

~N&K光學薄膜測厚儀~

基本操作手冊

湯淵富 2019.1.1

大綱

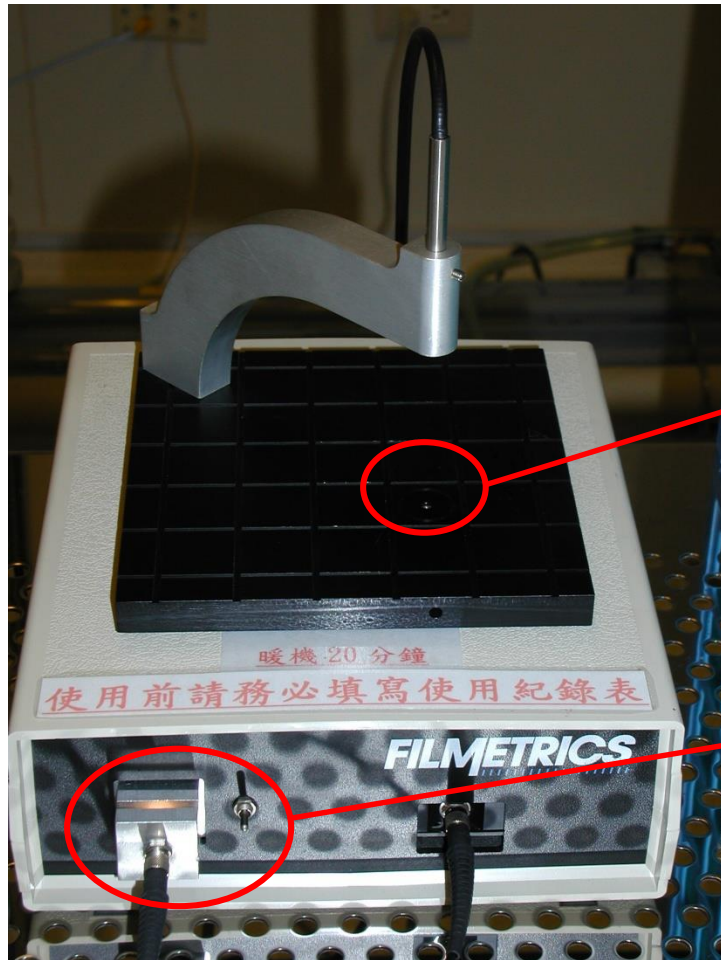
- 一、N&K光學薄膜測厚儀使用規範
- 二、N&K光學薄膜測厚儀的實際操作

一、 N&K光學薄膜測厚儀使用規範

01. 欲操作N&K光學薄膜測厚儀之研究生或同仁均須通過考核。
02. 欲考核下列南科NDL機台(1)破片光阻塗佈機 (2)自動化光族塗佈與顯影系統(Track)
(3)高溫及低壓水平爐管(4)PECVD，需一併接受n&k薄膜測厚儀之考核。
03. 使用N&K光學薄膜測厚儀須確實填寫使用紀錄簿。
04. 厚度量測有其極限，大約為 $200\text{\AA}\sim 50\mu\text{m}$ 。
05. 無法量測金屬，因無法透光。
06. 無法直接量測Poly-Silicon薄膜，需先成長一層氧化層(約 1000\AA)於矽晶圓上，再沉積多晶矽薄膜於氧化層上，方可量得多晶矽薄膜之厚度。
07. 光源使用前需先暖機20分鐘以上，確定不再使用後再將光源關閉。(避免經常性開開關關)
08. 合格使用人員若將機台使用卡外借他人使用，取消使用資格三個月。

