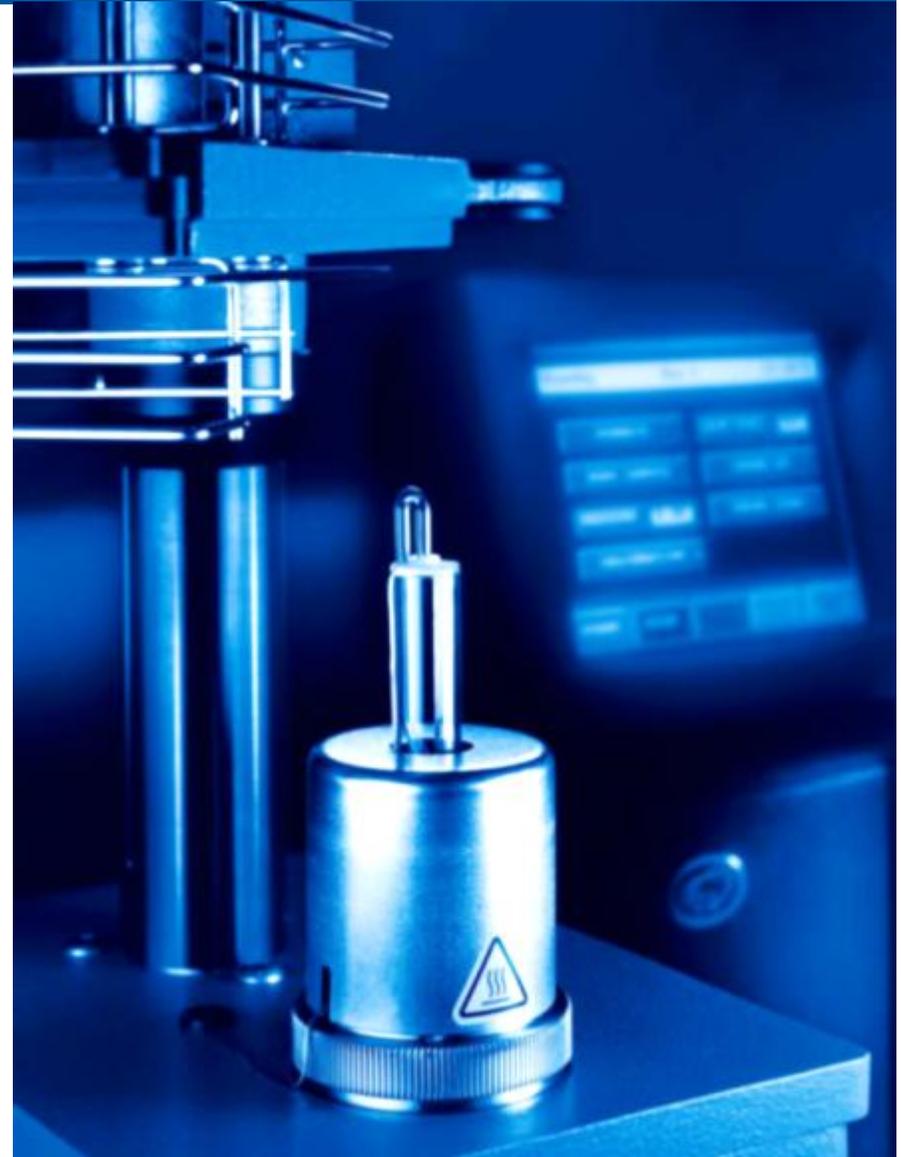


# TMA Q Series 操作訓練



# TMA Q400 操作訓練說明

- TMA開關機注意事項
- TMA機台功能鍵介紹
- TMA操作軟體介面說明
- TMA校正操作步驟示範
- 如何做一個簡單樣品實驗
- 分析軟體(簡易示範)
- 平時保養注意事項
- 維修合約與PLUS合約
- 保固政策說明
- 常見耗材備品
- 網路訓練及影片教學網址



