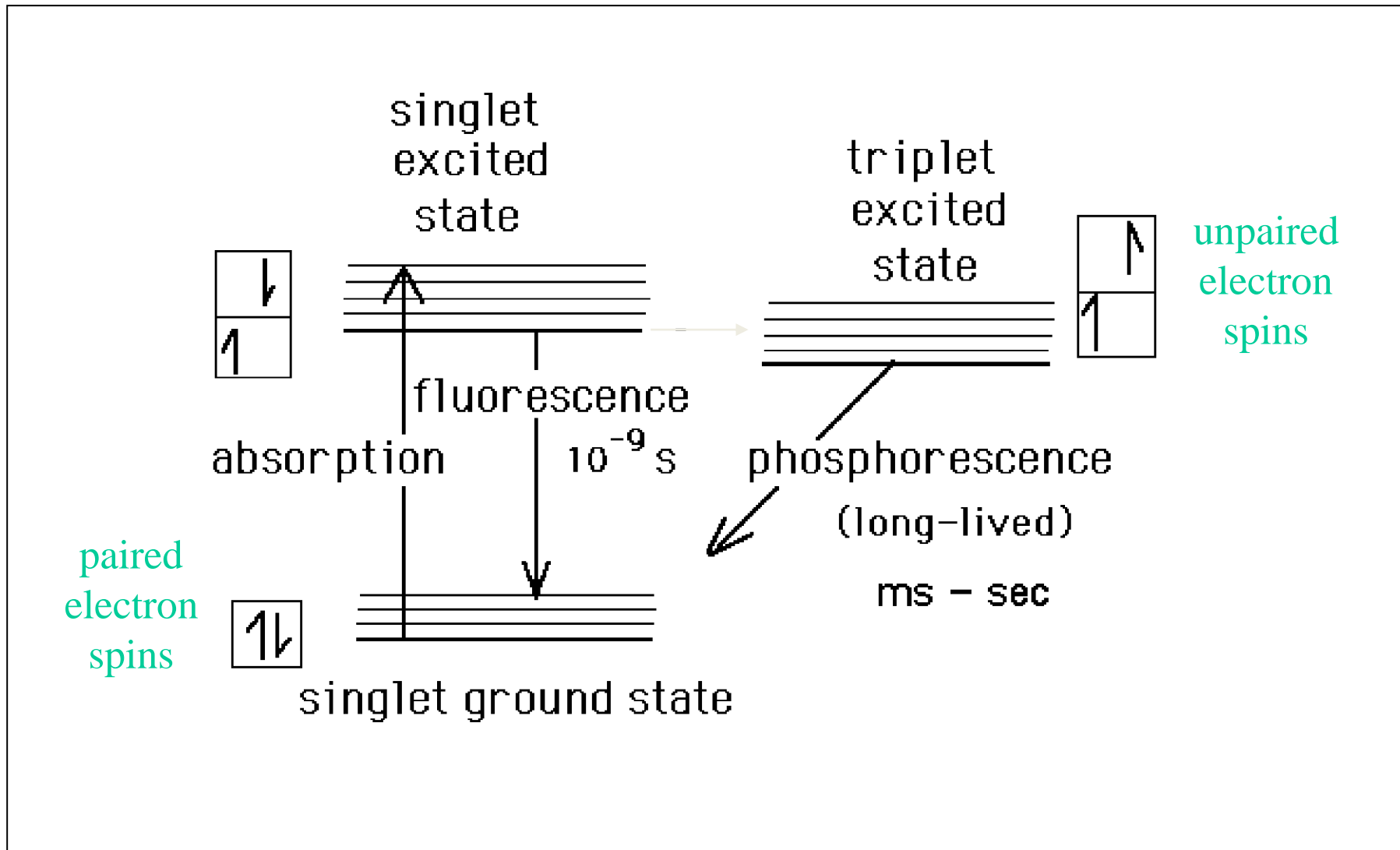


Fluorometer self-user training

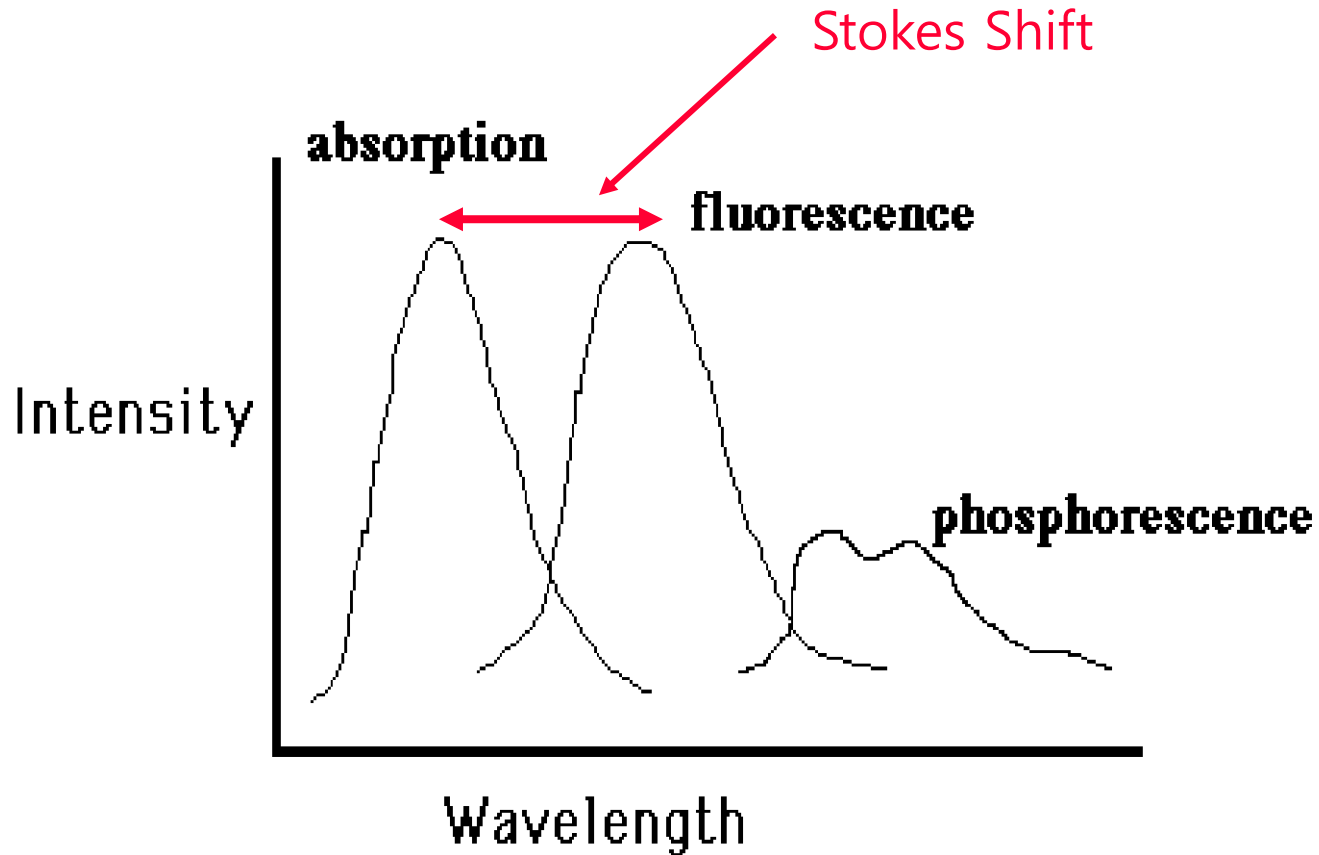
HYE NA LEE

UNIST Central Research Facilities (UCRF)
Ulsan National Institute of Science and Technology (UNIST)

