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## Standard Operating Procedure for UV-VIS-NIR Spectrophotometers

### Scope:

This procedure applies to all personnel who work in a laboratory and use Agilent Cary 5000 UV-VIS-NIR Spectrophotometers. It is the intent of this guideline to provide information on the proper use of Agilent Cary 5000 UV-VIS-NIR Spectrophotometers in Function Hub laboratory and ensure all laboratory worker protection while working in a laboratory.

### Responsibility:

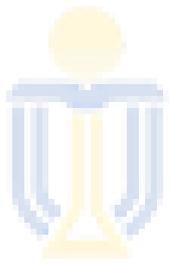
Only trained and qualified personnel shall be allowed to work in Function Hub laboratory. Each laboratory worker is directly responsible for safe operation of laboratory equipment and should read and follow this procedure before starting experiment.

**Please remember to sign on logbook when the experiment was finished.**

### Proper Personal Protective Equipment(PPE):

Each laboratory personnel should wear lab coat, clean gloves and a goggle.

### Operation procedure:



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# 安捷伦 **Cary 5000** 光谱仪操作手册



# 简介

Cary 5000 是一款高性能紫外-可见-近红外分光光度计，在 190-3300 nm 范围内具有优异的光度性能，这使其成为用于材料科学研究的一款功能强大的工具。

大样品室经过扩展可以容纳用于光谱和漫反射测试的大附件和积分球。锁定机械装置实现了快速更换和定位附件，从而获得可重现的分析结果。

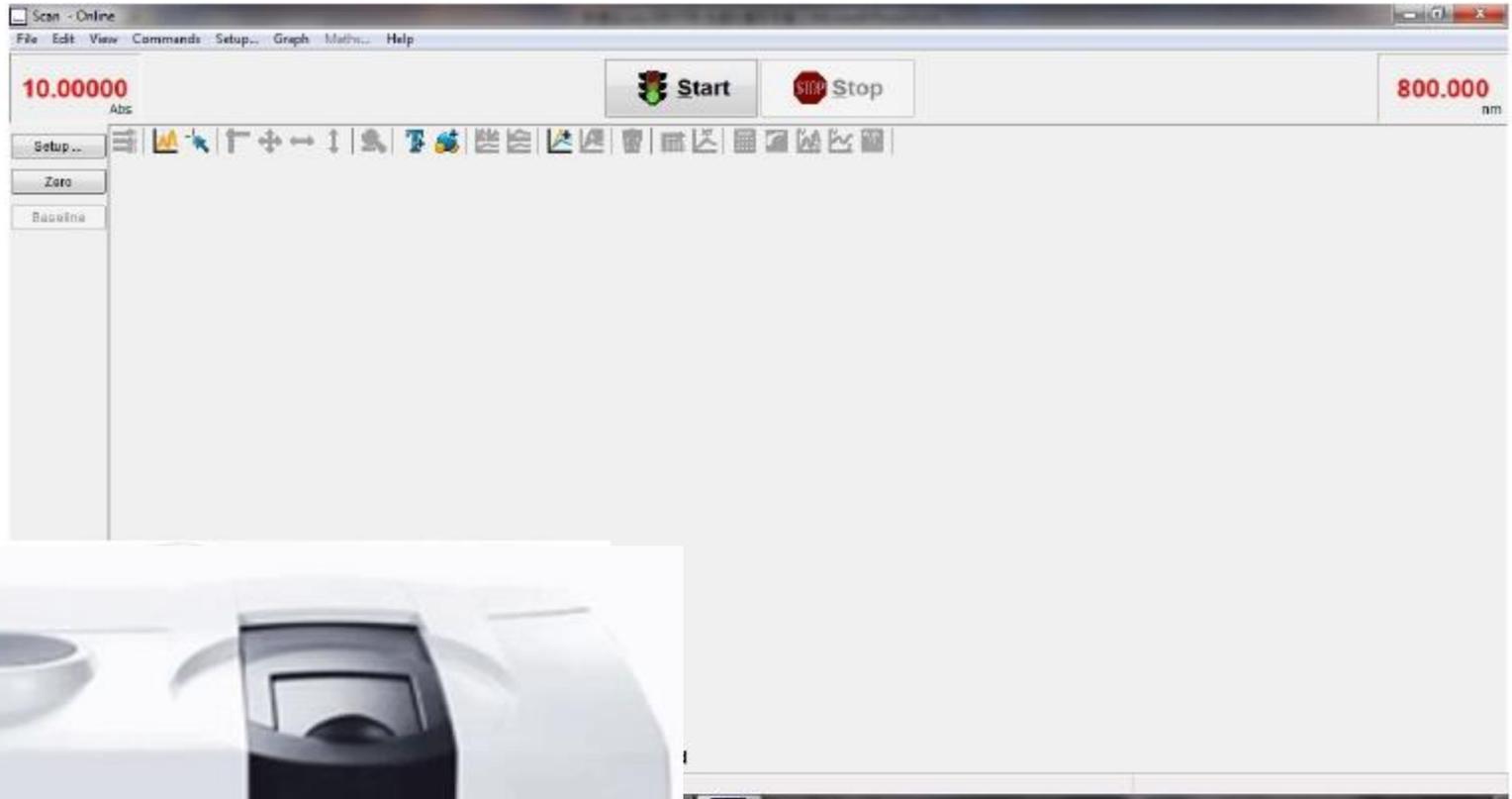


## 仪器配置:

- 光源: 氙灯/钨灯/汞灯 (其中汞灯用于校准)
- 光谱范围: 主机: 190-3300 nm,  
积分球: 200-2500 nm
- 检测器: 主机 光电倍增管/PbS
- 测量模式: 透射/反射



# Cary WinUV软件设置





# Cary WinUV软件设置

## 1. 点击Cary Options选项，进行波长范围等常规参数设置

The screenshot shows the 'Setup' dialog box for Cary WinUV. The 'Cary Options' section is highlighted with a red box. The settings are as follows:

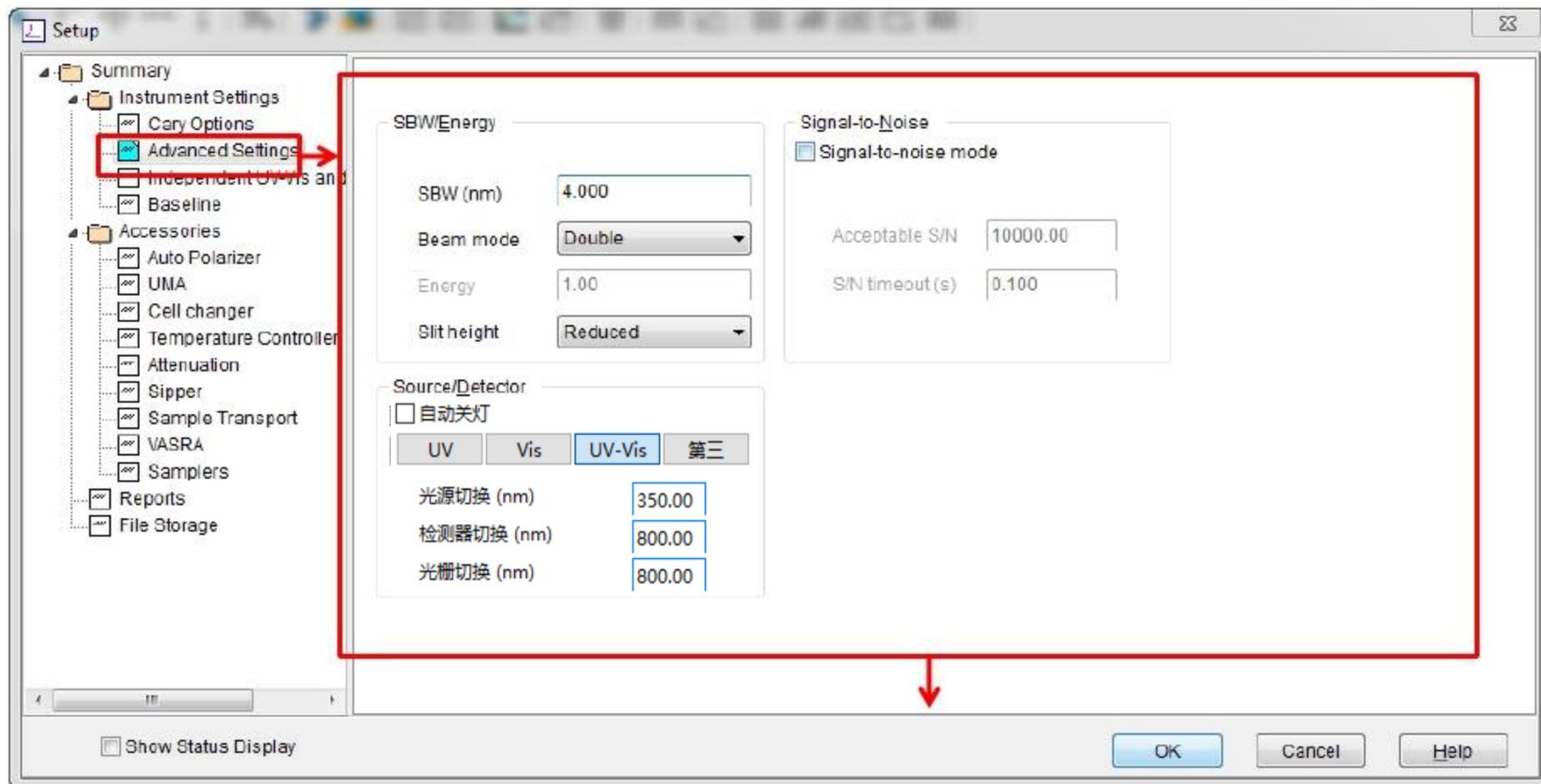
- Mode:** Nanometers
- Y Mode:** Abs, Factor: 1.0000
- Start:** 800.000 nm
- Stop:** 200.000 nm
- Y min:** 0.00
- Y max:** 1.00
- Cycle mode:**  Cycle mode
- Cycle count:** 1
- Cycle time:** 1.00 min
- Scan Controls:**
  - Ave time (s): 0.100
  - Data interval (nm): 1.000
  - Scan rate (nm/min): 600.000
- Temperature Monitor:** Monitor/Block
- Display Options:**
  - Individual data
  - Overlay data

At the bottom of the dialog, there are buttons for 'OK', 'Cancel', and 'Help'. A red arrow points from the 'Cary Options' section to the text below.

可在此设置波长范围，纵坐标单位及显示范围，积分时间、数据间隔和扫描速度等

# Cary WinUV软件设置

2. 点击**Advanced settings**选项，进行光谱带宽及元件切换点参数设置



# Cary WinUV软件设置

## 2.1 进行光谱带宽狭缝高度

**SBW/Energy**

SBW (nm)

Beam mode

Energy

Slit height

**Signal-to-Noise**

Signal-to-noise mode

Acceptable S/N

S/N timeout (s)

**Source/Detector**

自动关灯

光源切换 (nm)

检测器切换 (nm)

光栅切换 (nm)

# Cary WinUV软件设置

## 2.2 进行光学元件切换点设置

The screenshot displays the 'Source/Detector' settings panel, which is highlighted with a red border. It includes a 'Signal-to-Noise' panel and an 'SBW/Energy' panel. The 'Source/Detector' panel has a red box around it and contains the following settings:

- 自动关灯
- UV | Vis | **UV-Vis** | 第三
- 光源切换 (nm): 350.00
- 检测器切换 (nm): 800.00
- 光栅切换 (nm): 800.00

The 'Signal-to-Noise' panel includes:

- Signal-to-noise mode
- Acceptable S/N: 10000.00
- S/N timeout (s): 0.100

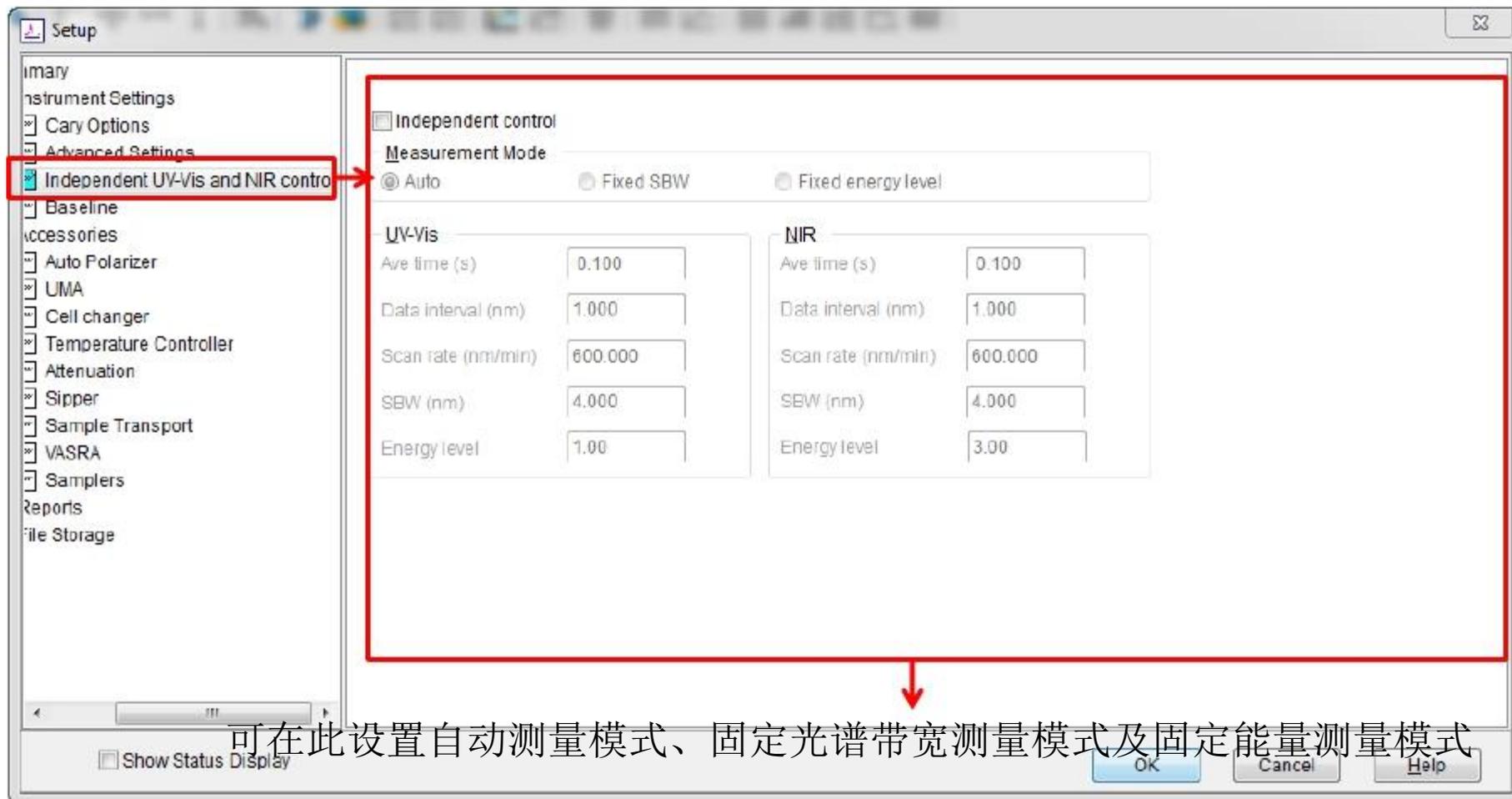
The 'SBW/Energy' panel includes:

- SBW (nm): 4.000
- Beam mode: Double
- Energy: 1.00
- Slit height: Reduced

在此设置仪器元件的切换点，如光源、检测器和光栅在测试过程中，一般无需更改。如果因为样品特性的原因，在谱图中元件切换点处出现台阶，可通过调整元件切换点位置来尝试消除台阶的产生。

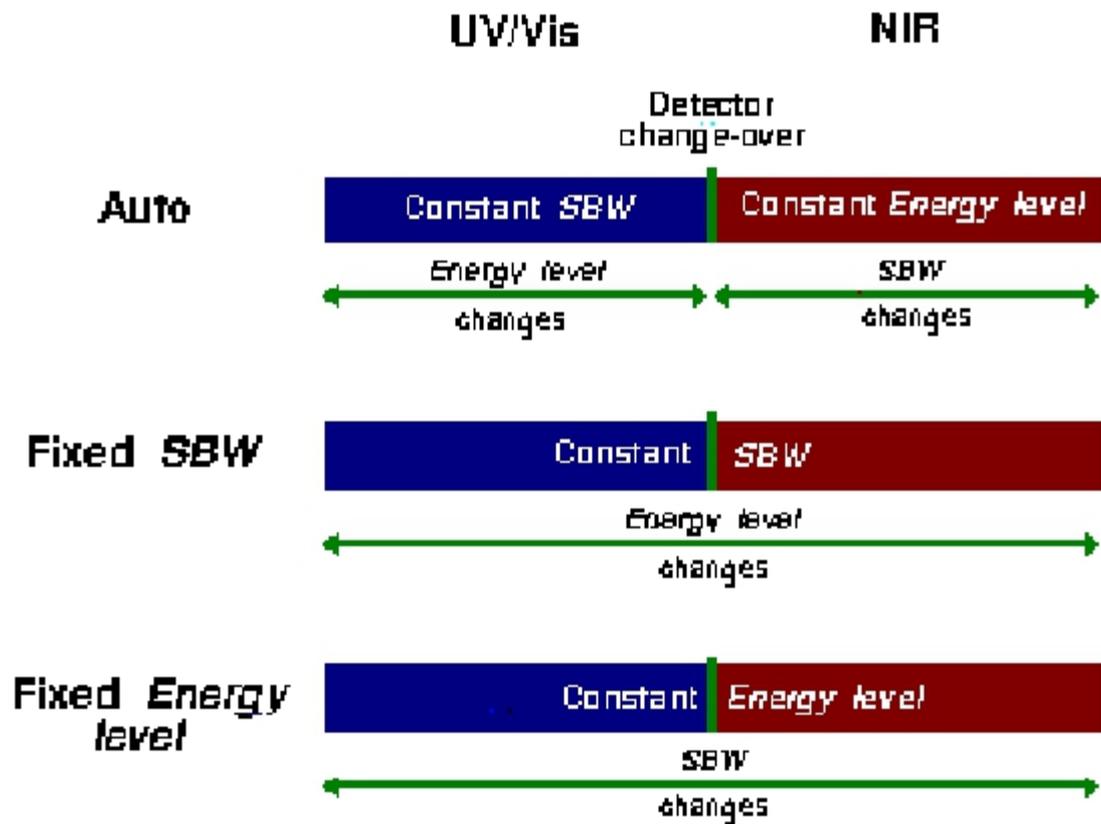
# Cary WinUV软件设置

3. 点击**Independent UV-Vis and NIR control**选项，进行测量模式设置



# Cary WinUV软件设置

3. 点击**Independent UV-Vis and NIR control**选项，进行测量模式设置



# Cary WinUV软件设置

## 3.1 Auto 模式

Independent control

### Measurement Mode

Auto

Fixed SBW

Fixed energy level

### UV-Vis

Ave time (s)

0.100

Data interval (nm)

1.000

Scan rate (nm/min)

600.000

SBW (nm)

4.000

Energy level

1.00

### NIR

Ave time (s)

0.100

Data interval (nm)

1.000

Scan rate (nm/min)

600.000

SBW (nm)

4.000

Energy level

3.00

在**Auto**测量模式下，在近红外段将采用固定能量的方式进行测量，  
在紫外可见波段将采用固定光谱带宽的方式进行测量

# Cary WinUV软件设置

## 3.2 Fixed SBW 模式

Independent control

Measurement Mode

Auto       Fixed SBW       Fixed energy level

<u>U</u> V-Vis		<u>N</u> IR	
Ave time (s)	0.100	Ave time (s)	0.100
Data interval (nm)	1.000	Data interval (nm)	1.000
Scan rate (nm/min)	600.000	Scan rate (nm/min)	600.000
SBW (nm)	4.000	SBW (nm)	4.000
Energy level	1.00	Energy level	3.00

在**Fixed SBW**测量模式下，在全波段范围内都按照设置的光谱带宽进行测量

# Cary WinUV软件设置

## 3.3 Fixed energy level模式

Independent control

Measurement Mode

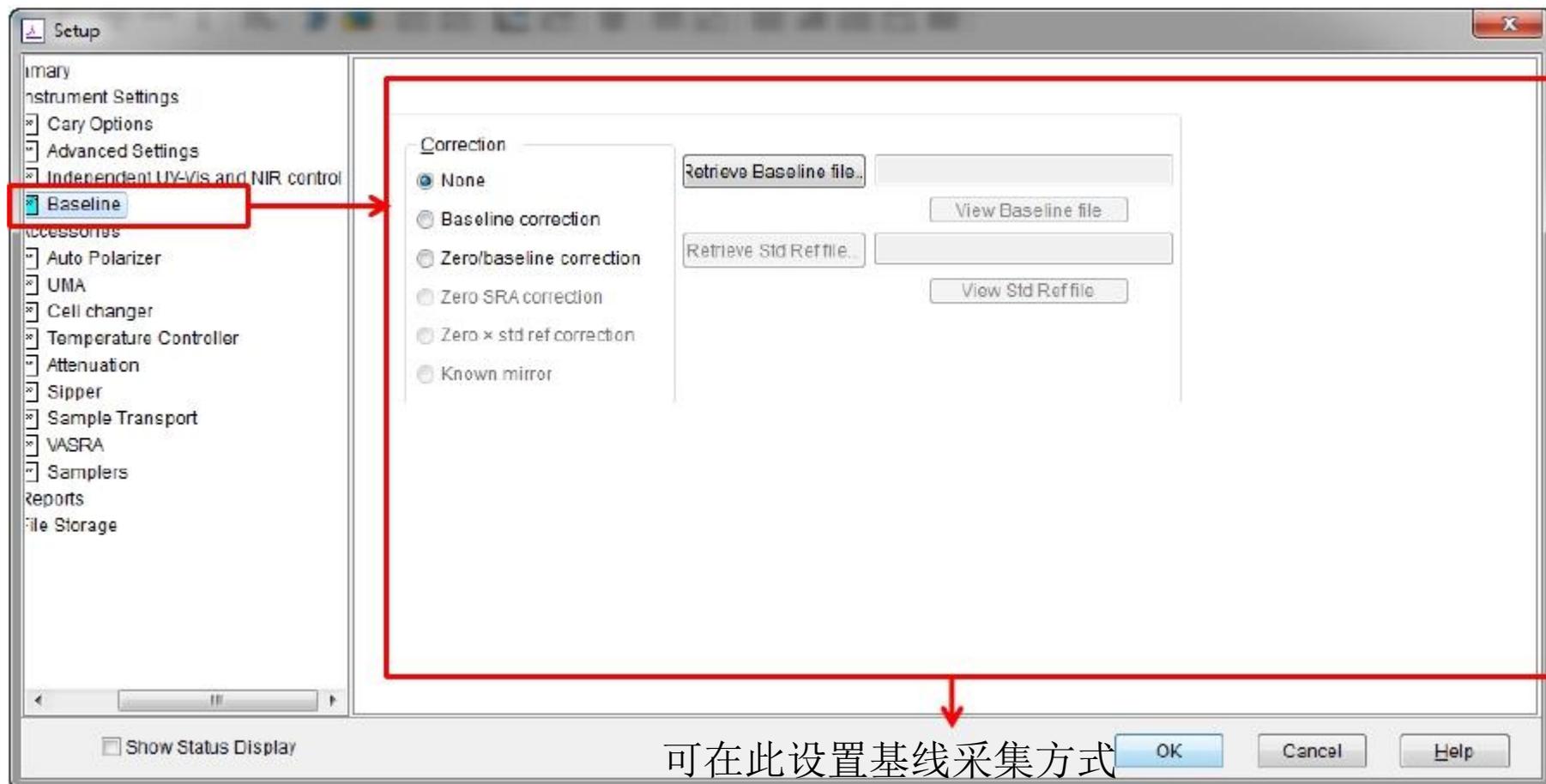
Auto       Fixed SBW       Fixed energy level

UV-Vis		NIR	
Ave time (s)	0.100	Ave time (s)	0.100
Data interval (nm)	1.000	Data interval (nm)	1.000
Scan rate (nm/min)	600.000	Scan rate (nm/min)	600.000
SBW (nm)	4.000	SBW (nm)	4.000
Energy level	1.00	Energy level	3.00