二、N&K光學薄膜測厚儀的實際操作

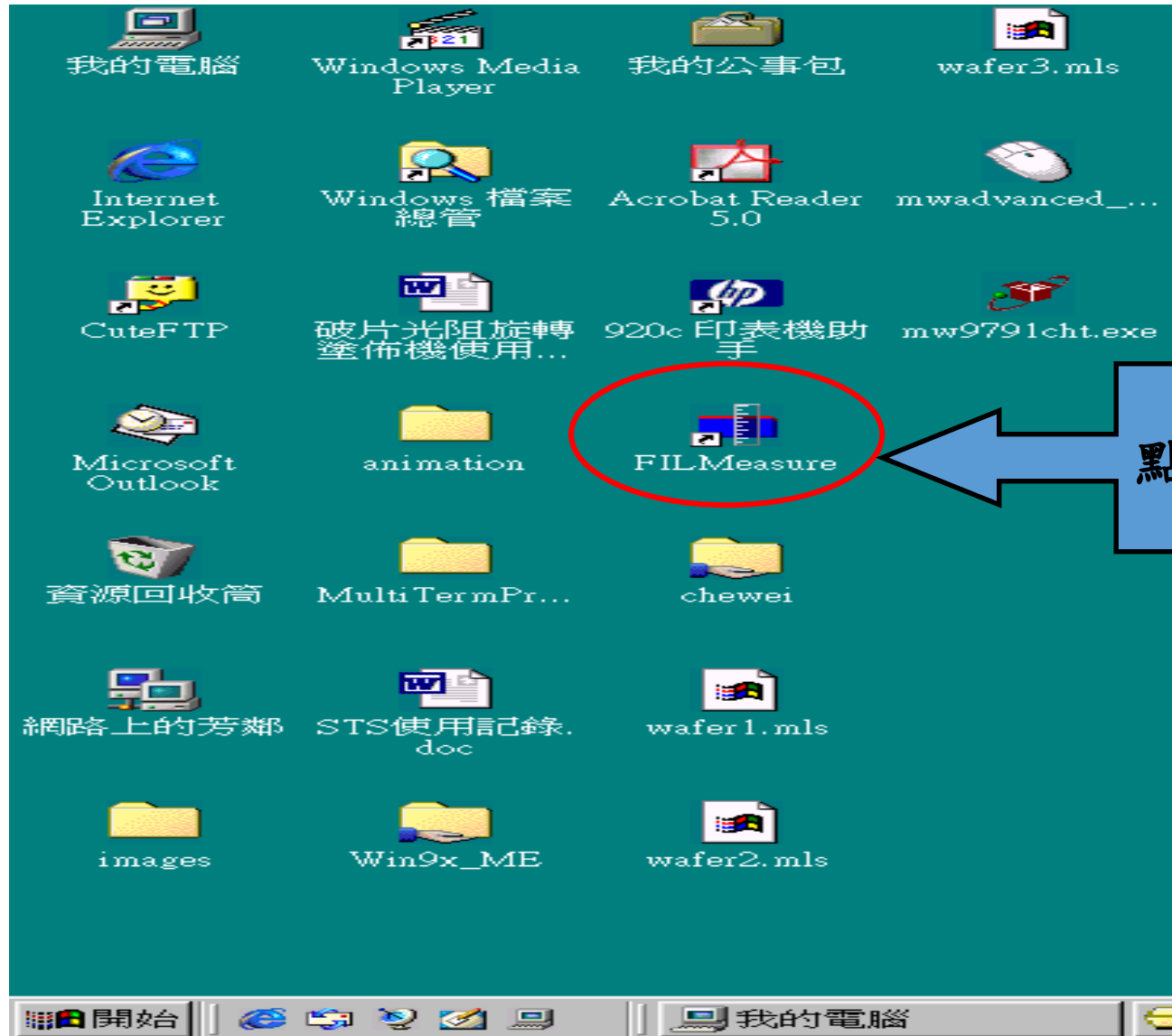
前置作業1



- 待量測試片位置
- 量測區域需大於光源1x1cm以上
- 欲量測之晶圓正面朝上

打開燈源確定燈源亮起
並暖機20分鐘以上

前置作業2



點選滑鼠左鍵2下

前置作業3

FILMeasure - [Main]

File Edit Set Up Acquire Window Help

Sample: Operator: — Measured

Cursor Wavelength(nm): Y:

FILMETRICS®

Reflectance

Wavelength(nm)