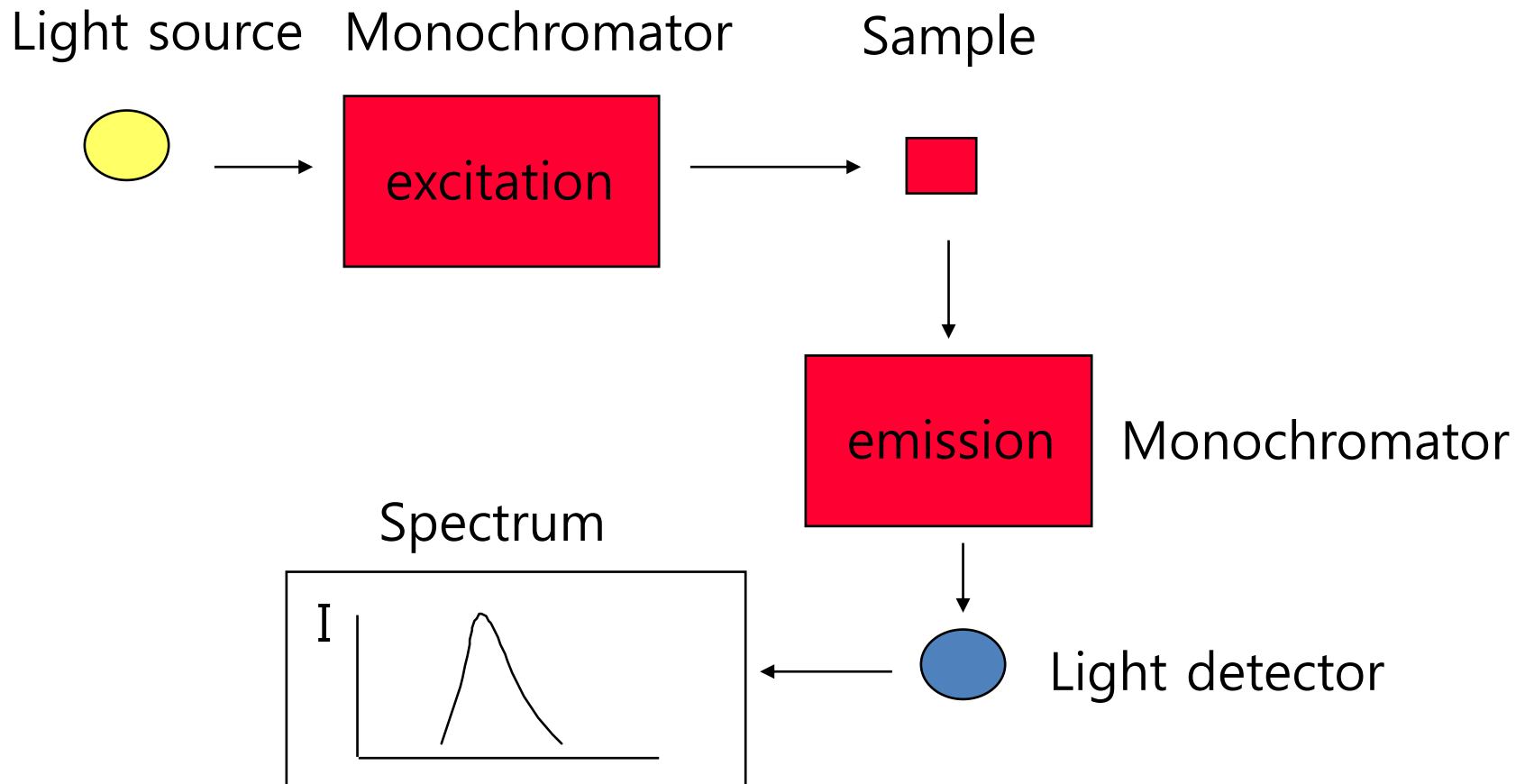
Photoluminescence Processes



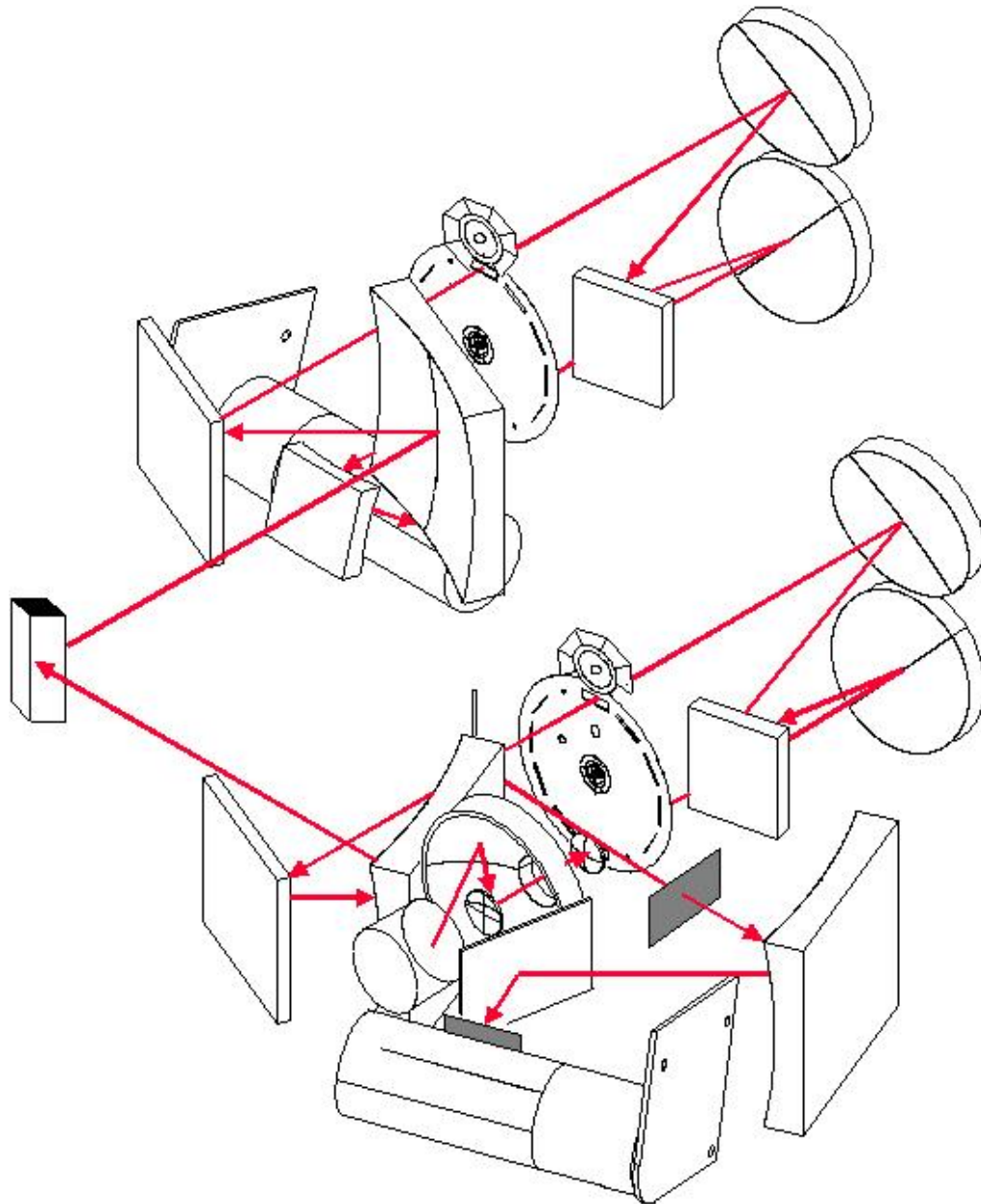
Absorption, Fluorescence, Phosphorescence spectra



Fluorescence Spectrophotometer



Schematic of Fluorometer



$$\phi_{fl} = \frac{\text{No. of photons emitted}}{\text{No. of photons absorbed}}$$