在**Fixed energy level**测量模式下，在全波段范围内都按照设置的能量进行测量

# Cary WinUV软件设置

## 4. 基线采集方式设置



# Cary WinUV软件设置

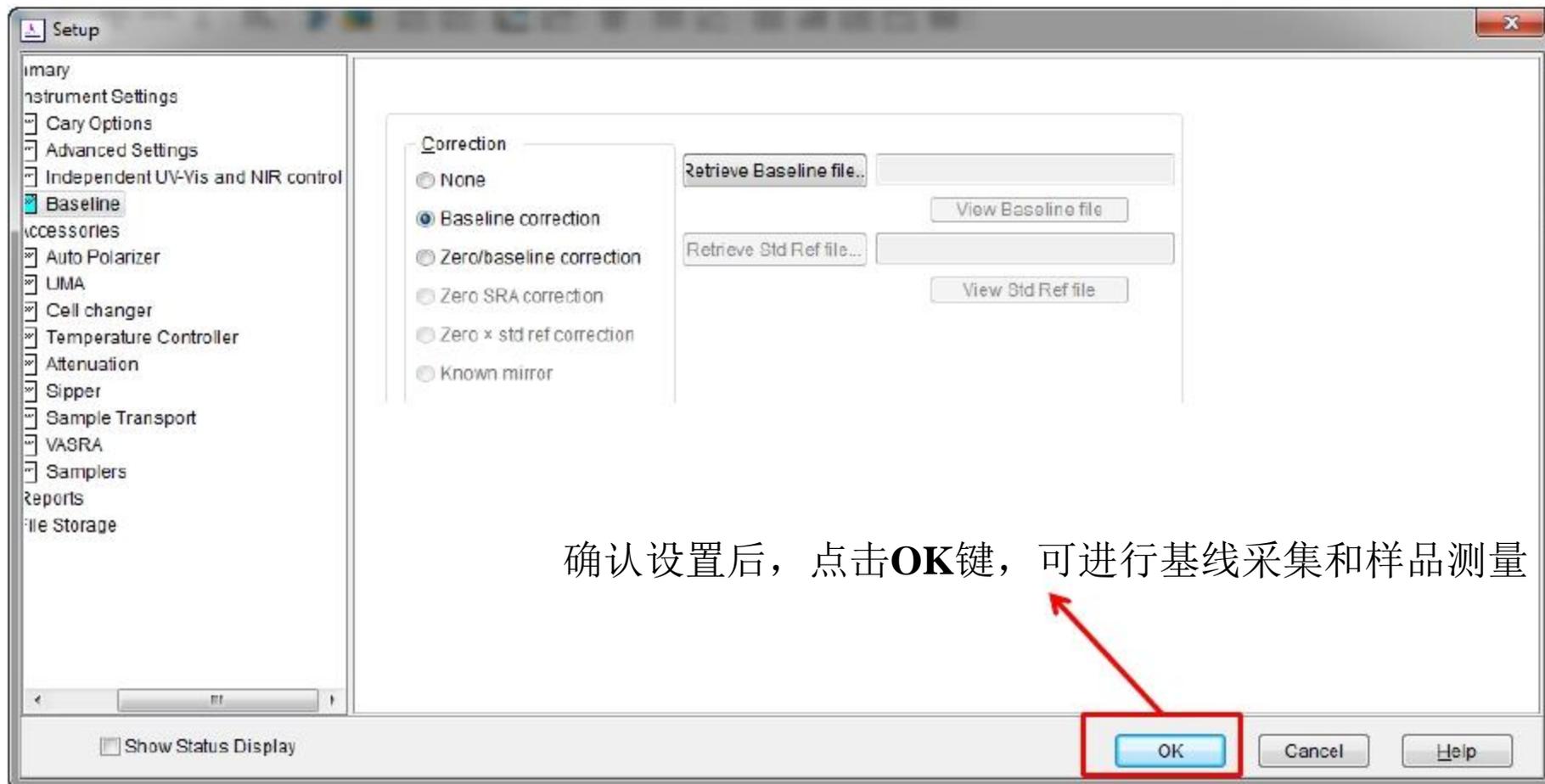
## 4. 基线采集方式设置



注：常规样品测试，只需采集基线；  
如果测试高吸光度/低透射率的样品，需同时采集0线和基线

# Cary WinUV软件设置

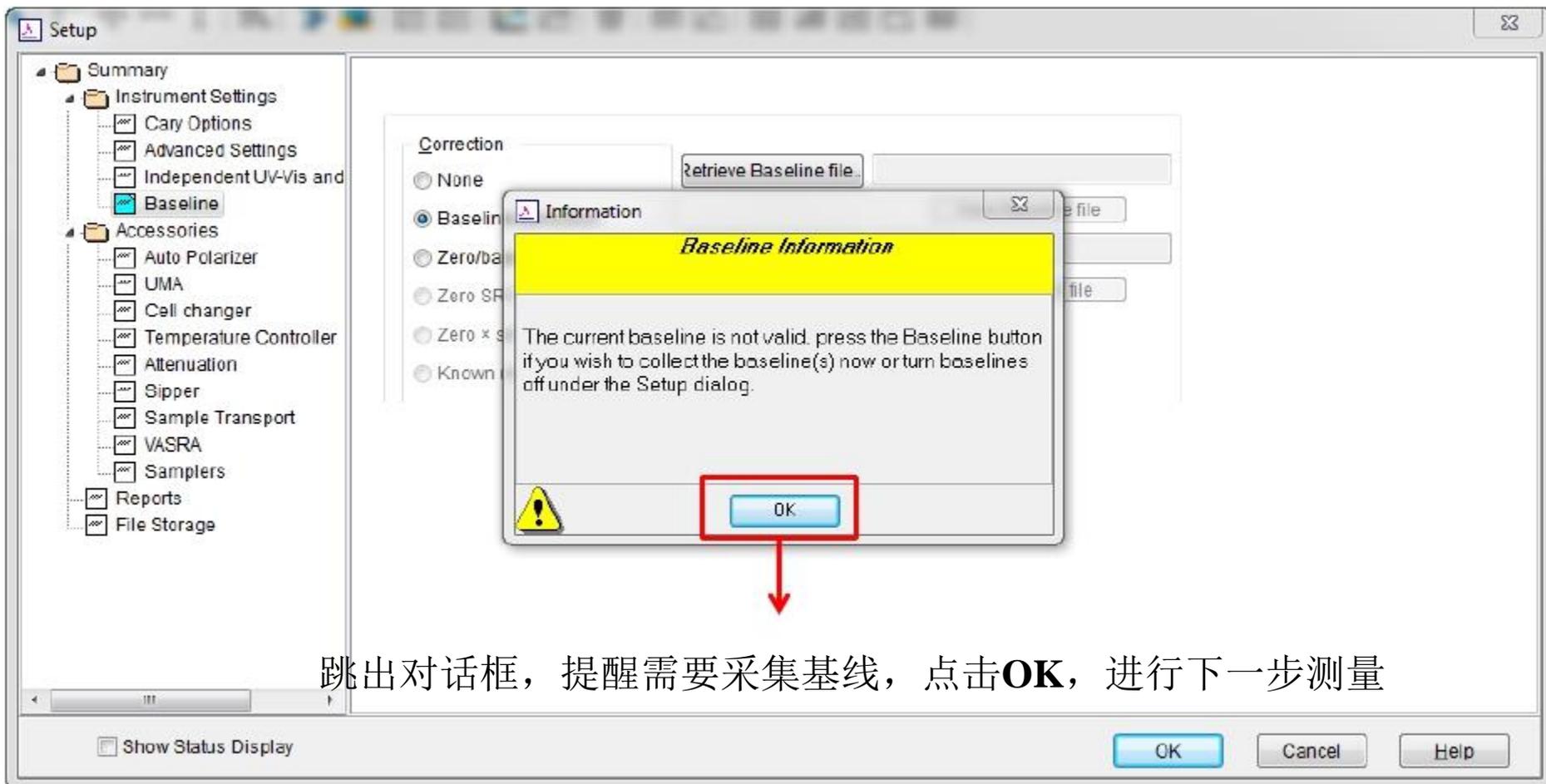
## 4. 基线采集方式设置



确认设置后，点击**OK**键，可进行基线采集和样品测量

# Cary WinUV软件设置

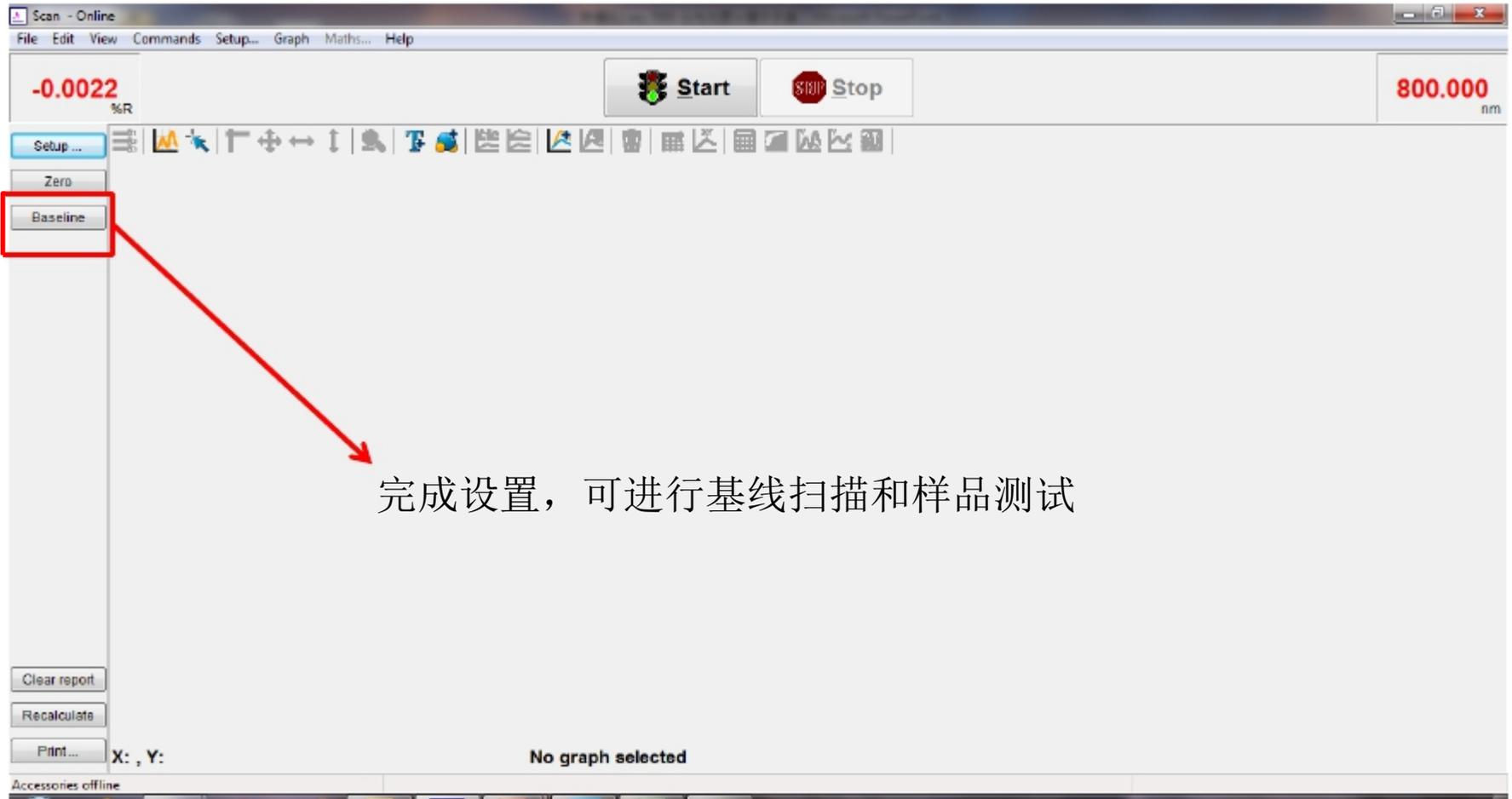
## 4. 基线采集方式设置



跳出对话框，提醒需要采集基线，点击**OK**，进行下一步测量

# Cary 5000 样品测试

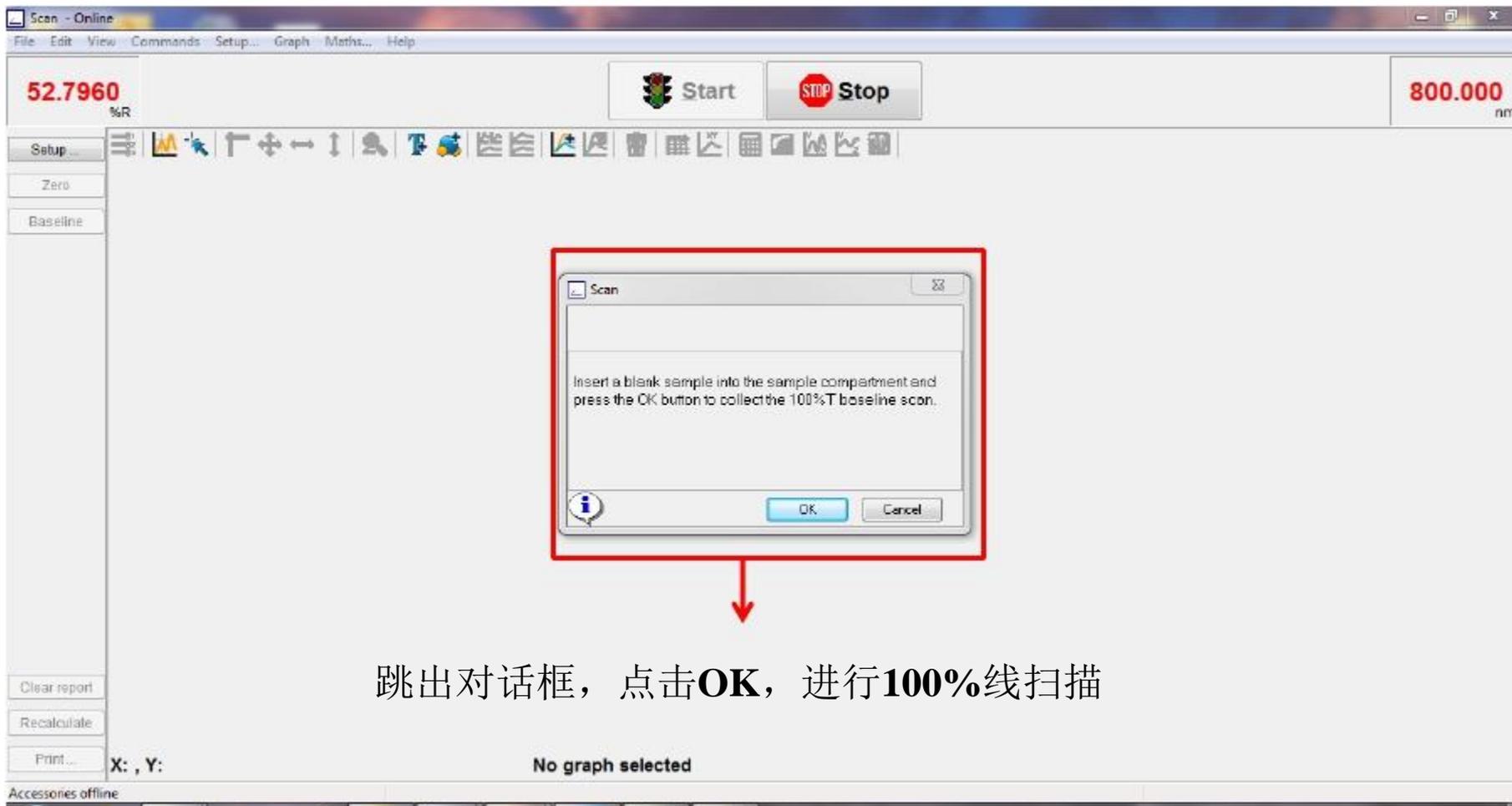
## 1. 基线扫描



完成设置，可进行基线扫描和样品测试

# Cary 5000 样品测试

## 1. 基线扫描

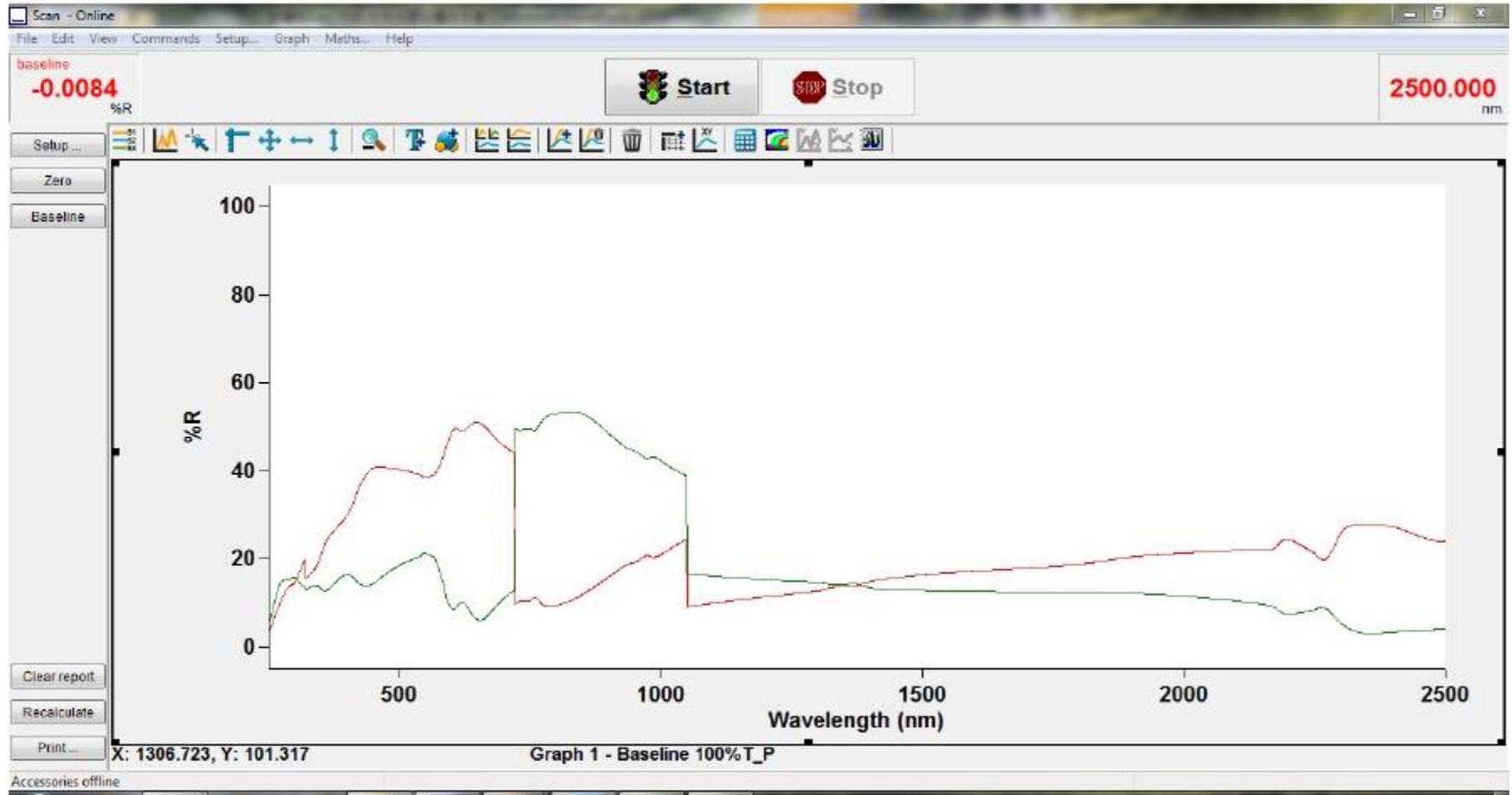


The screenshot displays the 'Scan - Online' software interface. At the top, the current wavelength is 52.7960 nm and the scan range is 800.000 nm. A 'Start' button (with a traffic light icon) and a 'Stop' button (with a red stop sign icon) are visible. A dialog box titled 'Scan' is centered on the screen, containing the instruction: 'Insert a blank sample into the sample compartment and press the OK button to collect the 100%T baseline scan.' The dialog box has 'OK' and 'Cancel' buttons at the bottom. A red arrow points from the 'OK' button to the text below.

