution)

![](_page_50_Figure_11.jpeg)

![](_page_50_Picture_12.jpeg)

![](_page_51_Picture_0.jpeg)

# **THANK YOU**

![](_page_51_Picture_2.jpeg)

FIRST IN CHANGE