# TMA Q400開關機注意事項

- 首先把氮氣鋼瓶氣體打開，出口壓力必須調整至15~20 PSI。



- 接著把壓縮機空氣打開，出口壓力必須調整至120PSI以內。
- 打開電腦電源。

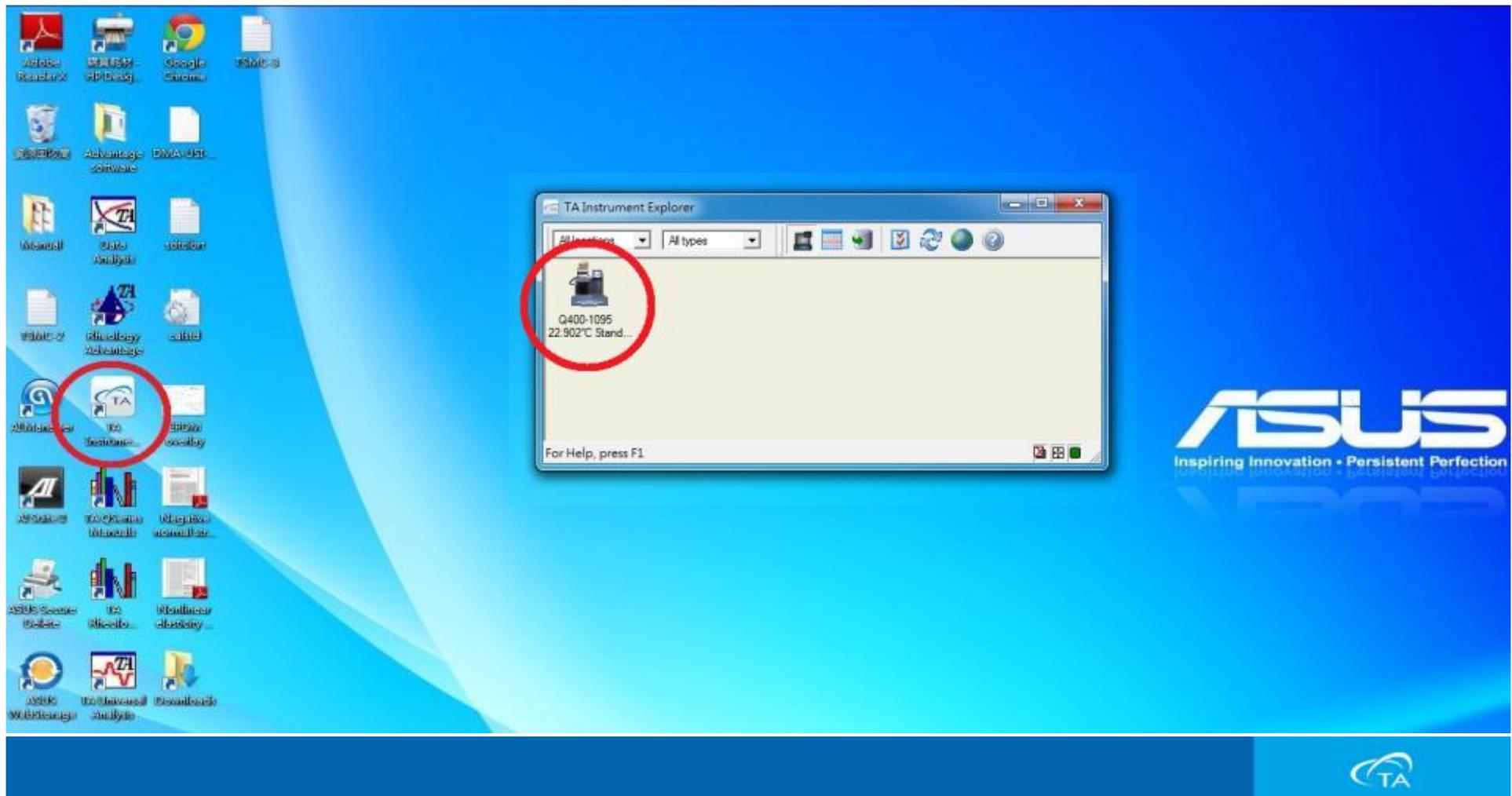
# TMA Q400開關機注意事項

- 打開TMA電源，約兩分鐘後，LCD螢幕出現TA圖樣



# TMA Q400開關機注意事項

- 執行 Instrument Explorer
- 點選TMA圖示，開啟連線控制視窗





# TMA Q400機台功能鍵介紹



Standby      Run 1      37.95°C

Control status      Control Command

Complete

Control command

Furnace      ↓      ▾      ▲

Open      ↓      ▾      ▲

Apply

Start      Stop      Control      Display      Calibrate

The image shows a software interface for the TMA Q400. At the top, there are three status boxes: 'Standby', 'Run 1', and '37.95°C'. Below this is a 'Control Command' section. The 'Control status' is 'Complete'. The 'Control command' section has two rows: 'Furnace' and 'Open'. Each row has a dark button with a white arrow pointing down, followed by two smaller buttons with white triangles pointing down and up. To the right of these are six icons in a 3x2 grid: a furnace with a flame, a balance scale, a furnace with a probe, a furnace with a probe and a blue triangle, a hand holding a probe, and a ruler. At the bottom of the interface is an 'Apply' button and a row of five large buttons: 'Start' (green), 'Stop' (red), 'Control' (grey), 'Display' (grey), and 'Calibrate' (grey).