跳出对话框，点击**OK**，进行**100%**线扫描

# Cary 5000 样品测试

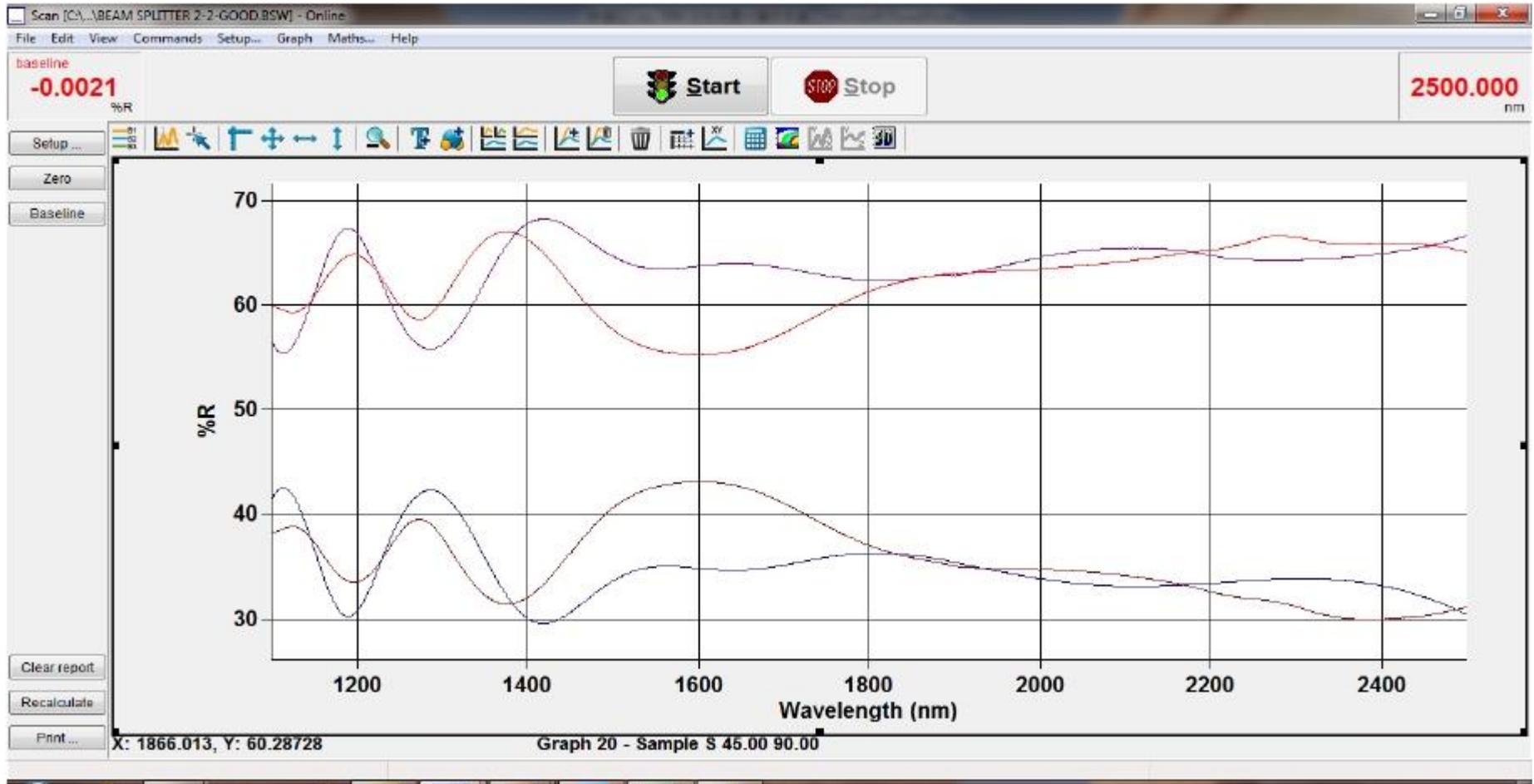
## 1. 基线扫描



# Cary 5000 样品测试

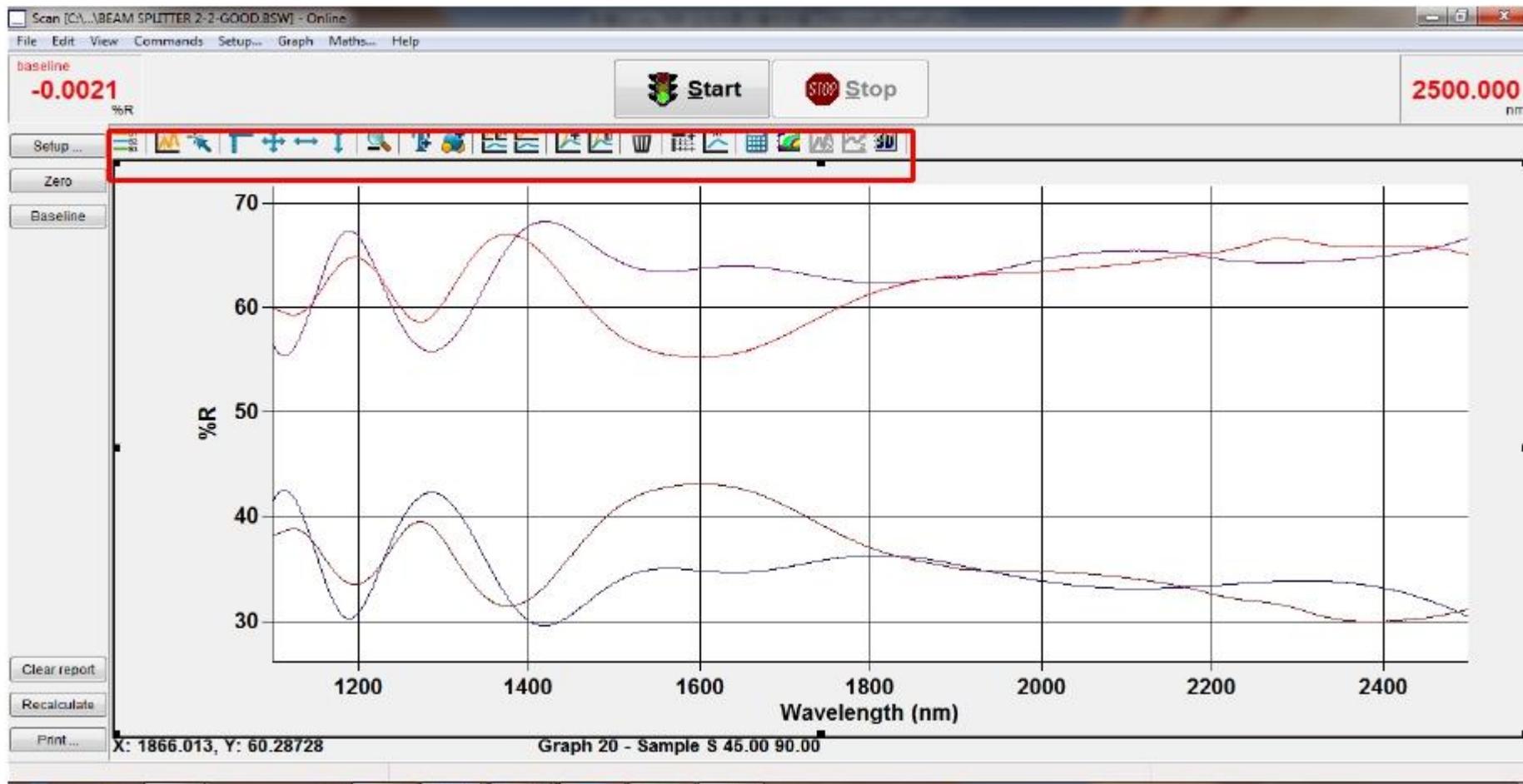
## 2. 样品扫描

点击**Start**，开始样品扫描



# Cary 5000 样品测试

## 3. 软件工具栏功能说明

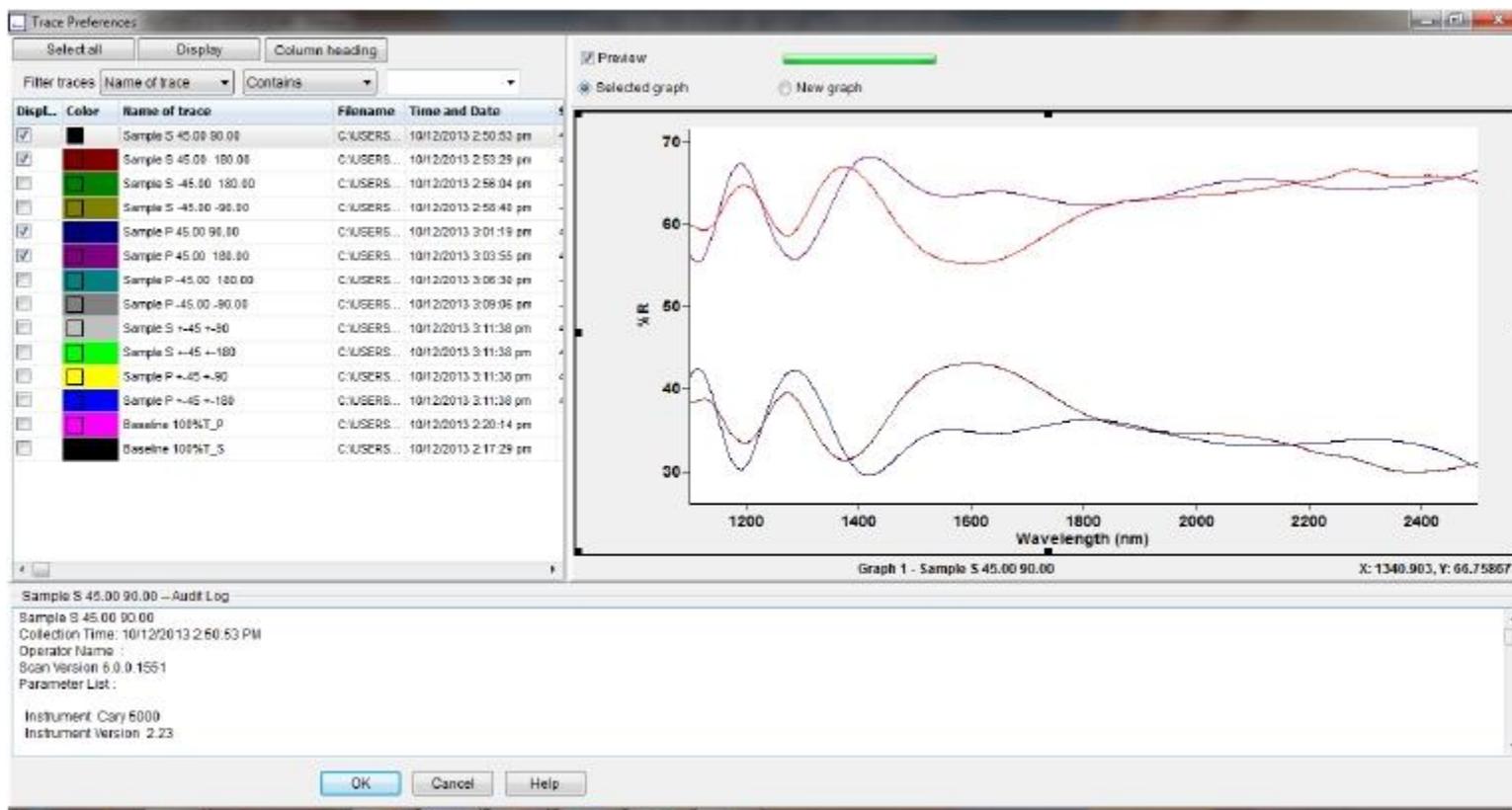


# Cary 5000 样品测试

## 3.1 Trace Preference



在此可将想要在主页面显示的谱图选中

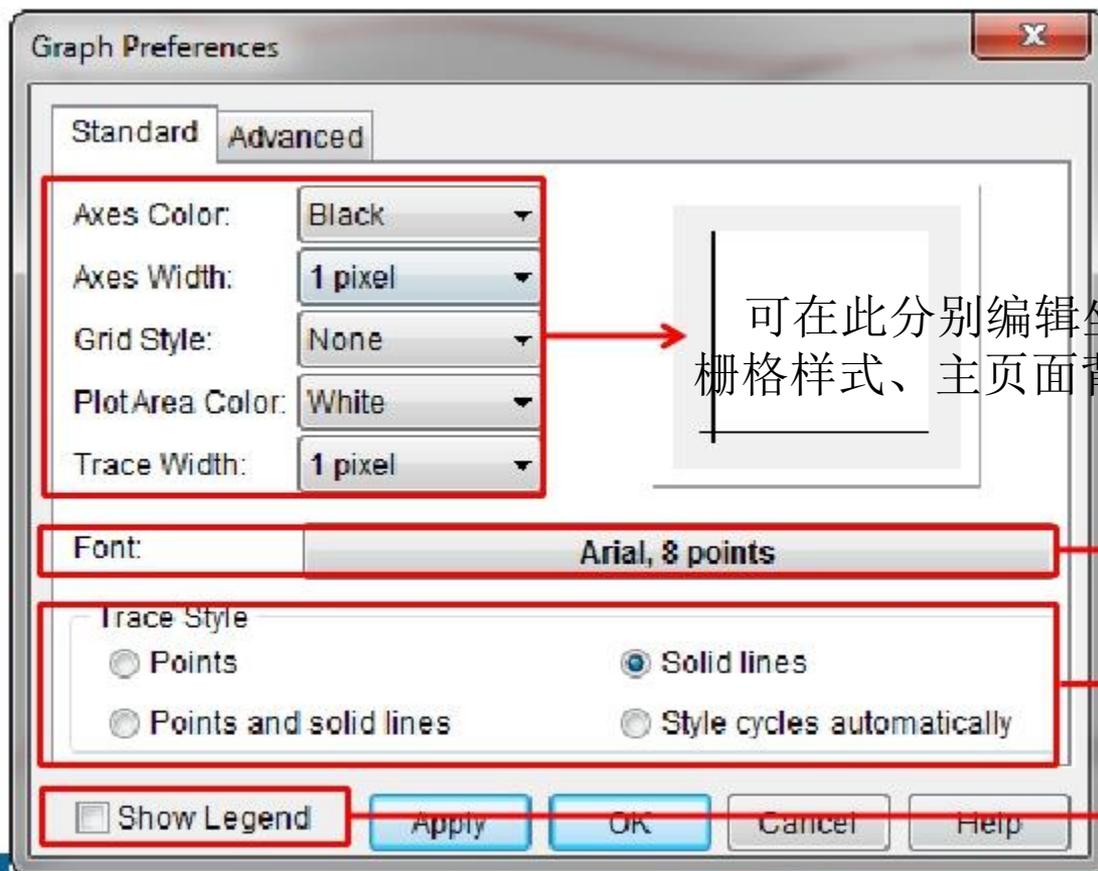


# Cary 5000 样品测试

## 3.2 Graph Preference



在此可对主页面格式进行编辑



可在此分别编辑坐标轴颜色、宽度、  
栅格样式、主页面背景颜色以及谱线宽度

可在此编辑坐标字体

可在此编辑谱线格式

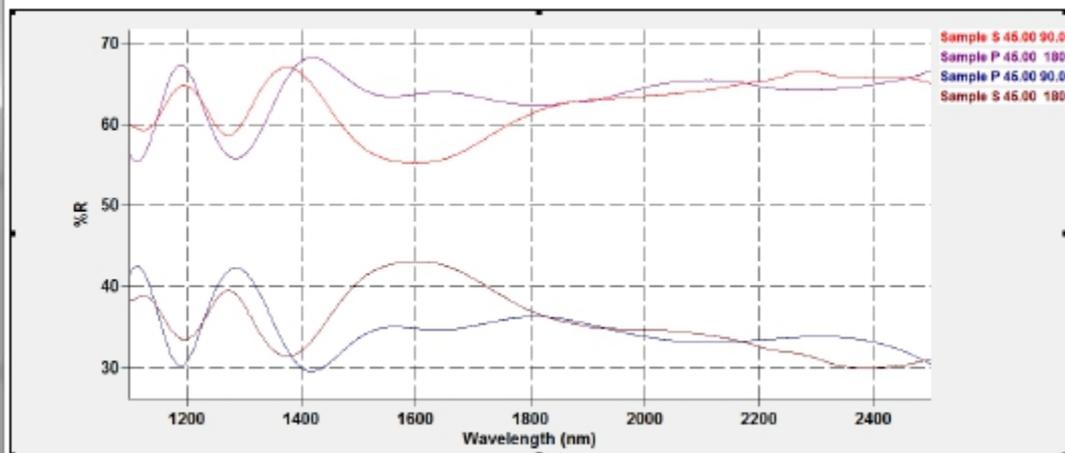
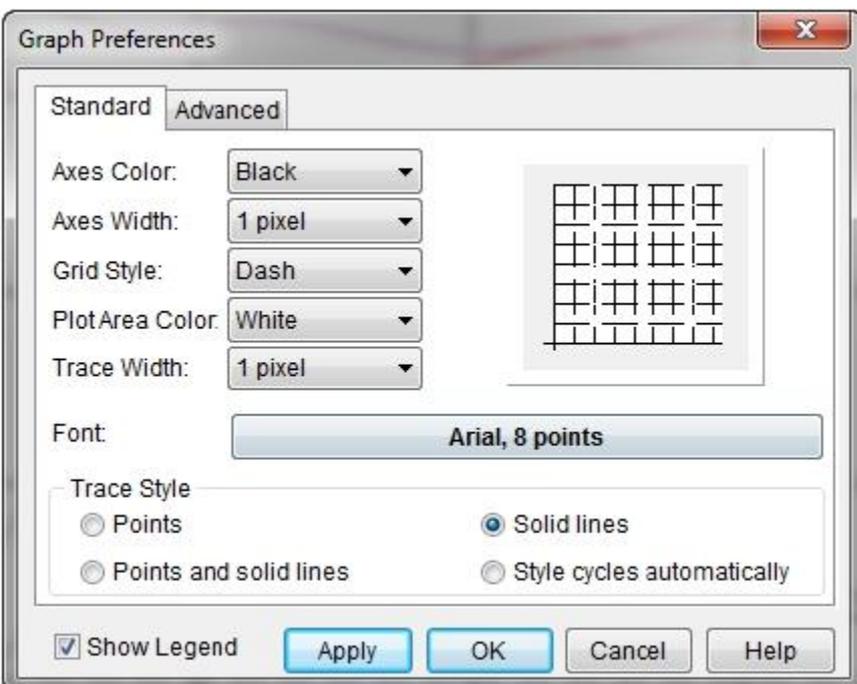
勾选此键，则在谱图  
右边提示谱图信息