$$0 \leq \phi_{fl} \leq 1$$

- Depends on material and conditions
 - e.g. temperature, solvent, viscosity

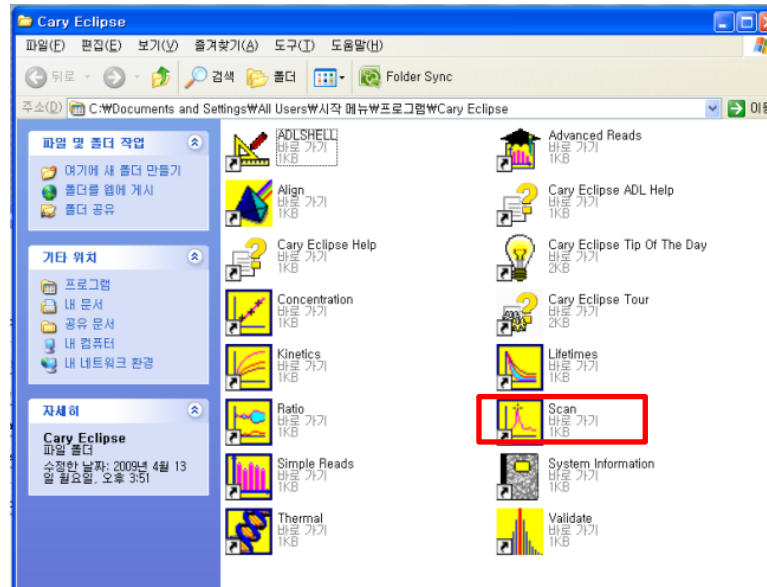
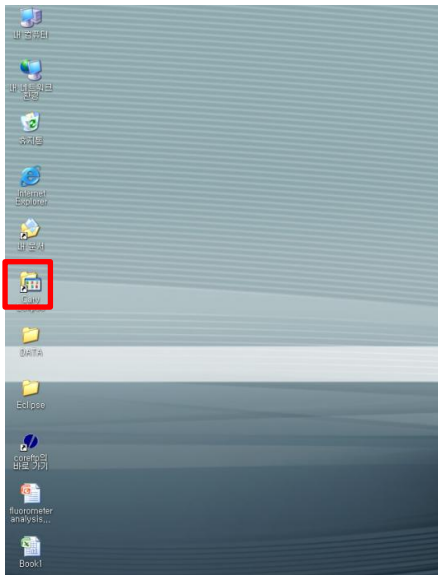
		Fluorometer	Spectrofluorometer
Sample		Liquid	Liquid, Solid/ QY
Light source		Xe pulsed lamp (75 kW)	Xe pulsed lamp (150 kW)
Wavelength ranges	Excitation	200~900 nm	200~850 nm/ 350~800 nm*
	Emission	200~900 nm	200~850 nm/ 350~800 nm*
Detector		Photomultiplier tube	Photomultiplier tube
Wavelength accuracy		< 1.5 nm	< 1.0 nm
Limiting resolution		1.5 nm	1.0 nm
Filter		O	X
Liquid cell		10 mm (2.5mL)	1 mm (0.25mL)

*Integrating sphere with quantum efficiency program

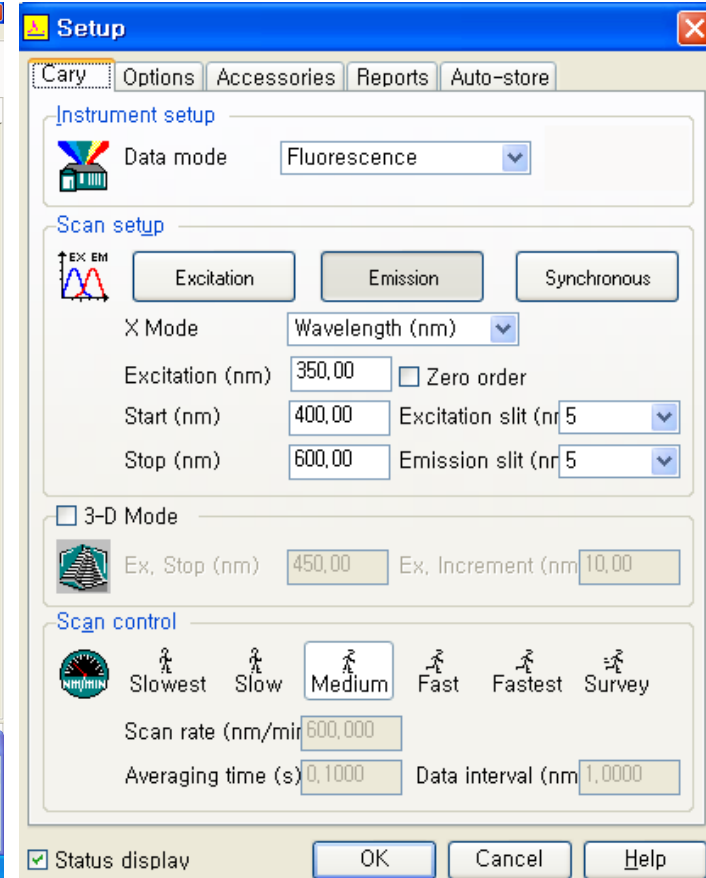
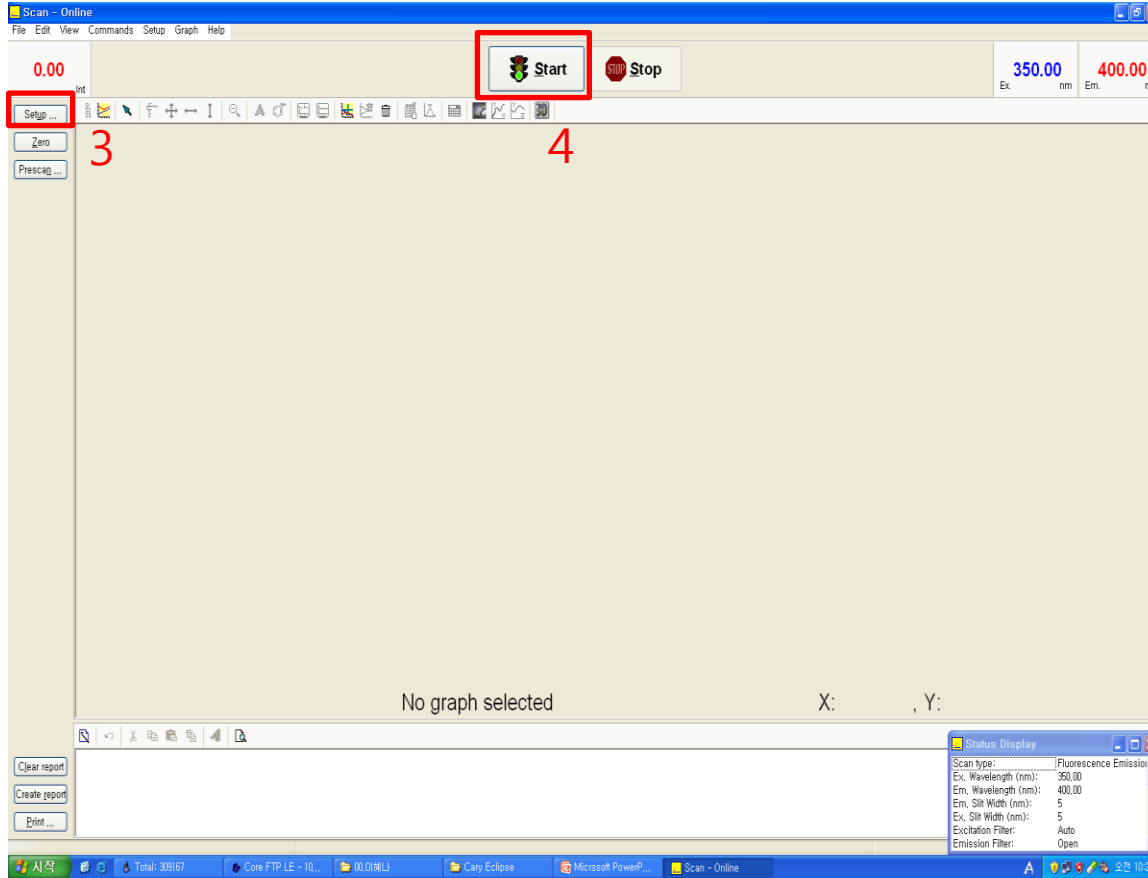
1. Switch on → warm up (10 min)