# TMA Q400機台功能鍵介紹



# TMA Q400機台功能鍵介紹



# TMA Q400機台功能鍵介紹



# TMA Q400機台功能鍵介紹



# TMA Q400機台功能鍵介紹



# TMA Q400機台功能鍵介紹



# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The window title is "QSeries - [Q400-1095 - TMA Q400@Mfg-tria]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". The status bar at the top indicates "Run 1 Standby Temp: 22.91°C".

The main interface is divided into several sections:

- Experiment Standard Sequence:** Shows "Sequence No. 2" and a "Run 1" button.
- Procedure:** Mode is set to "Standst" and Test is "Custom".
- Probe/Sample:** Probe Type is "Expanso" and Size is "14.847 mm".
- Sample Information:** Sample Name is "TMA-ASE-031714". Data File Name is "D:\ase-pc\td\Dat\TMA\Low\ase\A\SE\TMA-ASE-03141-".

A table on the right displays the following data:

Signal	Value
Meas'd Time	0.00 min
Segment Time	1.00 min
Remaining Run Time	0 min
Temperature	22.91 °C
Position Temperature	24.51 °C
Set Point Temp	0.00 °C
Dimension Change	-3505.53 µm
Length	0.000 µm
Force	0.0000 N
Heater Power	0.000 W
Sample Purge Flow	0.00 mL/min

Below the table is a "Running Segment Description" table:

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

At the bottom right, a graph plots "Dimension Change (µm)" on the y-axis (ranging from 0.90 to 2.00) against "Temperature (°C)" on the x-axis (ranging from 0.90 to 2.00). The graph area is currently empty.

The bottom status bar shows "01 11:20 min" and buttons for "Append", "Apply", "Cancel", and "Help". The status indicator is "Stand by" (red), and the current segment is "Standard Seg 0 in Run 1" at "14:44:33".

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. At the top, a red box highlights the toolbar, labeled "工具列" (Toolbar). The main window is titled "QSeries - [Q400-1095 - TMA Q400@mfg-tria]".

**Experiment Section:**

- Standard Sequence
- Sequence No. 2
- Run 1

**Procedure Section:**

- Mode: Standard
- Test: Custom
- Probe/Sample: Expansion, Size: 14.8:67 mm
- Sample Information: Sample Name: TMA-ASE-031714, Date File Name: \\file-prtn\Data\TMA\Lowrance\ASE\TMA-ASE-03141

**Signal Table:**

Signal	Value
Method Time	3.00 min
Segment Time	3.00 min
Remaining Run Time	3 min
Temperature	22.91 °C
Heater Temperature	24.91 °C
Set Point Temp	3.00 °C
Dimension Change	-3505.53 µm
Length	3.000 µm
Force	3.0900 N
Heater Power	3.000 W
Sample Purge Flow	3.00 ml/min

**Running Segment Description Table:**

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

**Graph:**

Dimension Change (µm) vs Temperature (°C)

The graph shows a plot of Dimension Change (µm) on the y-axis (ranging from 0.90 to 2.00) against Temperature (°C) on the x-axis (ranging from 0.90 to 2.00). The plot area is currently empty.

**Status Bar:**

01 118.20 min Append Apply Cancel Help Stand by Standard Seg 0 in Run 1 14:44:33

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The 'Experiment' window is highlighted with a red border. It shows the following configuration details:

- Procedure:** Mode: Standard, Test: Custom
- Probe/Sample:** Probe Type: Expansion, Size: 14.8:67 mm
- Sample Information:** Sample Name: TMA-ASE-031714, Date File Name: \\file-prnt\DATA\TMA\Lowrance\ASE\TMA-ASE-03141

Below the configuration fields, the text '順序排列視窗' (Ordering View) is written in red. The right side of the interface features a 'Signal' table and a 'Running Segment Description' table.