Baseline

Measure

Analyze

Structure: SiO2 on Si

Edit Structure

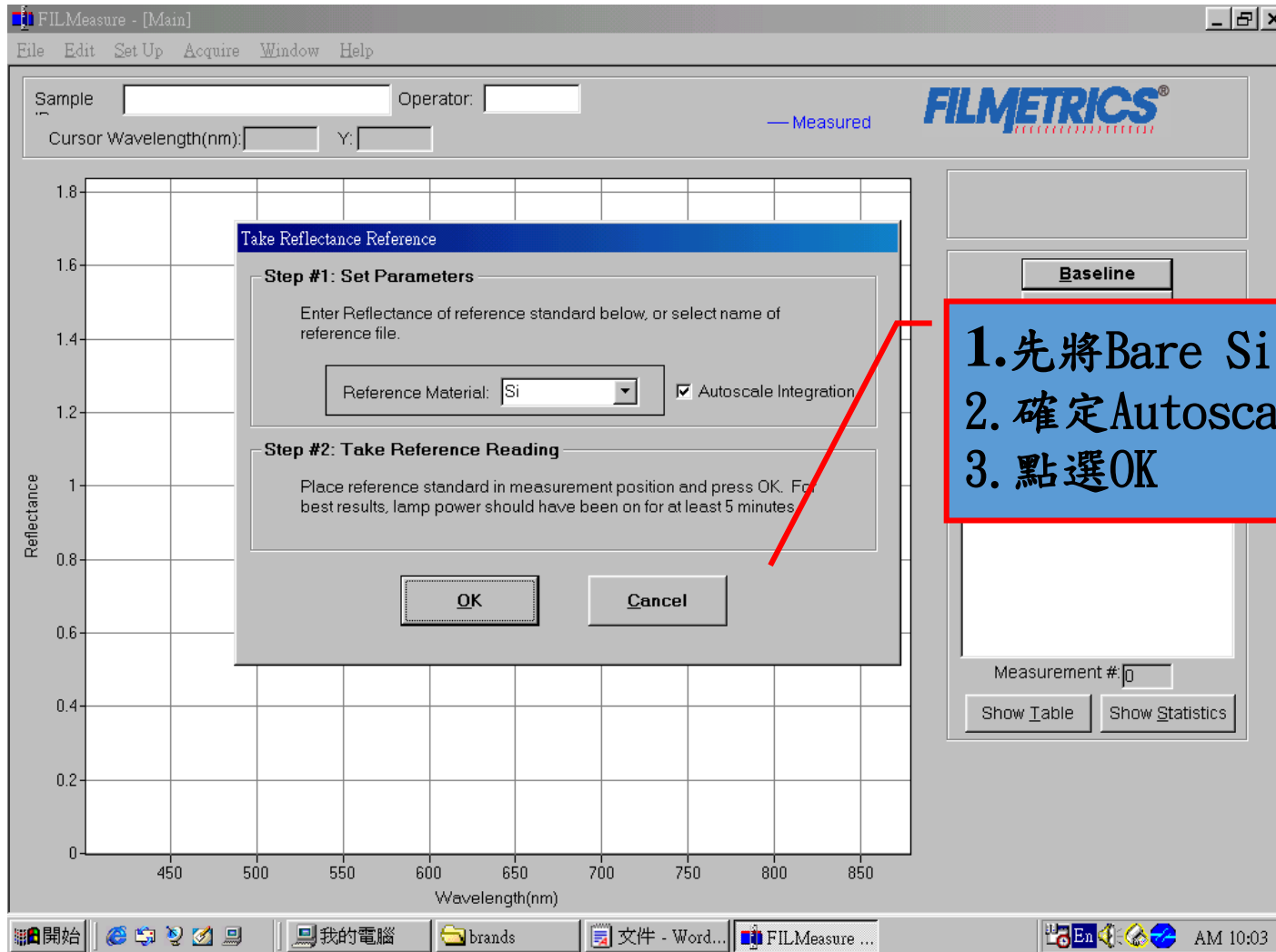
Display: Thicknesses

Measurement #

Show Table Show Statistics

點選Baseline

前置作業4



1. 先將Bare Silicon放在光源平台上
2. 確定Autoscale integration有勾選
3. 點選OK

前置作業5

FILMeasure - [Main]

File Edit Set Up Acquire Window Help

Sample: _____ Operator: _____

Cursor Wavelength(nm): _____ Y: _____

— Measured

FILMETRICS®

Structure: SiO2 on Si

Measurement # 0

Show Table Show Statistics

Raw Reflectance (counts)