2. Cary Eclipse → Scan START

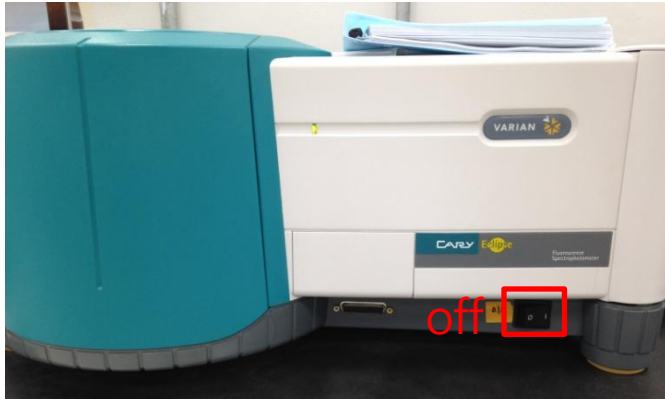


3. Set up change

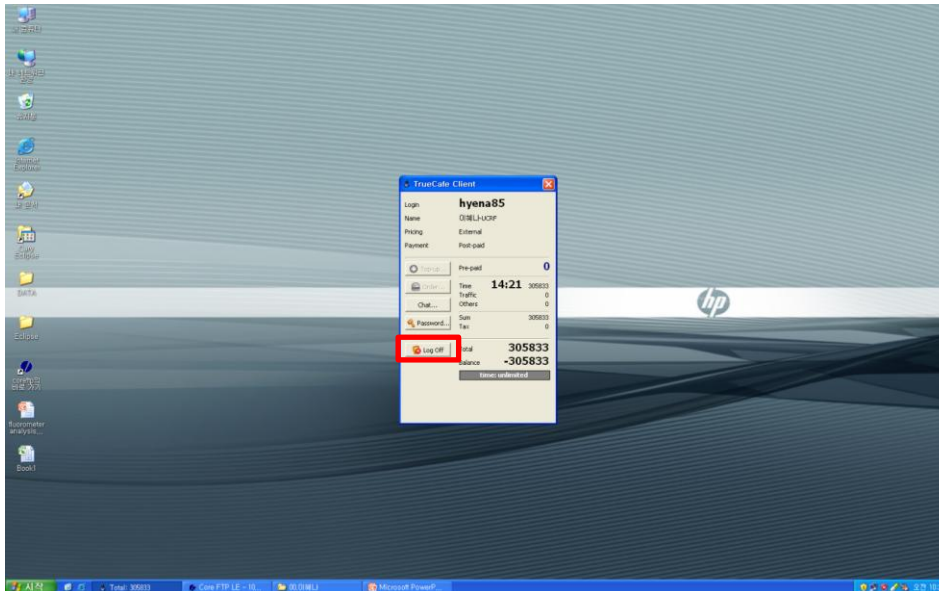


4. Start click

5. Switch off

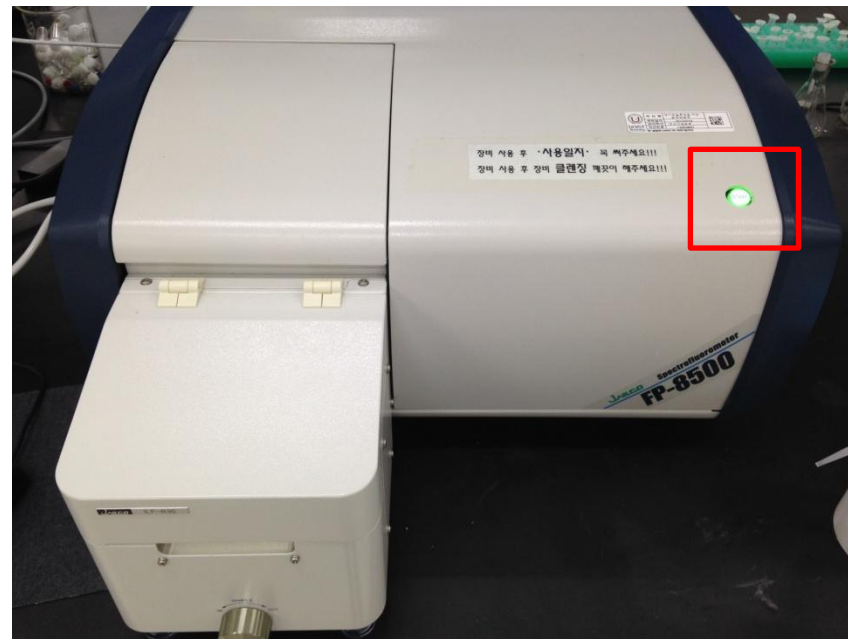


6. Log off True Cafe

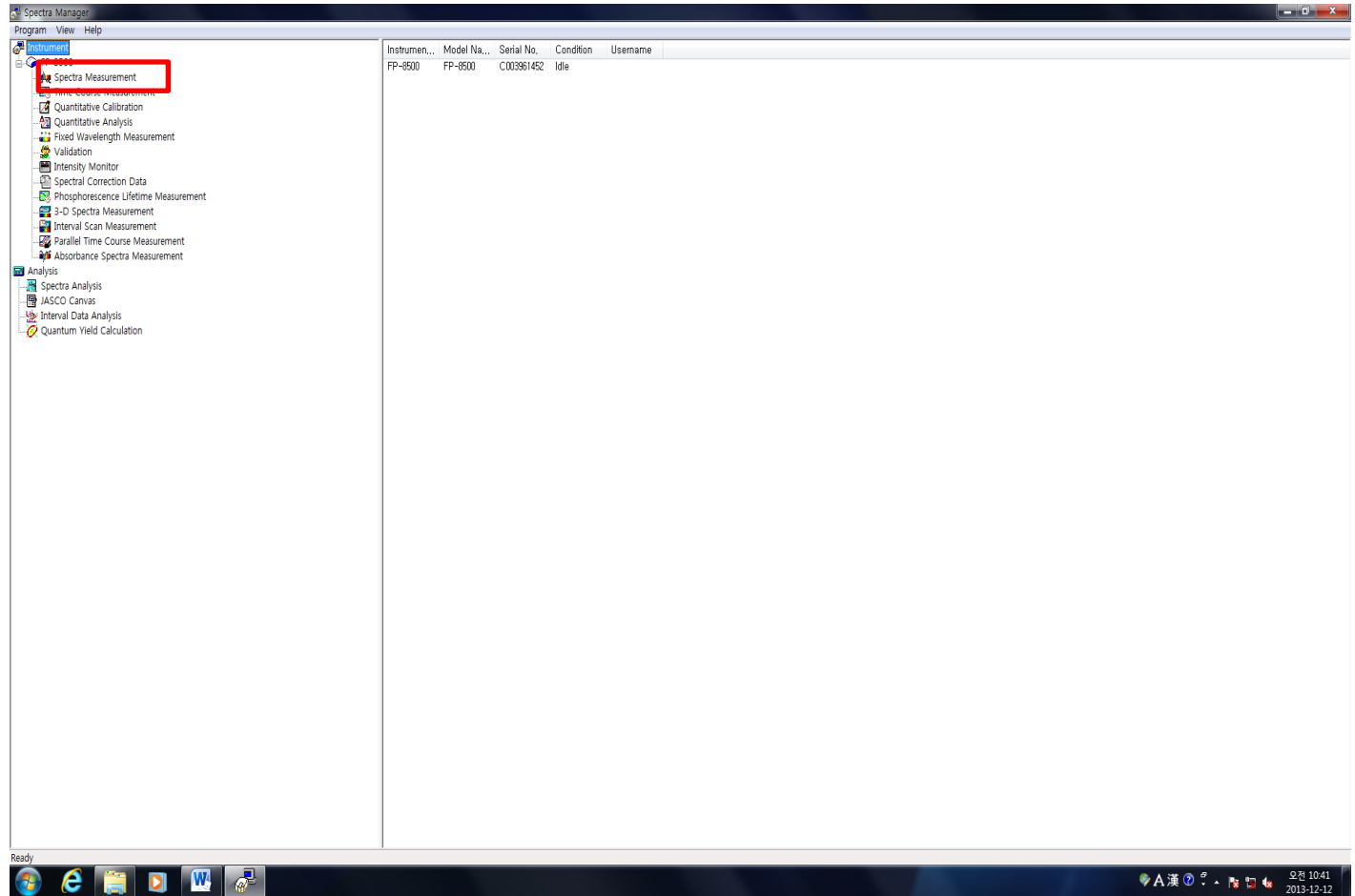
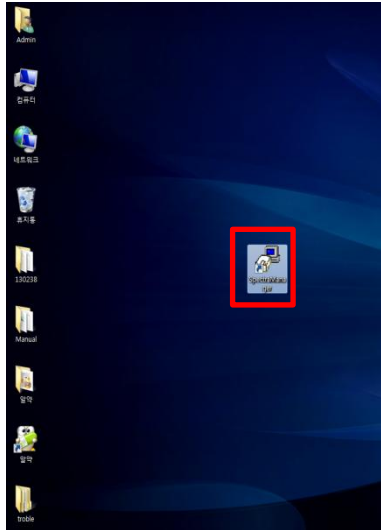