# Cary 5000 样品测试

## 3.2 Graph Preference



在此可对主页面格式进行编辑

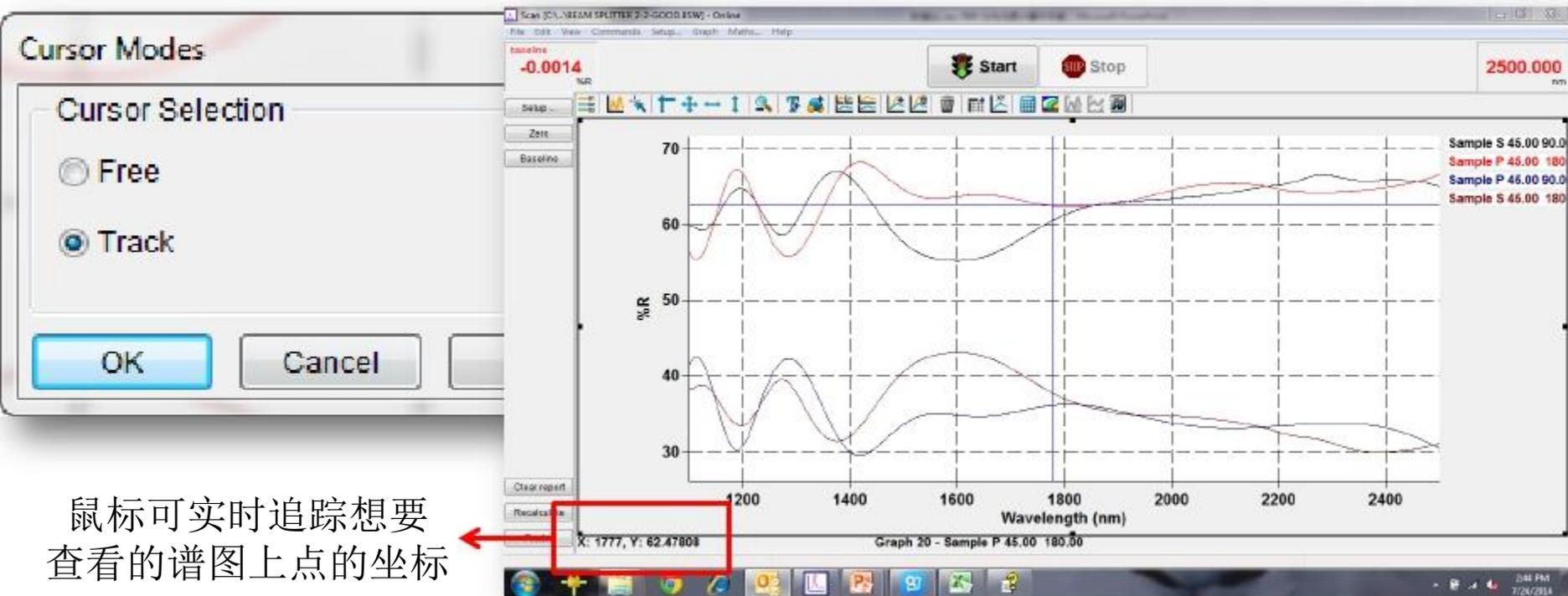


# Cary 5000 样品测试

## 3.3 Cursor Mode



在此可对鼠标格式进行编辑



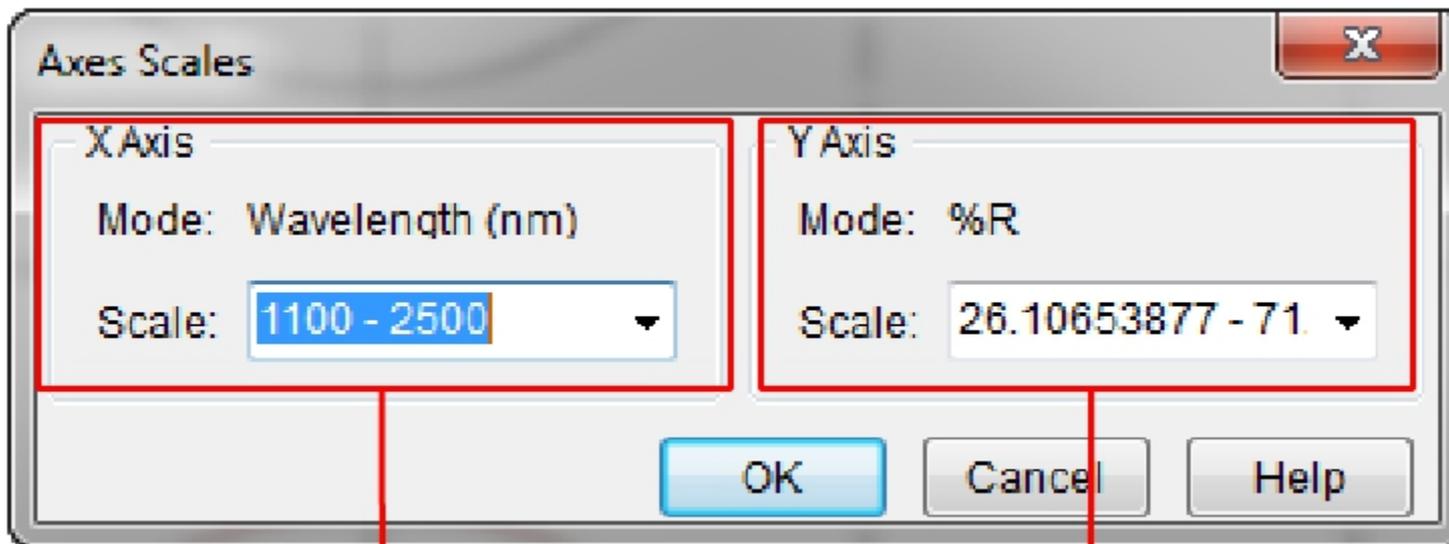
鼠标可实时追踪想要查看的谱图上点的坐标

# Cary 5000 样品测试

## 3.4 Scale Graph



在此可对坐标轴显示比例进行编辑



编辑X轴坐标显示比例

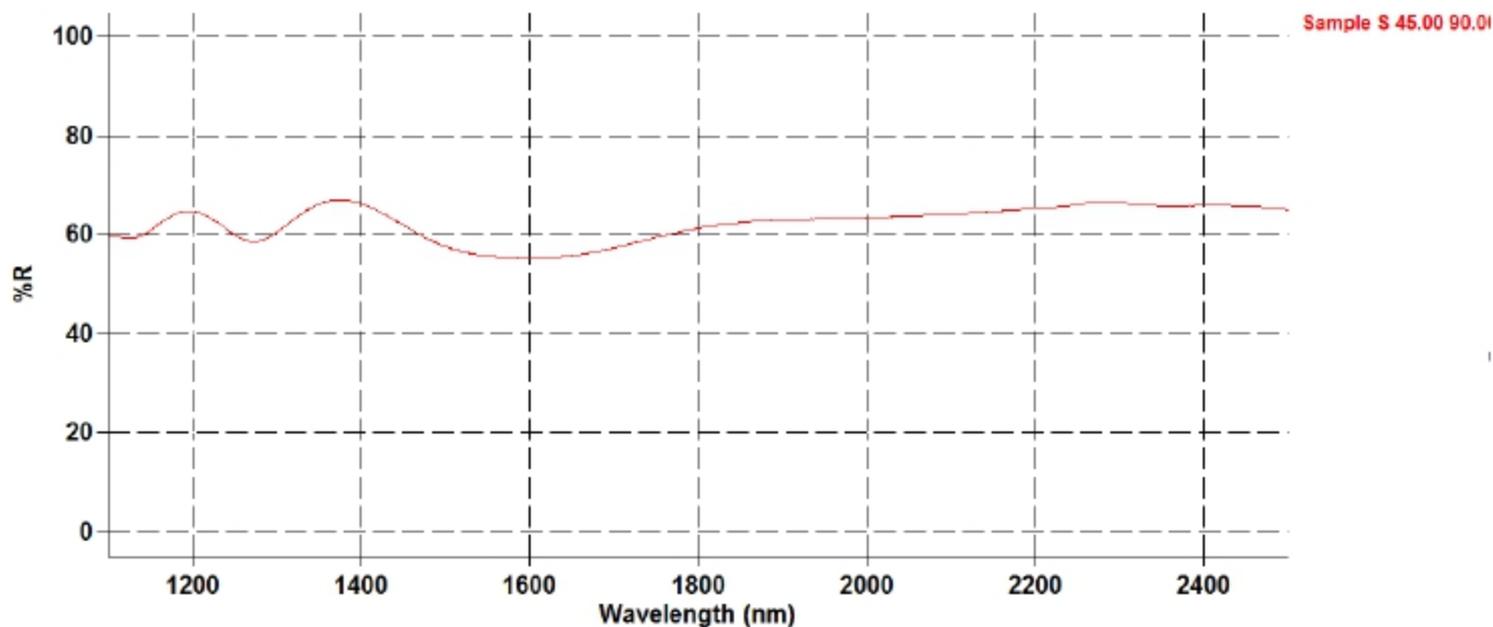
编辑Y轴坐标显示比例

# Cary 5000 样品测试

## 3.5 Autoscales the data in both the X and Y mode



自动调整坐标轴尺度