Wavelength(nm)

Take Reflectance Dark

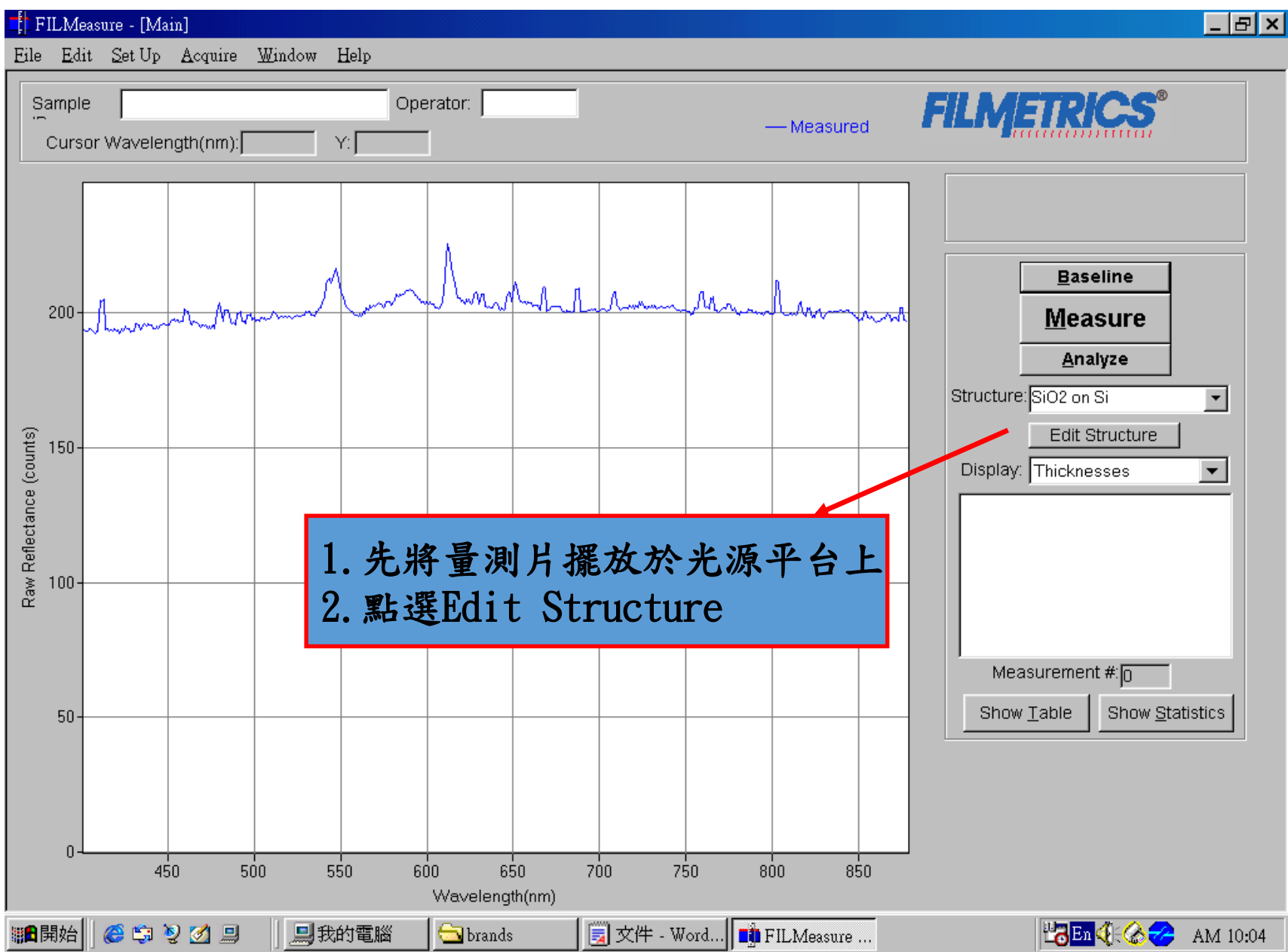
Set Up

For best results, place reference sample at 10-80 degree angle to light source, so light is deflected to the side.