Manual - Spectrofluorometer

1. Switch on → warm up (10 min)

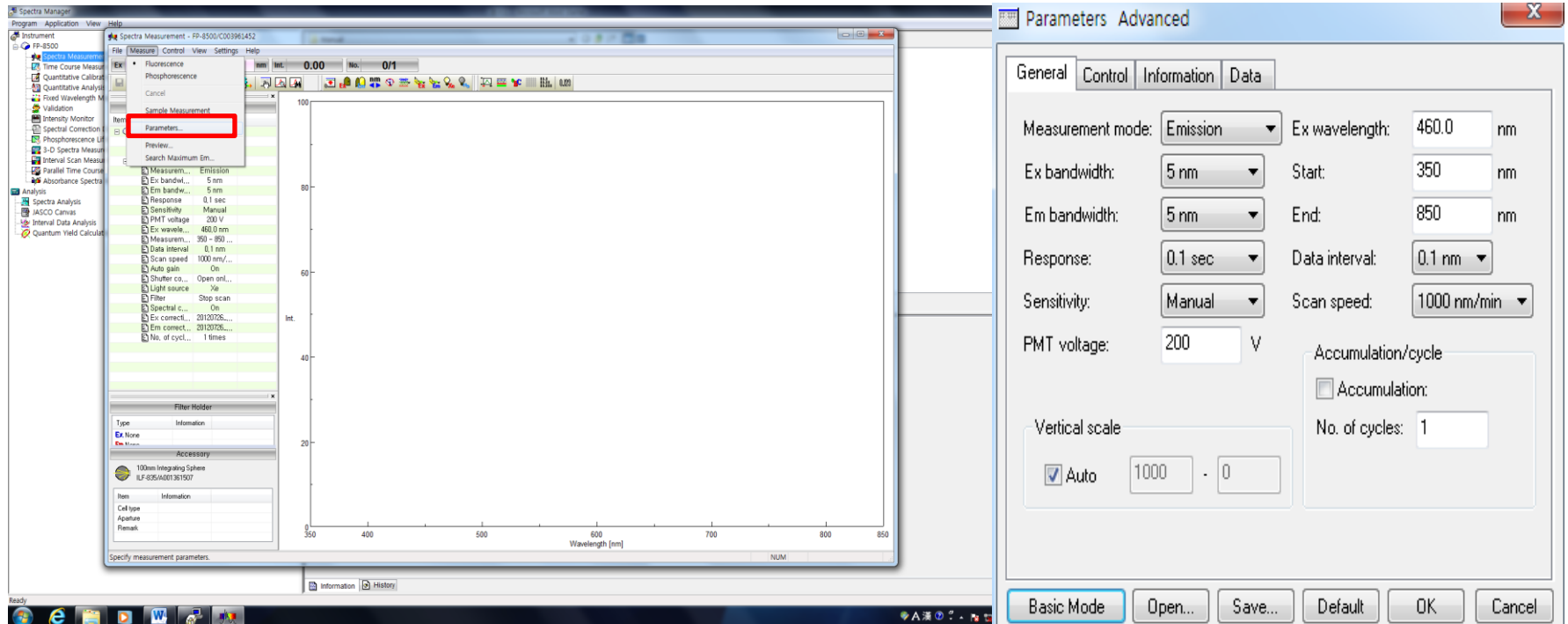


2. Spectra Manager Pro. START → Spectra Measurement click



3. Measure → Parameters change

- Measurement mode : Emission
- Ex. Wavelength
- Ex. bandwidth : 5 nm, Em. bandwidth : 5 nm
(시료의 intensity가 낮은 경우 bandwidth를 늘려 intensity를 높일 수 있다.)
- Start : 300 nm, Stop : 850 nm
(적분구를 사용하는 경우 350 nm ~ 800 nm 범위에서 scan 가능)
- Response : 0.1 sec, Data interval : 0.1 nm, Scan speed : 1000 nm/min or 500 nm/min
(resolution에 영향을 미치는 조건)
- Sensitivity : Medium
(Max. intensity : 10,000이 넘는 경우 sensitivity를 Low 또는 Manual을 선택한다.)
- No. of cycles : 반복측정 횟수



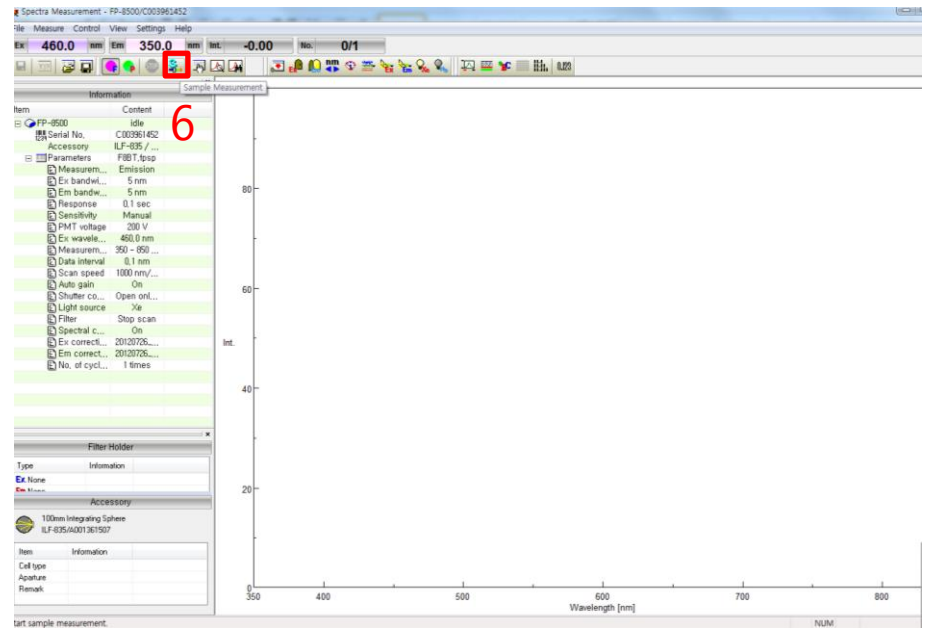
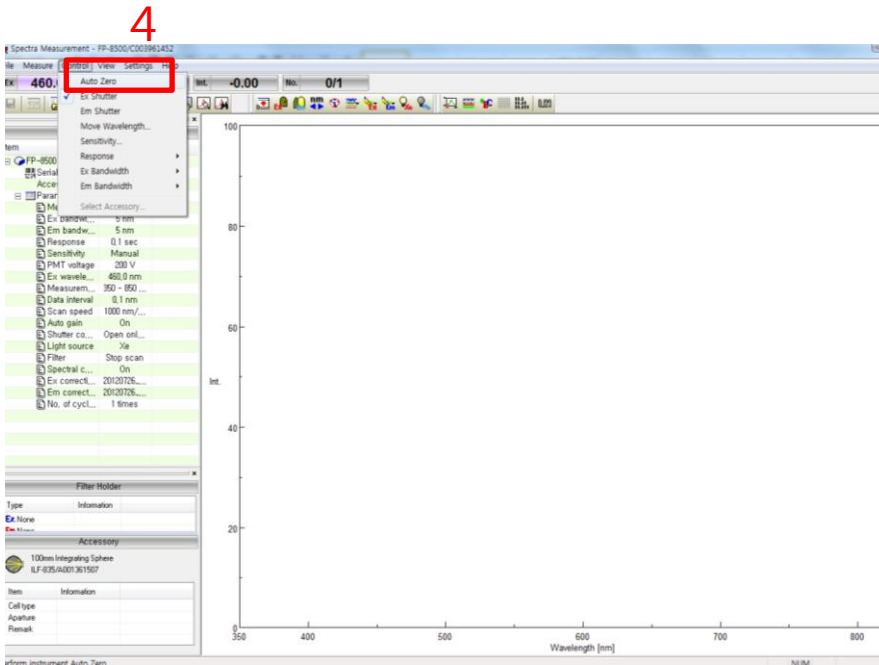
The screenshot displays the Spectra Manager software interface. On the left, the 'Measure' menu is open, with 'Parameters...' highlighted. The main window shows a plot of intensity versus wavelength (350-850 nm). On the right, the 'Parameters Advanced' dialog box is open, showing the following settings:

- General tab selected
- Measurement mode: Emission
- Ex wavelength: 460.0 nm
- Ex bandwidth: 5 nm
- Em bandwidth: 5 nm
- Response: 0.1 sec
- Sensitivity: Manual
- PMT voltage: 200 V
- Start: 350 nm
- End: 850 nm
- Data interval: 0.1 nm
- Scan speed: 1000 nm/min
- Accumulation/cycle: Accumulation
- No. of cycles: 1
- Vertical scale: Auto, 1000 - 0

Buttons at the bottom of the dialog include Basic Mode, Open..., Save..., Default, OK, and Cancel.