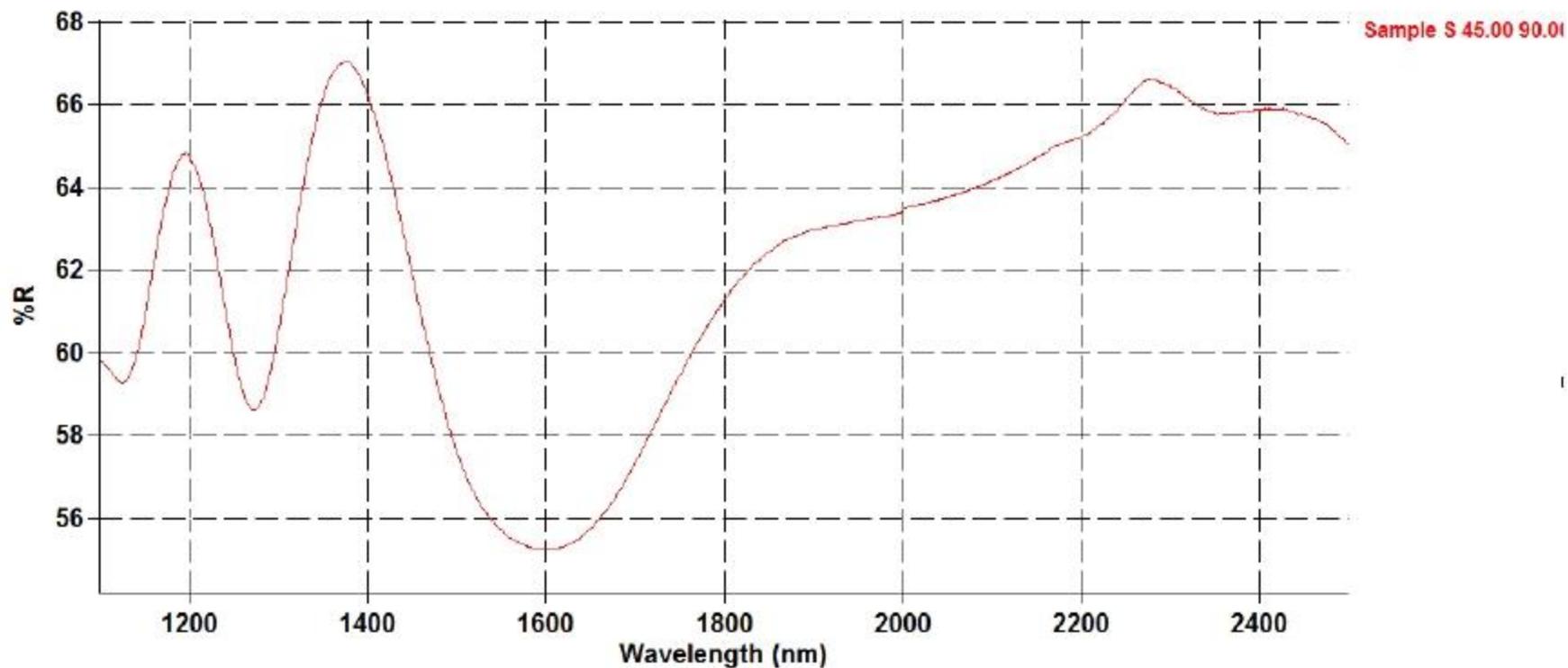
选中想要调整比例的谱线（变为红色），点击自动调整比例按钮后，谱先显示比例发生变化

# Cary 5000 样品测试

## 3.5 Autoscales the data in both the X and Y mode



自动调整坐标轴尺度

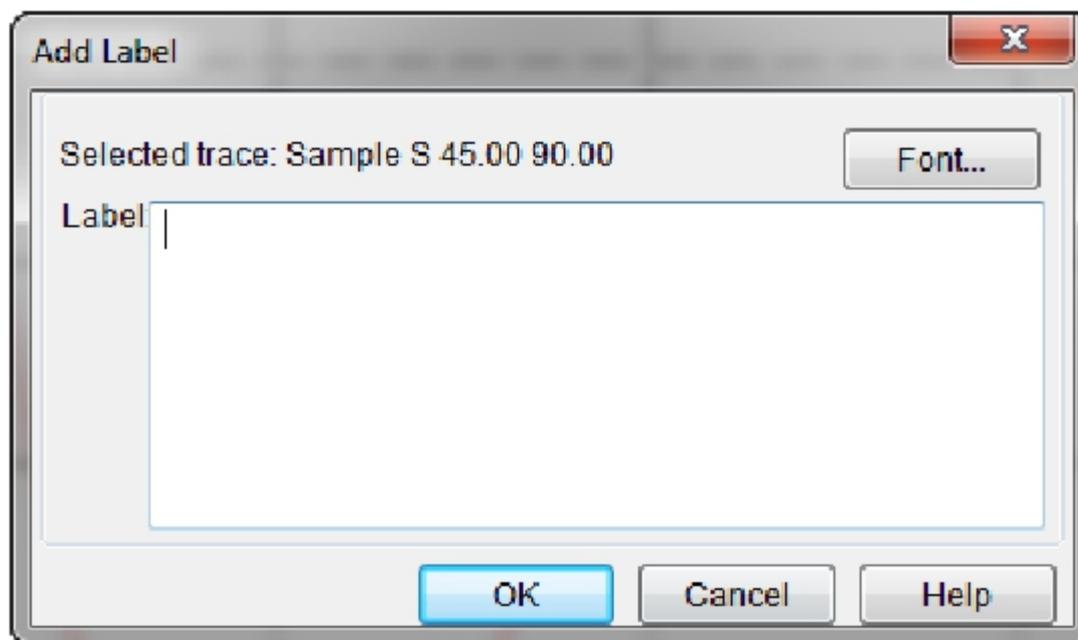


# Cary 5000 样品测试

## 3.6 Add Label



添加标签



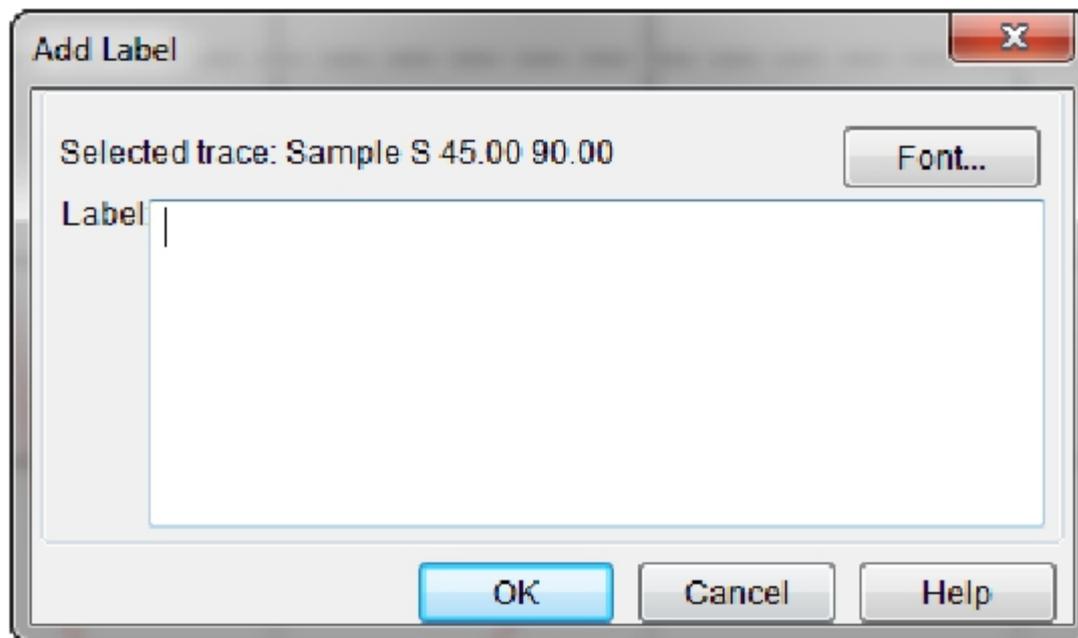
可在此添加谱图信息用于标注

# Cary 5000 样品测试

## 3.6 Add Label



添加标签



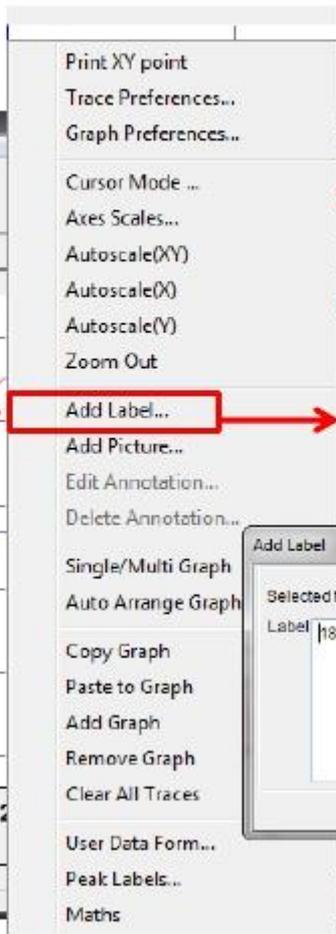
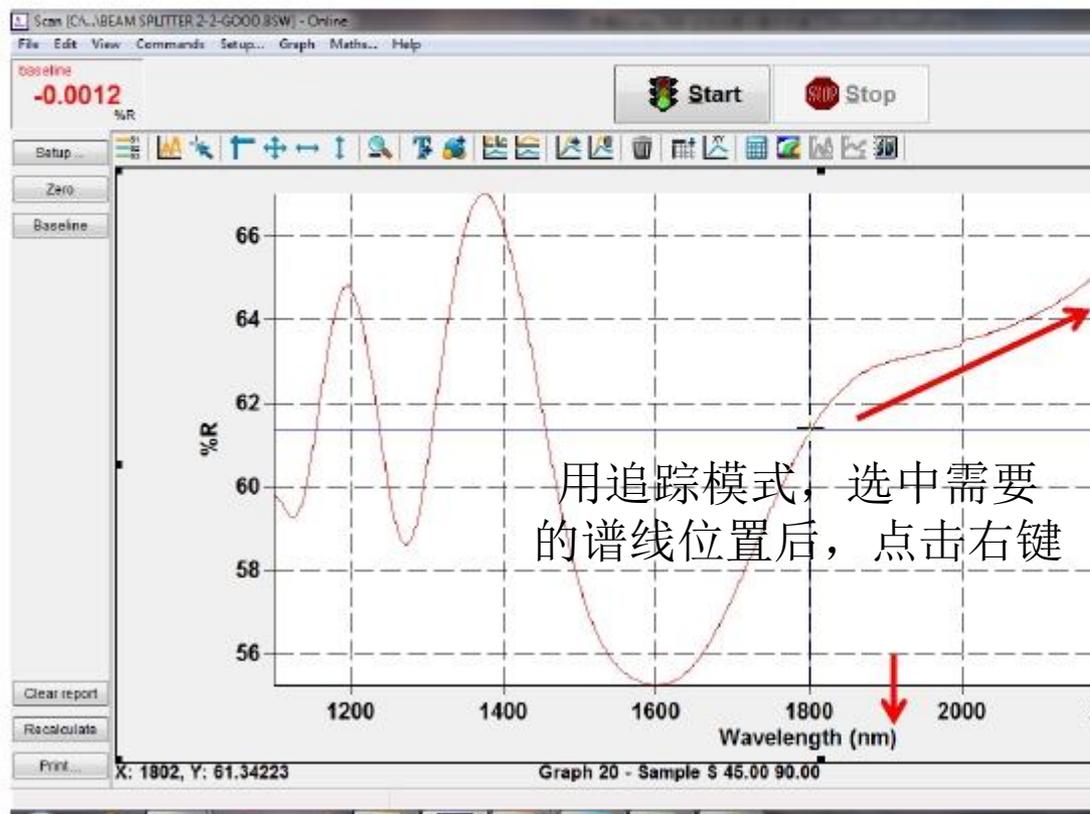
可在此添加谱图信息用于标注，如标注特征点坐标信息