OK Cancel

1. 先將Bare Silicon移離光源平台
2. 點選OK

開始 我的電腦 brands 文件 - Word... FILMeasure ... AM 10:04



Case1: Silicon/SiO2 薄膜(單層)

FILMeasure - [Main]

File Edit Set Up Acquire Window Help

Sample: _____ Operator: _____

Cursor Wavelength(nm): _____ Y: _____

— Measured

FILMETRICS®

Author: Unknown User

Mod. Date: 2004/7/28 AM 10:05:39

Edit Structure

Structure Name: SiO2 on Si

Number of Layers: 1

Options: Add Layer Delete Layer Enable Robust Thickness Only

Layer	Material	Thickness, d (A)	Roughness, r (A)	Measure
Medium	Air			
1	SiO2	7800	0	<input checked="" type="checkbox"/> d <input type="checkbox"/> n <input type="checkbox"/> k <input type="checkbox"/> r
Substrate	Si		0	<input type="checkbox"/> n <input type="checkbox"/> k <input type="checkbox"/> r

Save Save As Delete Structure Cancel OK

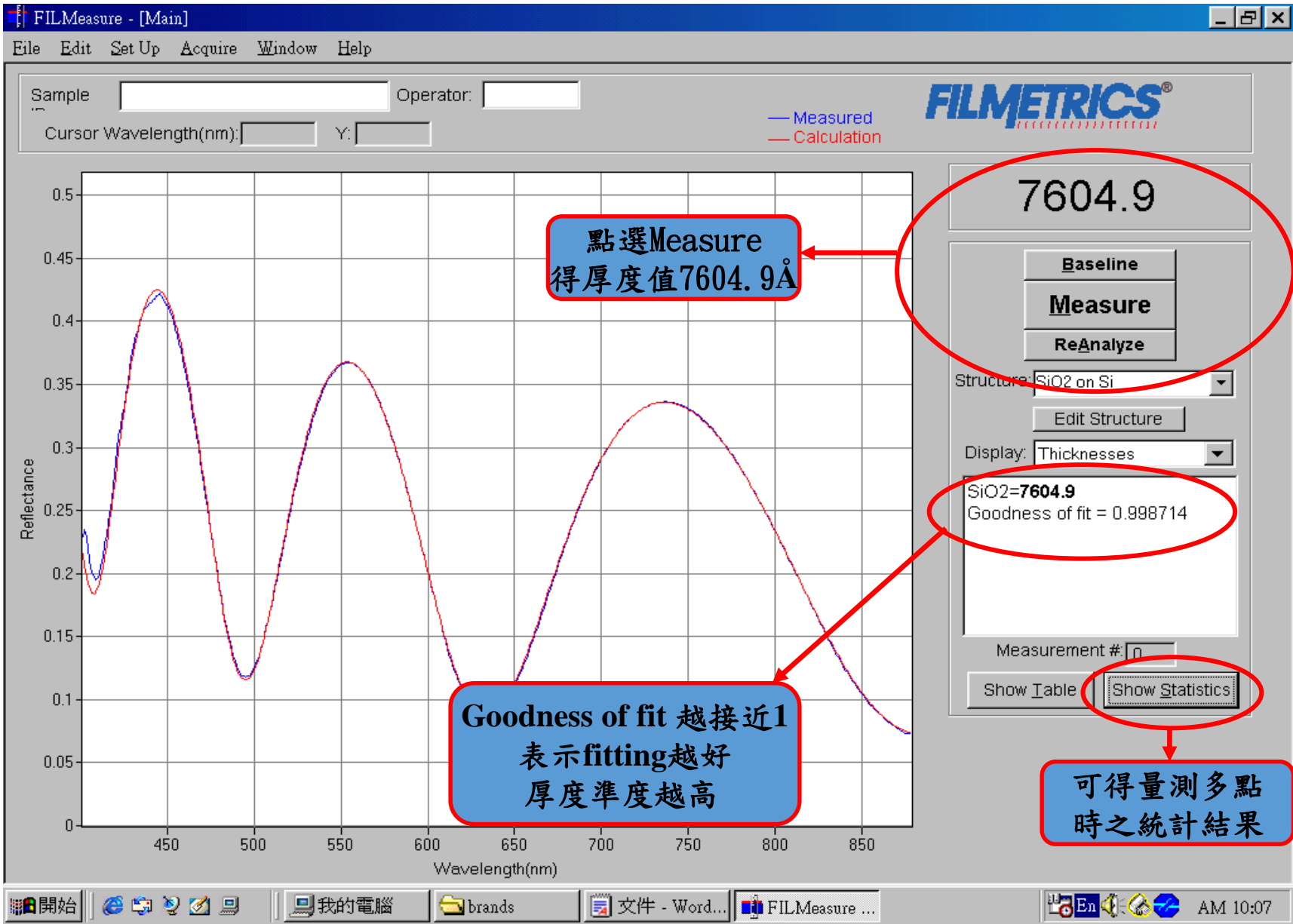
Raw Reflectance (counts)