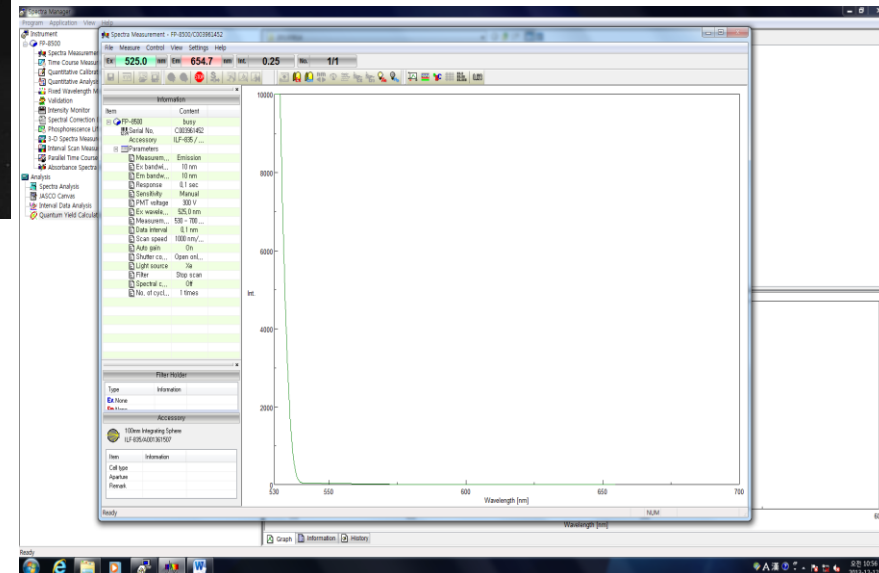
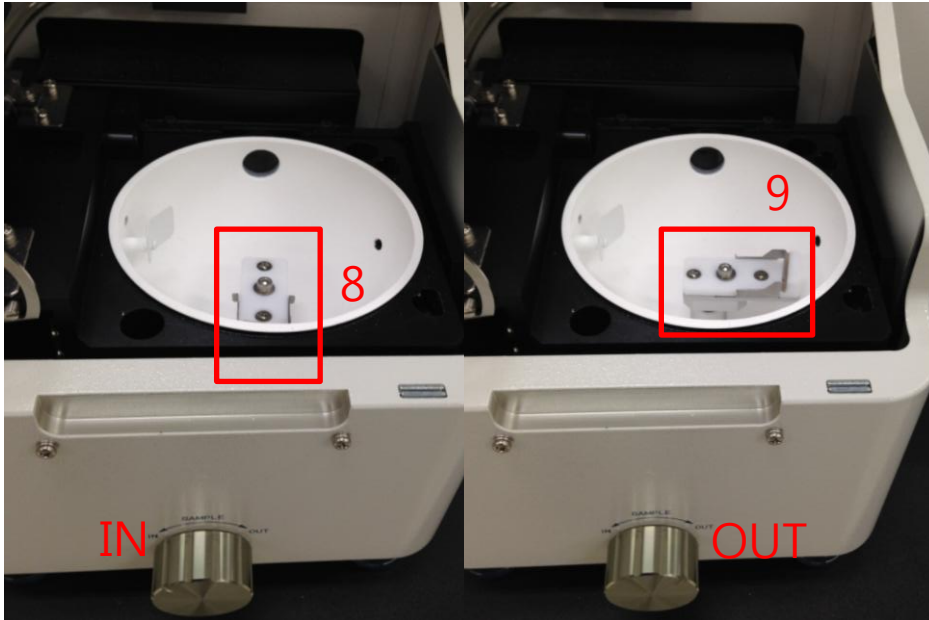
Manual - Spectrofluorometer

4. Control → Auto Zero click
5. Reference(background) insert
6. Sample Measurement click



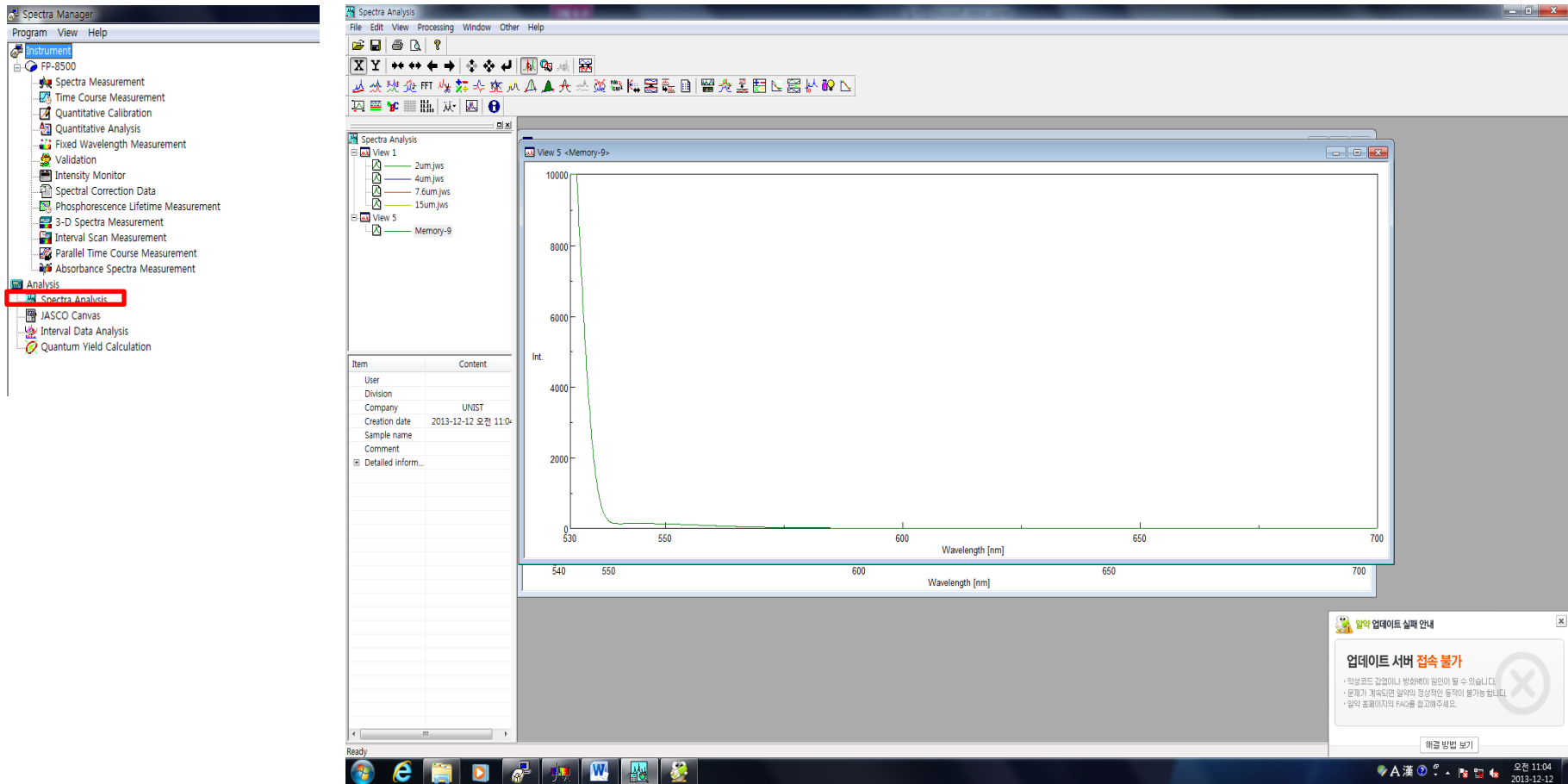
Manual - Spectrofluorometer

7. Sample insert(coated layer = forward)
8. Sample Measurement click(Direct = sample IN)
9. Sample Measurement click(Indirect = sample OUT)



10. Data save in Spectra Analysis

- Correction → Baseline, Smoothing, Noise Elimination
- Peak Processing → Peak Find, Peak Height, Peak Area
- X unit, Y unit conversion
- Overlay : View 2의 spectrum을 View 1을 drag 한다.



The screenshot displays the Spectra Manager and Spectra Analysis software interface. The Spectra Manager window on the left shows a tree view of measurement methods, with 'Spectra Analysis' highlighted. The Spectra Analysis window on the right shows a plot of Intensity (Int.) versus Wavelength (nm). The plot shows a sharp peak at approximately 530 nm, with the intensity dropping to near zero by 550 nm. The x-axis ranges from 530 to 700 nm, and the y-axis ranges from 0 to 10000. The plot is titled 'View 5 -Memory-9'.

Below the plot, there is a table with the following data:

Item	Content
User	
Division	
Company	UNIST
Creation date	2013-12-12 오전 11:04
Sample name	
Comment	
Detailed inform...	