# Cary 5000 样品测试

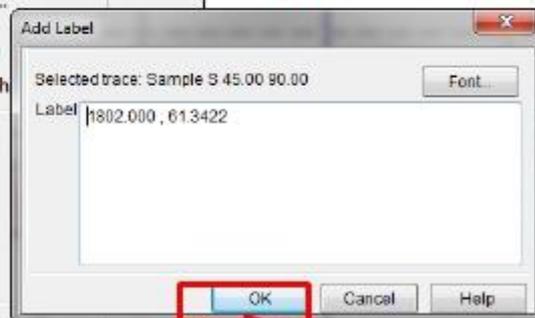
## 3.6 Add Label



添加标签



点击Add Label



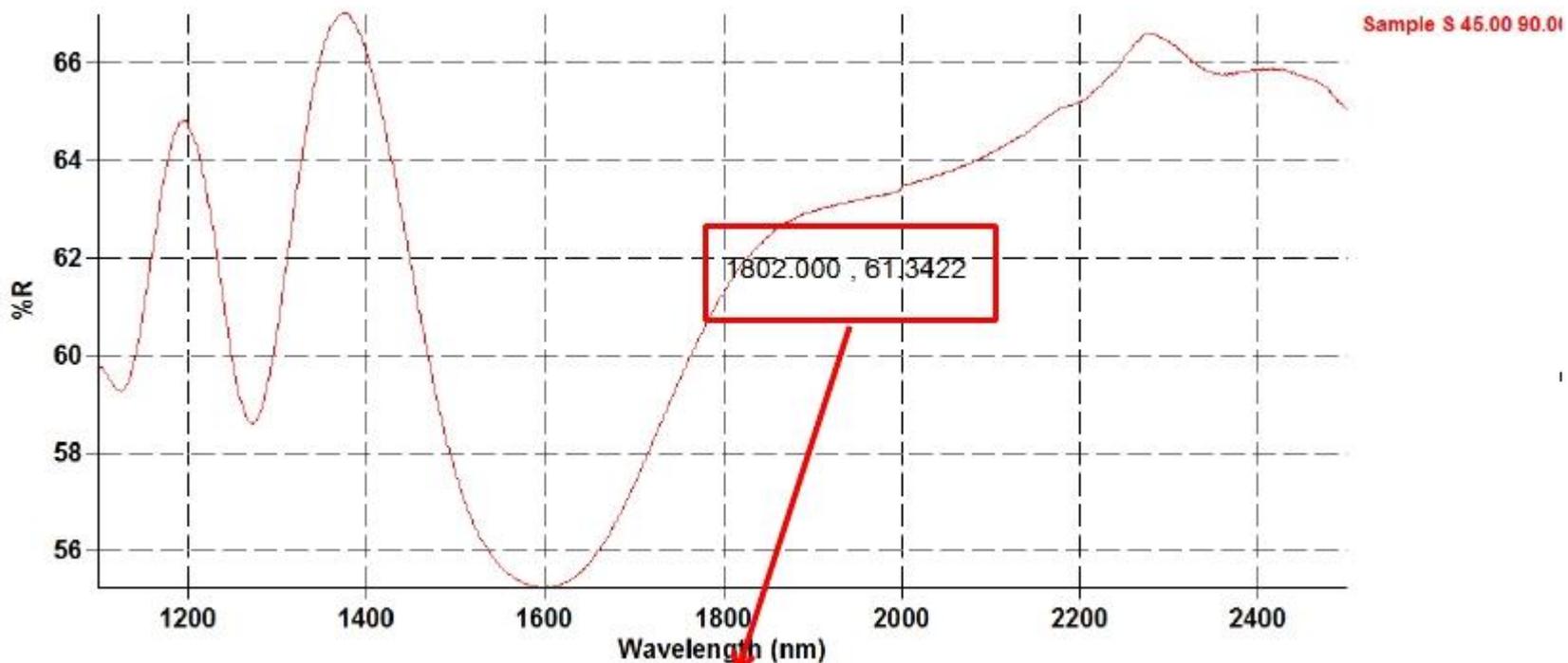
点击OK

# Cary 5000 样品测试

## 3.6 Add Label



添加标签



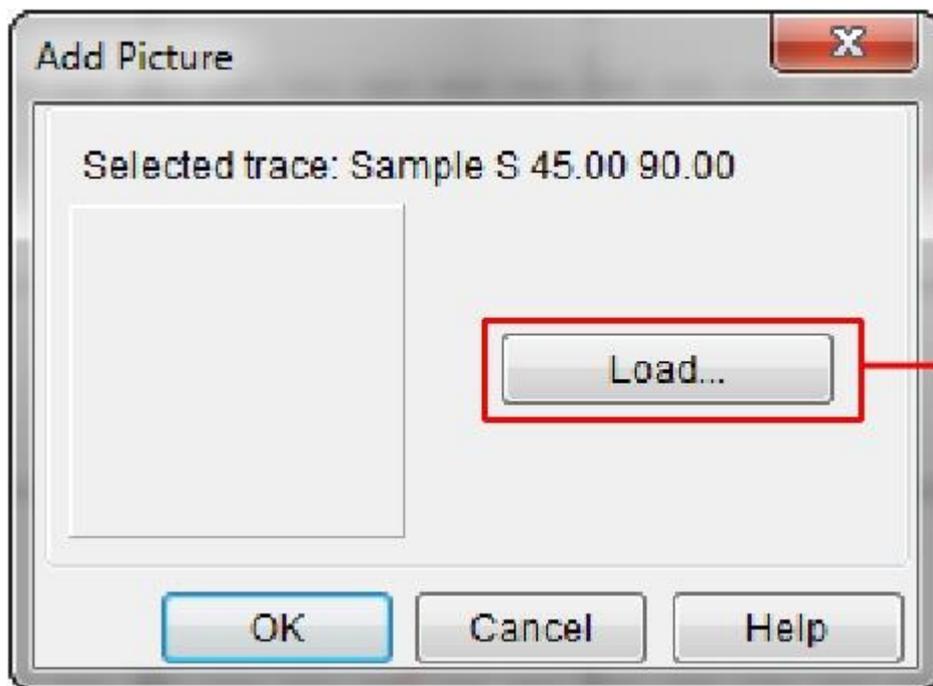
坐标添加成功

# Cary 5000 样品测试

## 3.7 Add Picture



添加图片



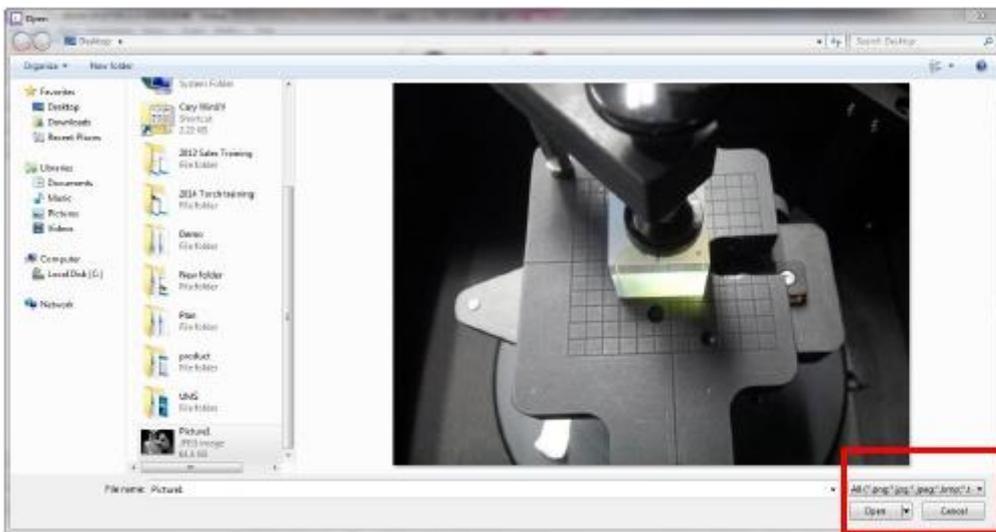
在此载入需要添加的图片，  
如样品图片

# Cary 5000 样品测试

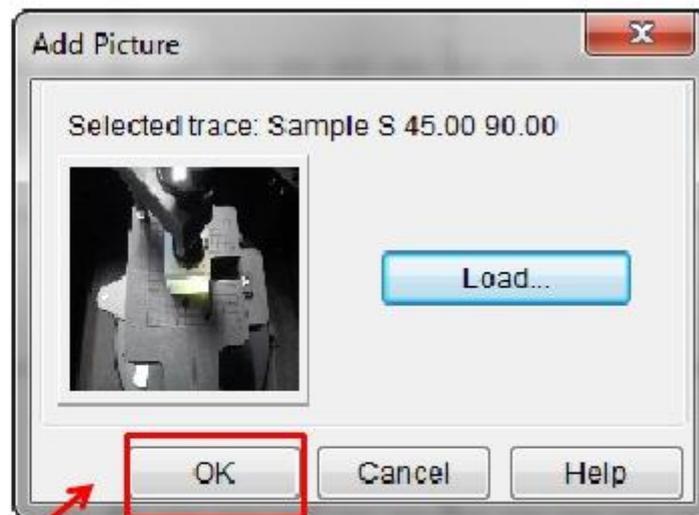
## 3.7 Add Picture



添加图片



选中图片后, 点击**Open**