Signal	Value
Method Time	3.00 min
Segment Time	3.00 min
Remaining Run Time	3 min
Temperature	22.91 °C
Heater Temperature	24.91 °C
Set Point Temp	3.00 °C
Dimension Change	-3505.53 µm
Length	3.000 µm
Force	3.0900 N
Heater Power	3.000 W
Sample Purge Flow	3.00 ml/min

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

At the bottom right, a graph plots Dimension Change (µm) on the y-axis (ranging from 0.90 to 2.00) against Temperature (°C) on the x-axis (ranging from 0.90 to 2.00). The status bar at the bottom indicates 'Stand by', 'Standard', 'Seg 0 in Run 1', and '14:44:33'.

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. A red box highlights the 'Experiment' settings panel on the left, which includes:

- Procedure:** Mode (Standard), Test (Custom)
- Probe/Sample:** Probe Type (Expanso), Size (14.8467 mm)
- Sample Information:** Sample Name (TMA ASE-031714), Comments, Data File Name (\\file-pc\to\Data\TMA\Lowrance\ASE\TMA-ASE-03141), Network Drive

Below the settings panel, the text **樣品資訊 · 方法步驟 · 流量設定** (Sample Information · Method Steps · Flow Setting) is displayed in red.

The main window shows a 'Signal' table with the following data:

Signal	Value
Preheat Time	2.00 min
Ignition Time	1.00 min
Remaining Run Time	2 min
Temperature	22.91 °C
Heater Temperature	24.51 °C
Set Point Temp	3.00 °C
Dimension Change	-3505.53 µm
Length	2.000 µm
Force	0.0500 N
Heater Power	3.000 W
Sample Purge Flow	3.00 ml/min

Below the table is a 'Running Segment Description' table:

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

At the bottom, a graph plots Dimensional Change (µm) on the y-axis (0.90 to 2.00) against Temperature (°C) on the x-axis (0.90 to 2.00). The status bar at the bottom right shows 'Stand by', 'Standard', 'Seg 0 in Run 1', and '14:44:33'.

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The window title is "QSeries - [Q400-1095 - TMA Q400@mfg-trm]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". The status bar at the top indicates "Run 1 Standby Temp: 22.91°C".

The interface is divided into several sections:

- Experiment:** Shows "Standard Sequence" and "Run 1".
- Procedure:** Mode: Standby, Test: Custom.
- Probe/Sample:** Probe Type: Expedera, Size: 14.8467 mm.
- Sample Information:** Sample Name: TMA-ASE-031714, Date File Name: \\file-pc\to\Data\TMA\Lowrance\ASE\TMA-ASE-03141.

A table titled "Signal" is highlighted with a red border, showing the following data:

Signal	Value
Method Time	2.00 min
Segment Time	1.00 min
Remaining Run Time	2 min
Temperature	22.91 °C
Heater Temperature	24.51 °C
Set Point Temp	3.00 °C
Dimension Change	-3505.53 µm
Length	2.000 µm
Force	0.0500 N
Heater Power	3.000 W
Sample Purge Flow	3.00 ml/min

Below the table is a "Running Segment Description" list:

- 1 Ramp 5.00 °C/min to 300.00 °C
- 2  Mask end of cycle 1
- 3 Equilibrate at 40.00 °C
- 4  Mask end of cycle 2
- 5 Ramp 5.00 °C/min to 300.00 °C

The text "訊號視窗" (Signal Window) is overlaid in red on the right side of the interface.

At the bottom right, there is a graph titled "Dimension Change (µm)" vs "Temperature (°C)". The y-axis ranges from 0.90 to 2.00, and the x-axis ranges from 0.90 to 2.00. The graph is currently empty.

The status bar at the bottom shows "Ready", "Standby", "Standard", "Seg 0 in Run 1", and "14:44:33".

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The window title is "QSeries - [Q400-1095 - TMA Q400@mfg-trm]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". The status bar at the top indicates "Run 1 Standby Temp: 22.91°C".

The interface is divided into several sections:

- Experiment:** Shows "Standard Sequence" and "Run 1".
- Procedure:** Mode is "Standard", Test is "Custom".
- Probe/Sample:** Probe Type is "Expanso", Size is "14.8467 mm".
- Sample Information:** Sample Name is "TMA ASE-031714", Comments is empty, Data File Name is "W:\se-pc\td\TMA\Lowrance\ASE\TMA-ASE-03141", and Network Drive is empty.
- Signal Table:** Lists various parameters and their values.
- Running Segment Description Table:** A table with 5 rows describing the test sequence.
- Graph:** A plot of Dimension Change (µm) vs. Temperature (°C) with the text "目前樣品測試方法視窗" overlaid.
- Bottom Bar:** Shows "01 1:00.20 min" and buttons for "Append", "Apply", "Cancel", and "Help".