In the bottom right corner, there is a notification window titled '업데이트 서버 실패 안내' (Update Server Failure Notice) with the following text:

업데이트 서버 접속 불가

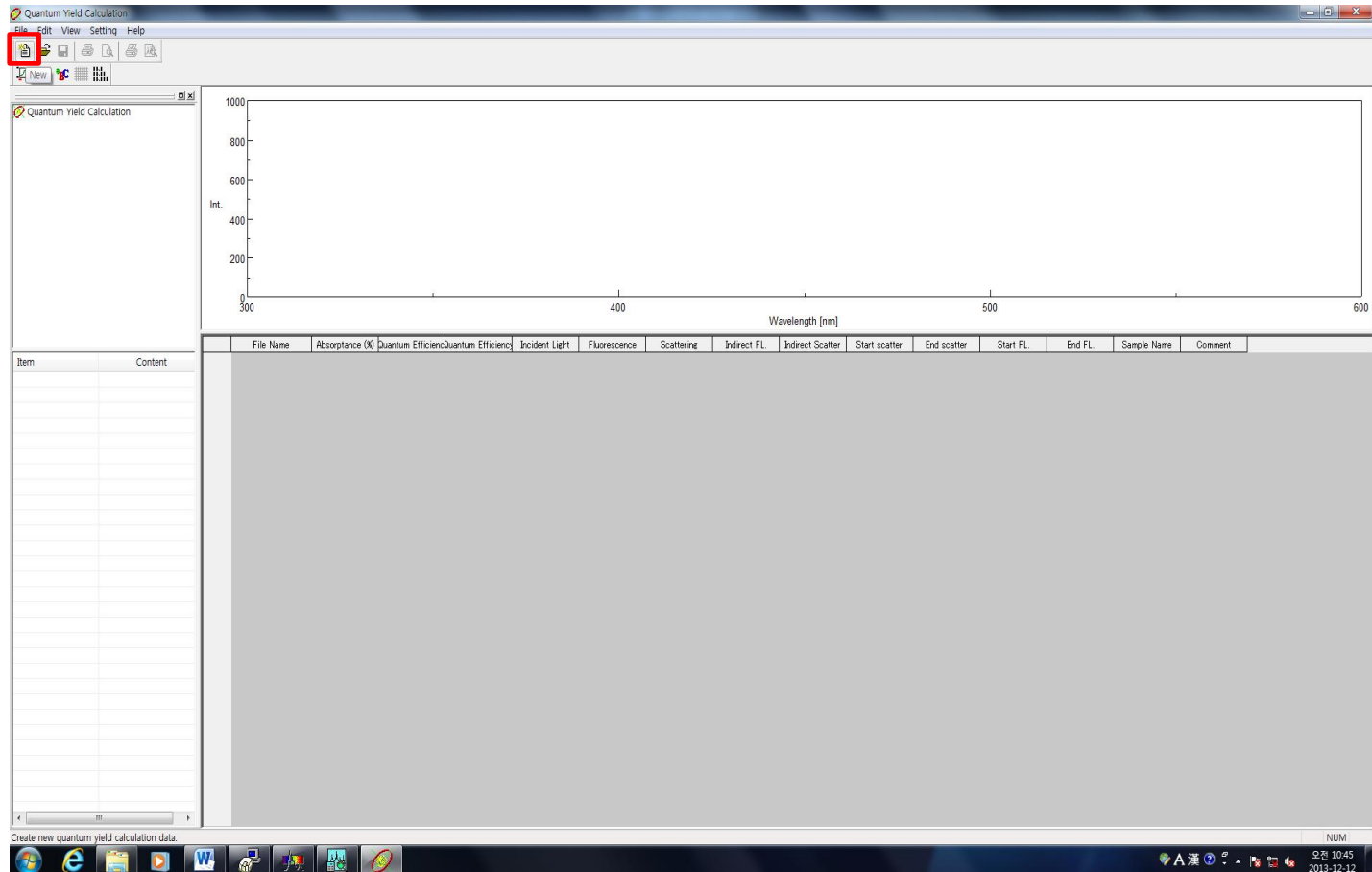
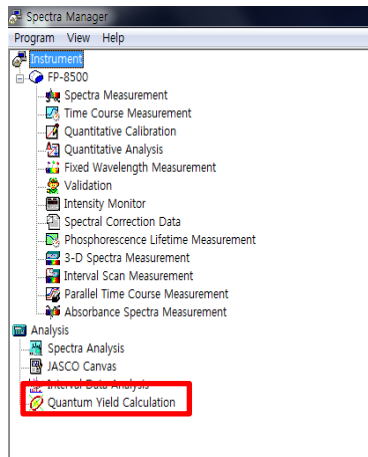
·인증표준 값에러나 방화벽이 동작이 될 수 있습니다.
·문제가 계속되면 관리자 계정인 관리자 아이디를 변경하십시오.
·업데이트 서버의 FAQ를 참고하십시오.

Buttons: [X] [확인]