Wavelength(nm)

選取欲量測薄膜之名稱結構

1. 輸入估計之厚度
2. d (厚度) 需勾選
3. 點選OK

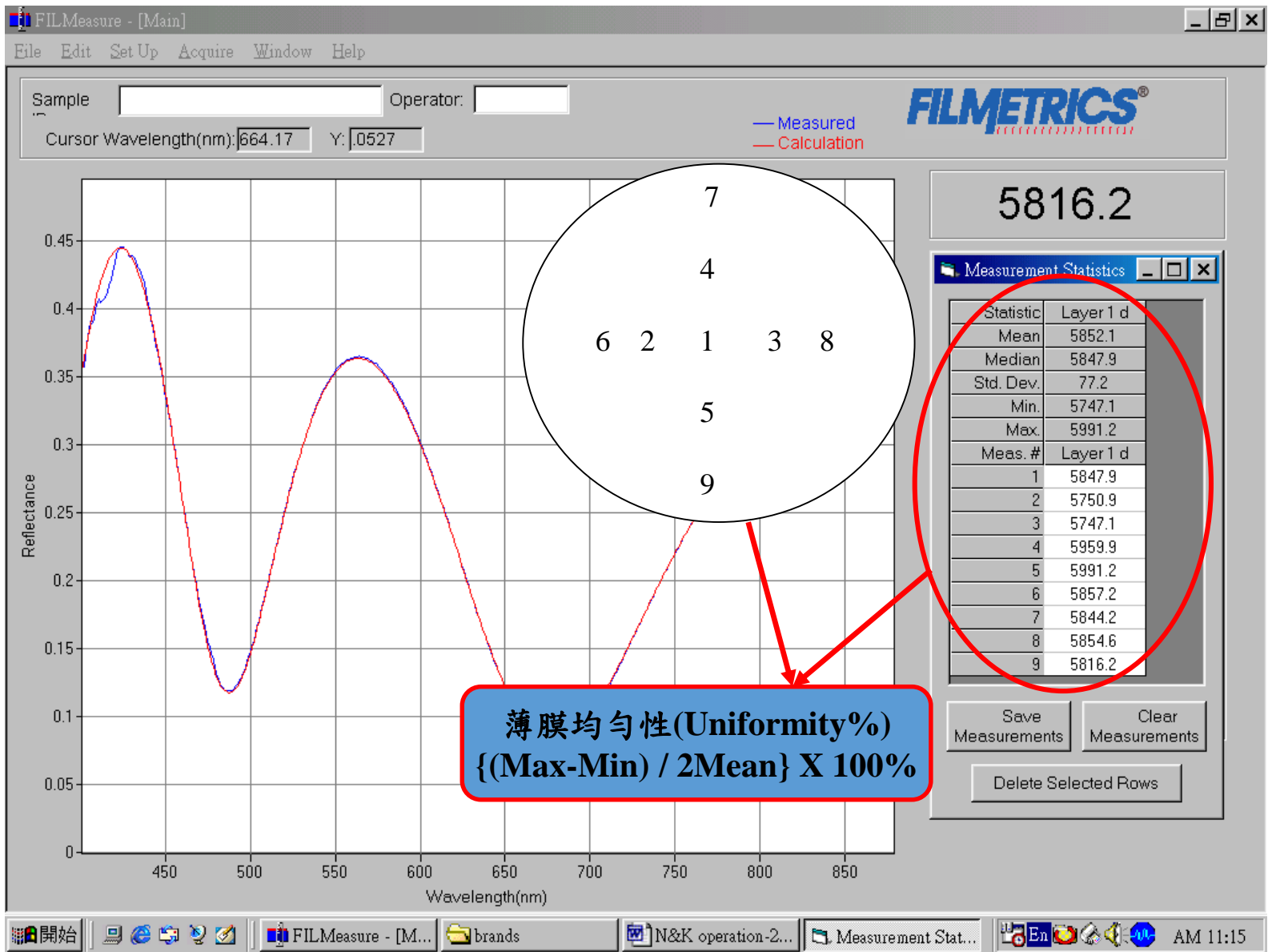
開始 我的電腦 brands 文件 - Word... FILMeasure ... En AM 10:06