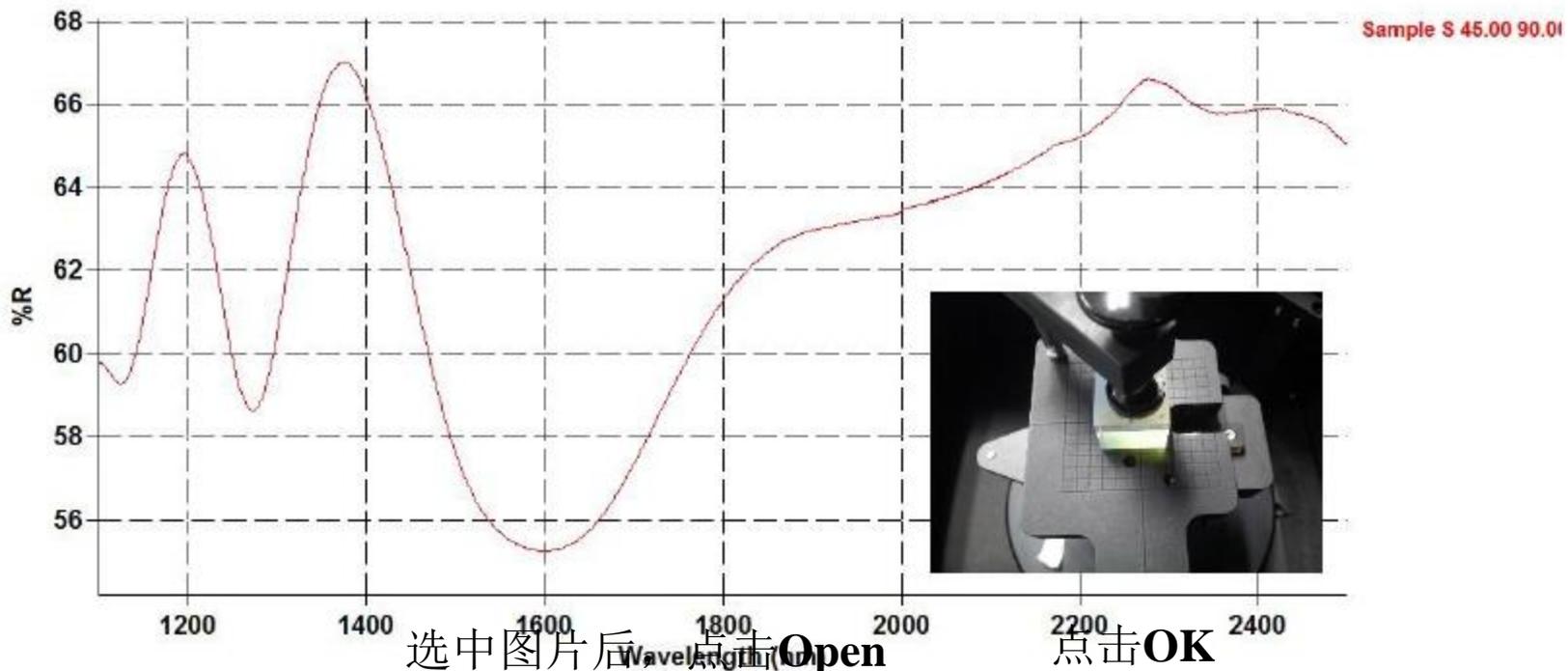
点击**OK**

# Cary 5000 样品测试

## 3.7 Add Picture



添加图片

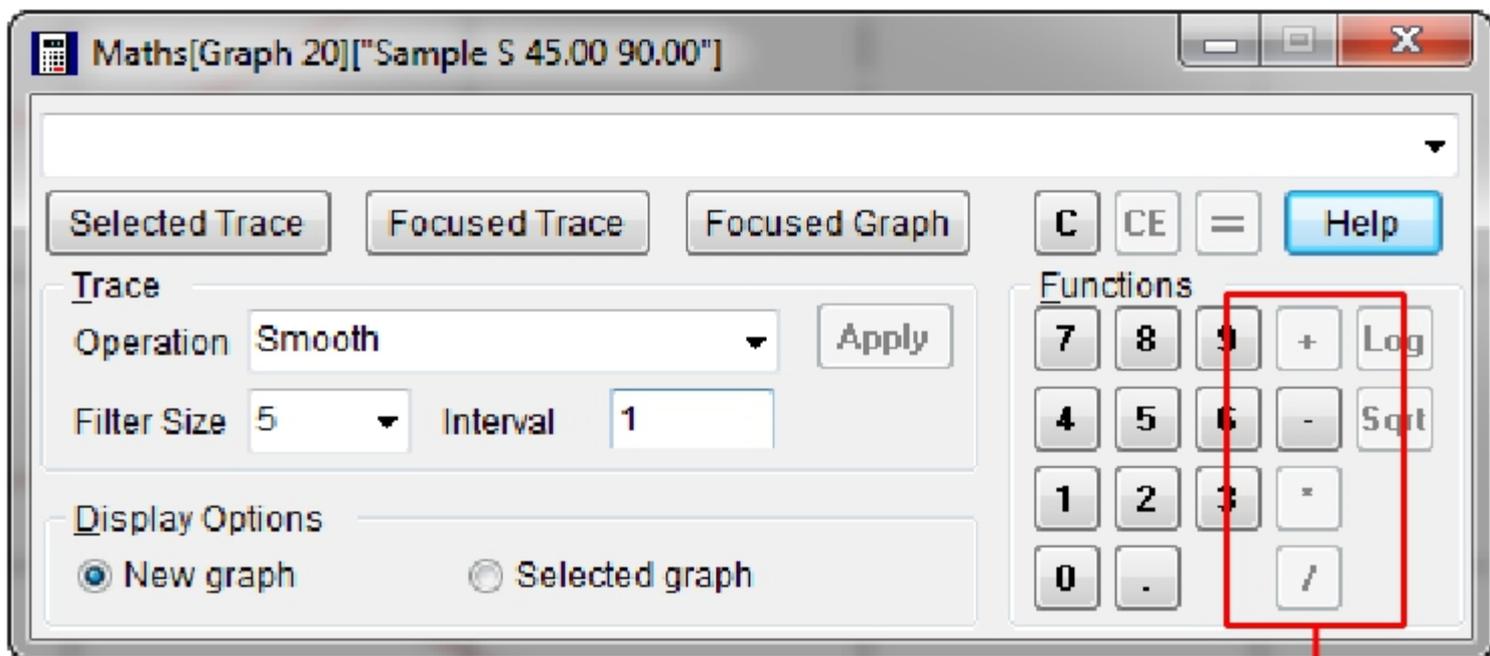


# Cary 5000 样品测试

## 3.8 Maths



可在此进行谱图的数学运算



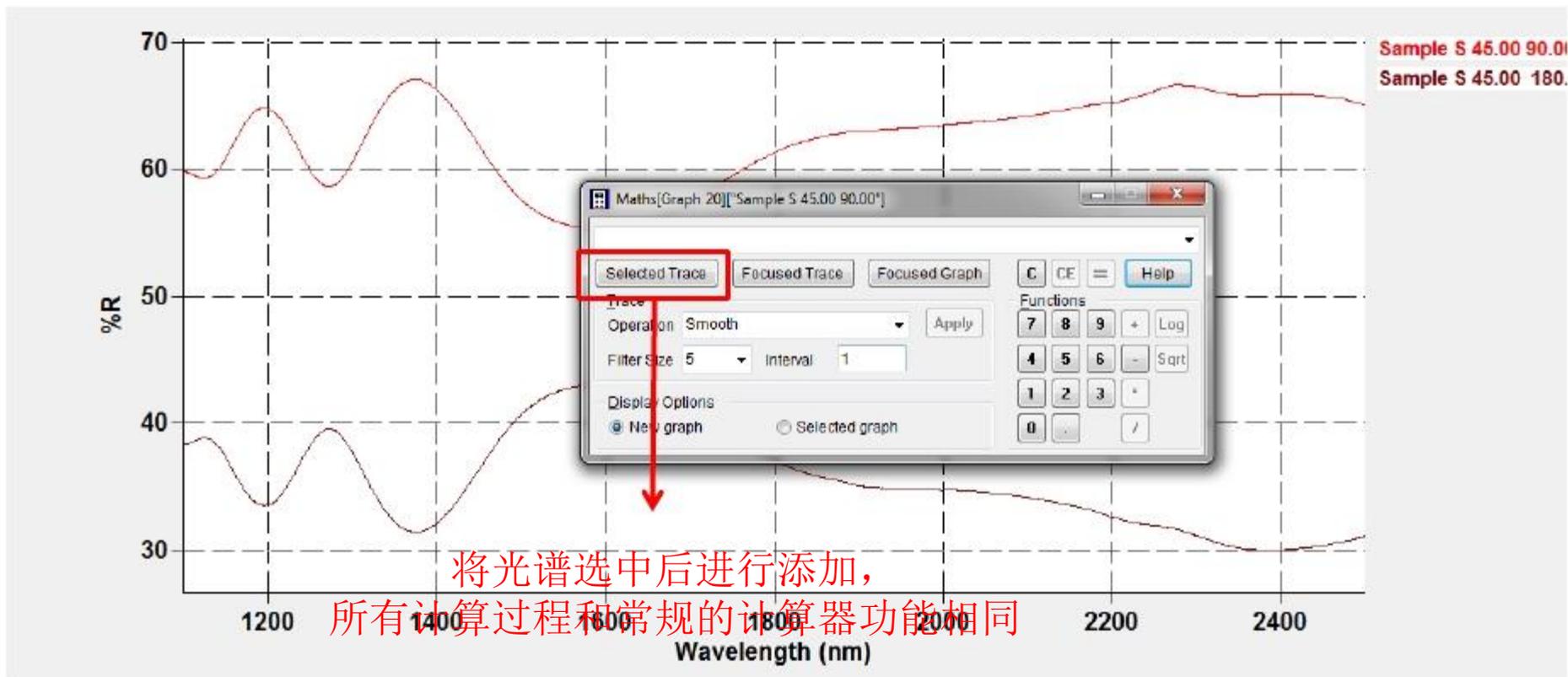
如谱线加和运算等

# Cary 5000 样品测试

## 3.8 Maths



可在此进行谱图的数学运算

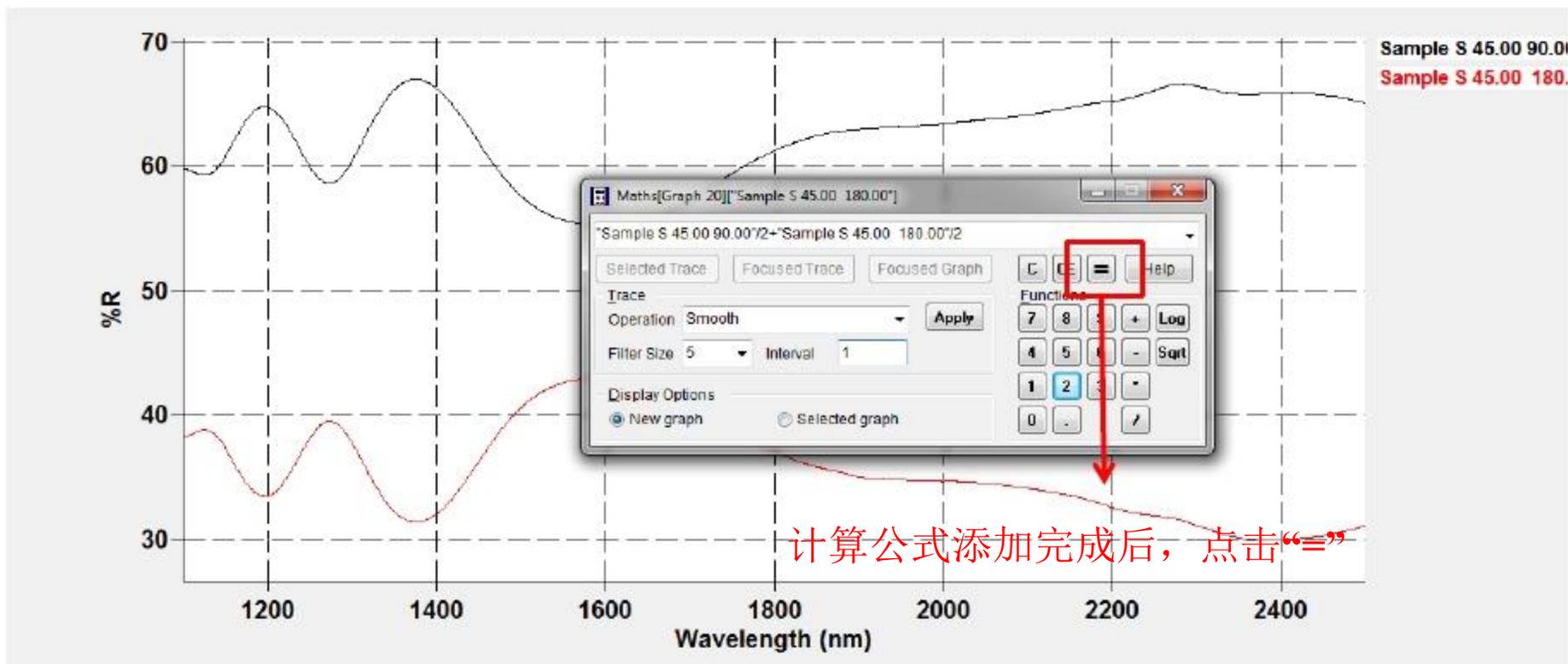


# Cary 5000 样品测试

## 3.8 Maths



可在此进行谱图的数学运算

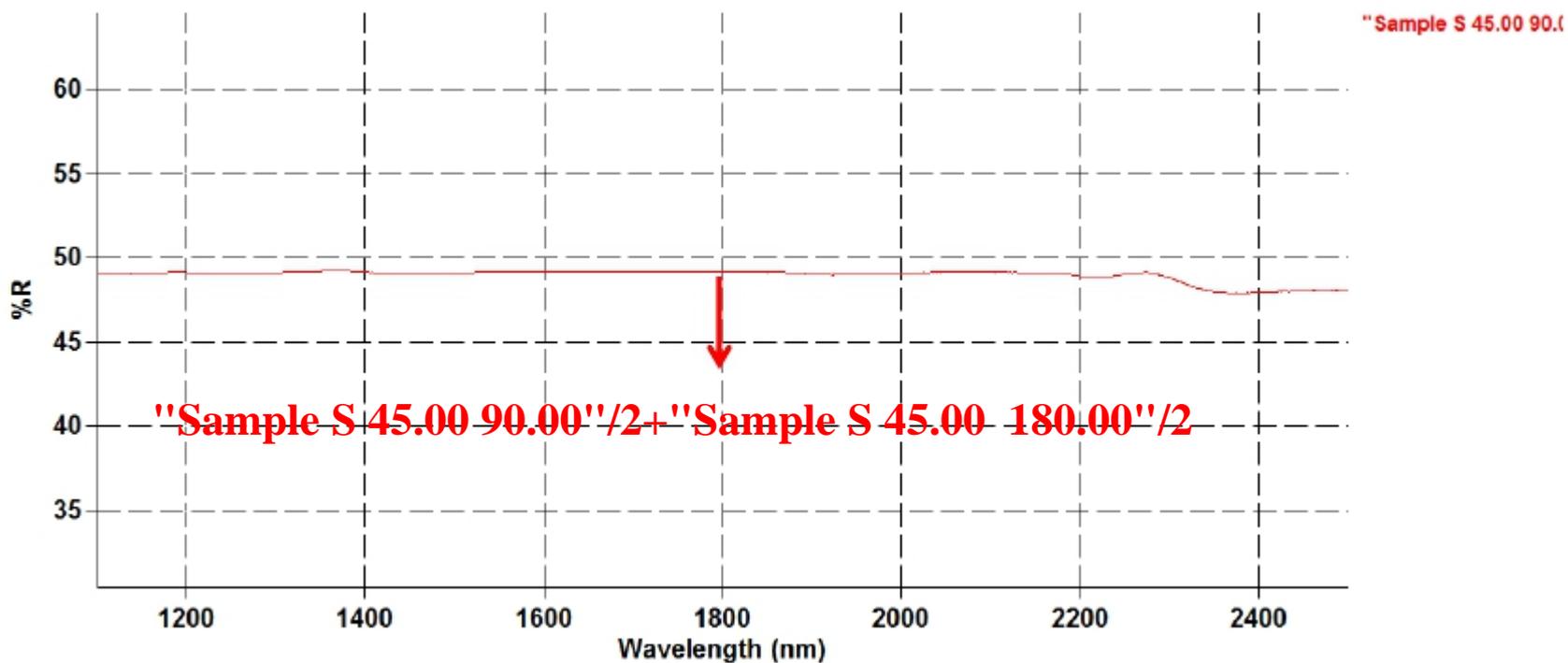


# Cary 5000 样品测试

## 3.8 Maths



可在此进行谱图的数学运算



**The End**