System tray: Ready, 2013-12-12 오전 11:04

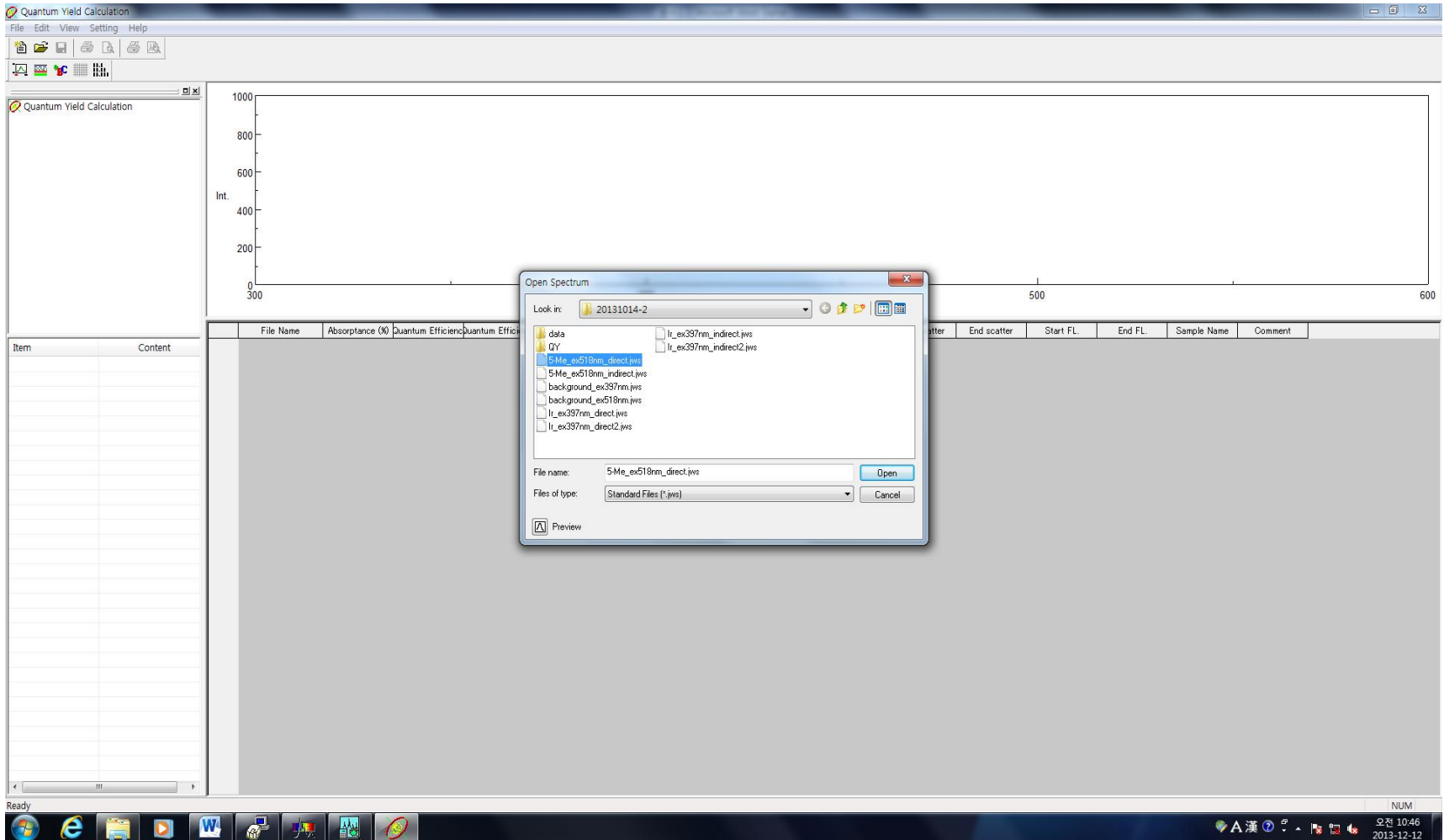
11. Quantum Yield Calculation click

1) File → New click



11. Quantum Yield Calculation click

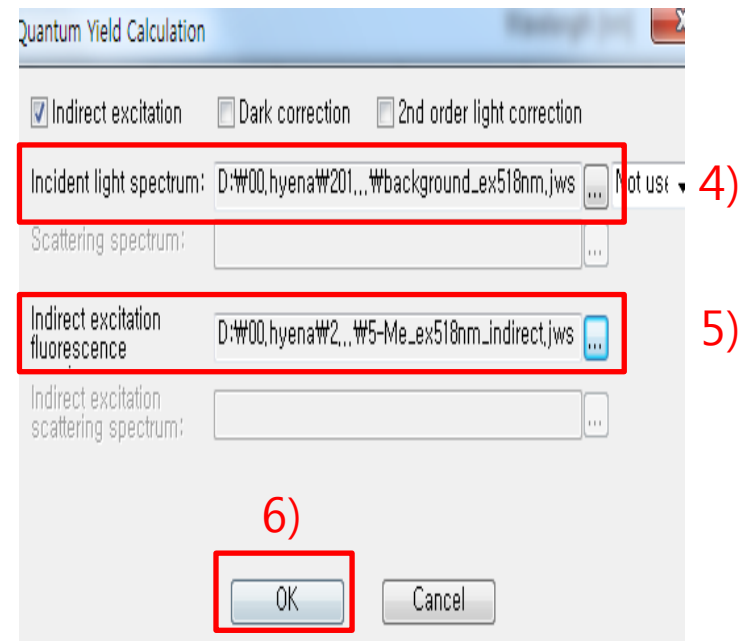
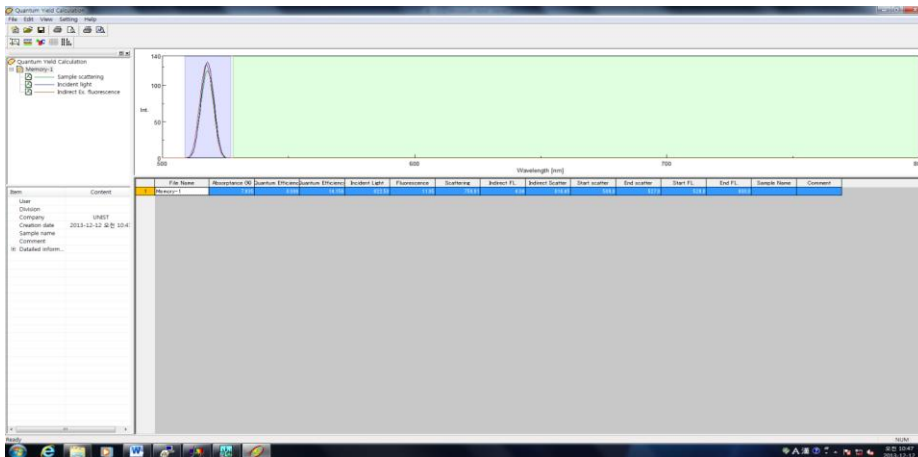
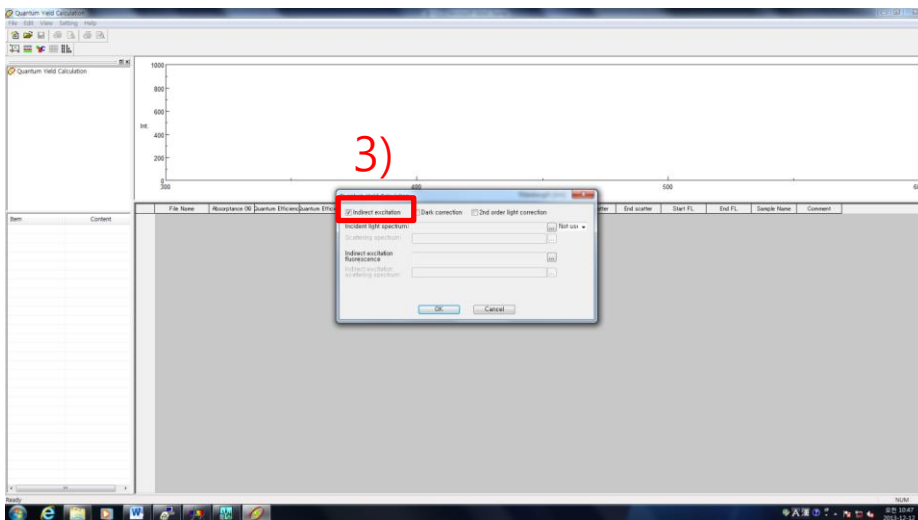
2) Select 'Direct sample data'



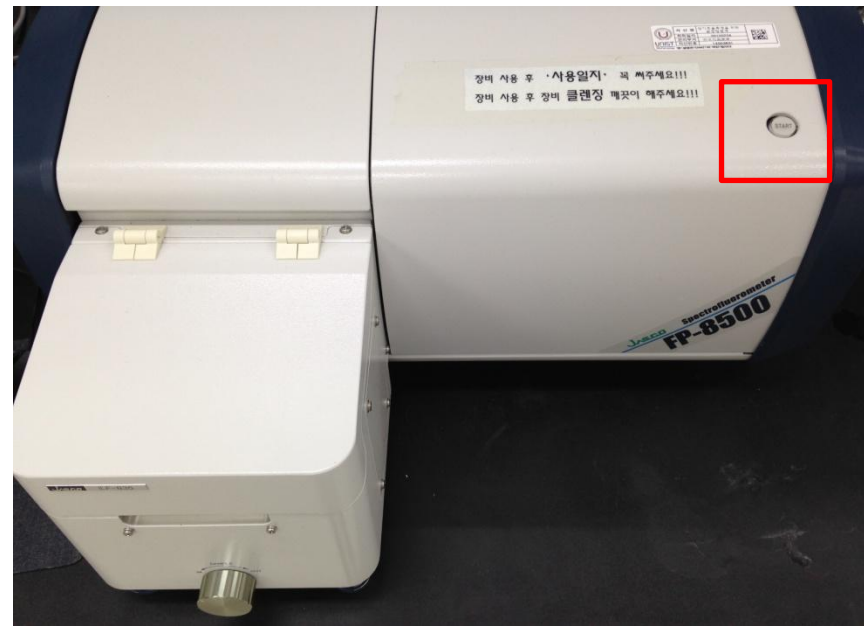
The screenshot displays the 'Quantum Yield Calculation' software interface. The main window features a menu bar (File, Edit, View, Setting, Help), a toolbar, and a large plot area with a y-axis labeled 'Int.' ranging from 0 to 1000 and an x-axis ranging from 300 to 600. Below the plot is a table with columns: File Name, Absorbance (%), Quantum Efficiency, and Quantum Efficiency. An 'Open Spectrum' dialog box is open in the center, showing a file list with '5_Me_ex518nm_direct.jws' selected. The dialog also includes fields for 'File name', 'Files of type', and 'Open/Cancel' buttons. The Windows taskbar at the bottom shows the system tray with the date and time: '오전 10:46 2013-12-12'.

11. Quantum Yield Calculation click

- 3) Check Indirect excitation
- 4) Select 'Reference data' in Incident
- 5) Select 'Indirect sample data' in Indirect
- 6) OK click



12. Switch off



1. Switch off



2. Don't contaminate equipment with your sample



3. Fill in the sheet

UNIST

A Record of Equipment Use

		Approval		Manager
Fluorometer				
Equipment				
University or Company				
Client	Department (Supervisor)			Position
	Name			Contact number
	E-mail	<small>(Please write the contact number and e-mail address in case of an outside client.)</small>		
User	Department (Supervisor)			Position
	Name			Contact number
Date	From () Month - () Day - () Year			
	to () Month - () Day - () Year			
(Total use time : hours		minutes , [: - :])		
Sample			No. of samples	
Details about use of equipment				
Details about use of hazardous materials				
Equipment state (problem and repair)			Cleanliness	Good
				Poor



Charge

		Fluorometer	Spectrofluorometer
UNIST students	Client(70%)	14,000/hr	14,000/hr
	Self-user(50%)	10,000/hr	10,000/hr

True Café using time	Charging time
0.1~0.5 hr	0.5 hr
0.6~1.0 hr	1.0 hr
1.1~1.5 hr	1.5 hr
1.6~2.0 hr	2.0 hr
...	...