點選Measure
得厚度值7604.9Å

Goodness of fit 越接近1
表示fitting越好
厚度準度越高

可得量測多點
時之統計結果



Case2: Silicon/SiO2/Poly Si 薄膜(雙層)

The screenshot displays the FILMetrics software interface. The main window shows a graph of Reflectance versus Wavelength (nm) with a red curve. The 'Edit Structure' dialog box is open, showing the 'Structure Name' as 'SiO2 on Si'. The 'Options' tab is selected and circled in red. A red arrow points from the 'Options' tab to a callout box containing the text: 點選Add Layer增加一層欲量測之材料. The 'Add Layer' button is also visible in the dialog box. The 'Layers' section shows a table with columns for Layer, Material, and Thickness (Å). The table contains three rows: 'Medium' (Air), '1' (SiO2, 5890 Å), and 'Substrate' (Si, 0 Å). The 'Options' section has radio buttons for 'Above' and 'Below', with 'Below' selected. The 'OK' and 'Cancel' buttons are visible at the bottom of the dialog box.

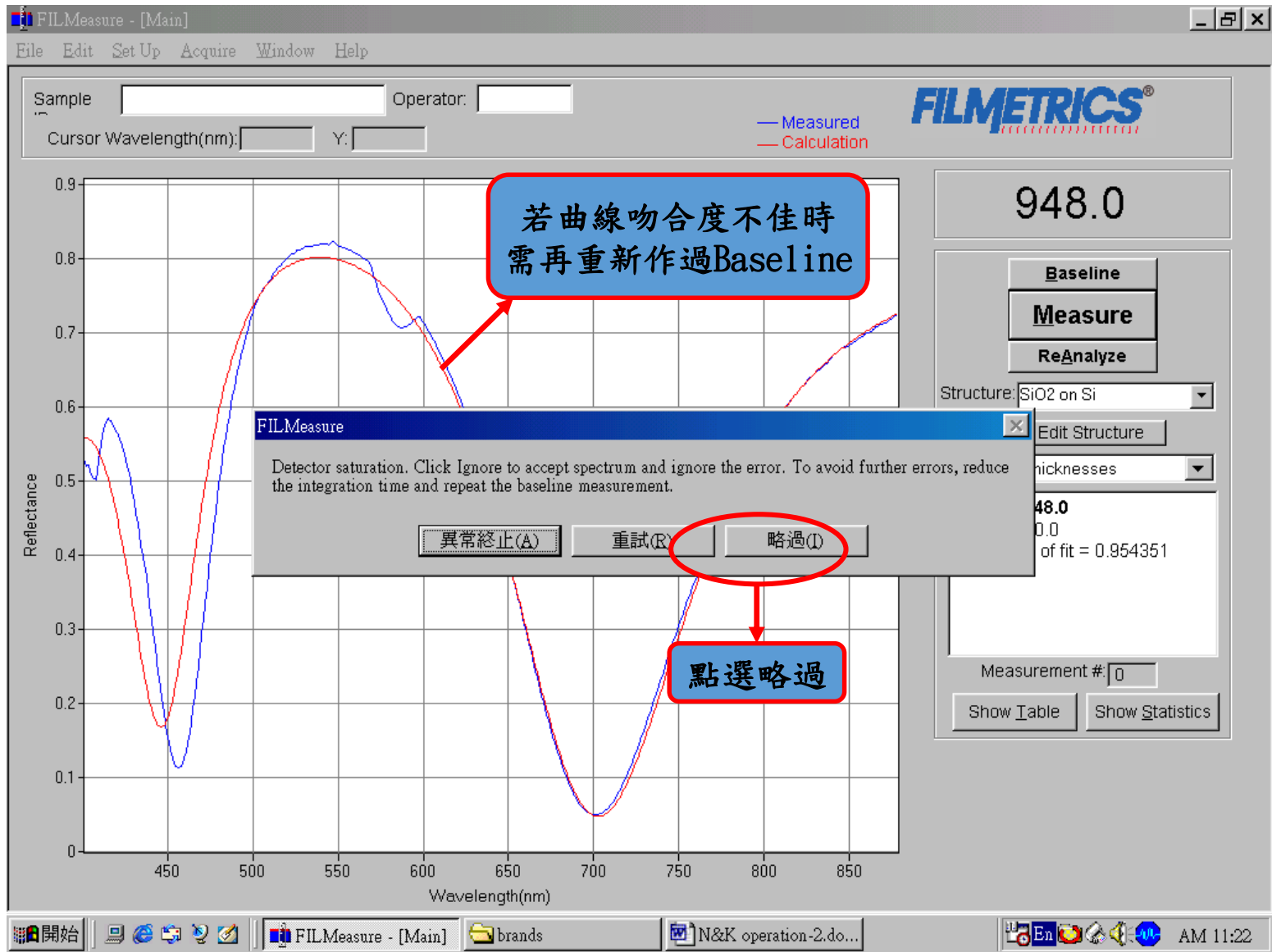
Layer	Material	Thickness (Å)	d	n	k	r
Medium	Air					
1	SiO2	5890	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Substrate	Si	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The screenshot shows the FILMETRICS software interface for editing a structure. The structure name is "SiO2 on Si". The layers are defined as follows:

Layer	Material	Thickness (Å)	Refr. Index (n)	Ext. Coeff. (k)	Options
1	Si_Poly	342	1.942	0	<input checked="" type="checkbox"/> b, <input type="checkbox"/> n, <input type="checkbox"/> k, <input type="checkbox"/> r
2	SiO2	0	1.460	0	<input type="checkbox"/> b, <input type="checkbox"/> n, <input type="checkbox"/> k, <input type="checkbox"/> r
3	Substrate	0	3.420	0	<input type="checkbox"/> b, <input type="checkbox"/> n, <input type="checkbox"/> k, <input type="checkbox"/> r

Annotations in Chinese:

- 試片結構為由下往上 (The sample structure is from bottom to top)
- 只能勾選一種欲量測薄膜之厚度 另一膜層厚度需視為已知值(不要勾選) (Only one thickness measurement option can be selected for a film layer; the other film layer thickness must be treated as a known value (do not select))



Case3: Silicon/Photoresist(單層)

FILMeasure - [Main]

File Edit Set Up Acquire Window Help

Sample: _____ Operator: _____

Cursor Wavelength(nm): _____ Measured

FILMETRICS®

Author: Unknown User

Structure Name: SiO2 on Si

Number of Layers: 1

Layer	Material	Thickness, d (A)	Roughness, r (A)
Medium	Air		
1	Azp4110	1000	
Substrate	Si		

量測AZ4620&AZ5214 所用之database

(無法量測SU8-25 & 50系列之光阻)

Reflectance

Wavelength(nm)

開始

FILMeasure - [Main]

brands

N&K operation-2.do...

AM 11:22

當量測曲線吻合度不佳時

點選Options

當量測曲線於450nm之前有明顯不吻合之現象
可修改波長之量測範圍
可使曲線吻合度更佳
(最多由500nm量測起)

Structure Name: SiO2 on Si

Author: Unknown User

Mod. Date: 2004/11/24 AM

Analyzed Data

Displayed Data

Fixed Range

From: 450 nm

To: 1030 nm

Save Save As Delete Structure Cancel OK

Reflectance

Wavelength(nm)

FILMeasure - [Main]

brands

N&K operation-2.do...

AM 11:25