Signal	Value
Method Time	2.00 min
Segment Time	1.00 min
Remaining Run Time	2 min
Temperature	22.91 °C
Heater Temperature	24.51 °C
Set Point Temp	3.00 °C
Dimension Change	-3505.53 µm
Length	2.000 µm
Force	0.0500 N
Heater Power	3.000 W
Sample Purge Flow	3.00 ml/min

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

Dimension Change (µm)

Temperature (°C)

01 1:00.20 min

Append Apply Cancel Help

Standby Standard Seg 0 in Run 1 14:44:33

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The main window is titled "QSeries - [Q400-1095 - TMA Q400@mfg-tria]". The interface is divided into several sections:

- Experiment Section:** Shows "Standard Sequence" and "Run 1 Standby Temp: 22.91°C".
- Procedure Section:** Includes fields for "Mode" (Standard), "Test" (Custom), "Probe/Sample" (Probe Type: Expression, Size: 14.867 mm), and "Sample Information" (Sample Name: TMA-ASE-031714, Date File Name: \\User-pc\ts\Data\TMA\TMA\ase\ase\TMA-ASE-03141).
- Signal Section:** A table listing various parameters and their values:

Signal	Value
Measur Time	0.00 min
Segment Time	1.00 min
Remaining Run Time	0 min
Temperature	22.91 °C
Heater Temperature	24.91 °C
Set Point Temp	0.00 °C
Dimension Change	-3505.53 µm
Length	0.000 µm
Force	0.0000 N
Heater Power	0.000 W
Sample Purge Flow	0.00 mL/min
- Running Segment Description:** A list of steps:
  - 1 Ramp 5.00 °C/min to 300.00 °C
  - 2 Mark end of cycle 1
  - 3 Equilibrate at 40.00 °C
  - 4 Mark end of cycle 2
  - 5 Ramp 5.00 °C/min to 300.00 °C
- Graph Window:** A plot titled "即時圖形視窗" (Real-time Graph Window) showing "Dimension Change (µm)" on the y-axis (ranging from 0.90 to 2.00) and "Temperature (°C)" on the x-axis (ranging from 0.90 to 2.00). The graph area is currently blank.

At the bottom, there are buttons for "Append", "Apply", "Cancel", and "Help". The status bar shows "Ready" and "01 1M.20 min".

# TMA Q400操作軟體介面說明

QSeries - [Q400-1095 - TMA Q400@mfg-tria]

Control Experimental Calibrate Tools View Window Help

Run 1 Standby Temp: 22.91°C

**Experiment**

Standard Sequence

Sequence No. 2

Run 1

**Procedure**

Mode: Standard

Test: Custom

Probe/Sample

Probe Type: Expanso

Size: 14.8467 mm

Sample Information

Sample Name: TMA-ASE-031714

Comments:

Data File Name: \\file-pc\to\Data\TMA\Lawrence\ASE\TMA-ASE-03141

Network Drive:

**Signal**

Signal	Value
Method Time	2.00 min
Segment Time	1.00 min
Remaining Run Time	2 min
Temperature	22.91 °C
Heater Temperature	24.51 °C
Set Point Temp	3.00 °C
Dimension Change	-3505.53 µm
Length	2.000 µm
Force	0.0500 N
Heater Power	3.000 W
Sample Purge Flow	3.00 ml/min

**Running Segment Description**

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

**Dimension Change (µm) vs Temperature (°C)**

01 144.22 min

Append Apply Cancel Help

Stand by Standard Seg 0 in Run 1 14:44:33

Ready

TA

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The main window is titled "QSeries - [Q400-1095 - TMA Q400@Mfg-tma]". The interface is divided into several sections:

- Control Panel:** Includes buttons for Control, Experimental, Calibrate, Tools, View, Window, and Help. A status bar at the top indicates "Run 1: Standby Temp: 22.86°C".
- Experiment Section:** Contains a "Standard Sequence" list and a "Procedure Information" panel. The "Procedure Information" panel includes a "Test" dropdown menu set to "Custom", a "Notes" text area, and a "Final Force" input field set to "0.0500 N".
- Method Editor:** A red box highlights this section, which is titled "Method" and contains a table of test segments. The table is as follows:

#	Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C
- Signal/Value Table:** A table on the right side of the interface displays various parameters and their current values:

Signal	Value
Method Time	0.00 min
Segment Time	0.00 min
Remaining Run Time	0 min
Temperature	22.86 °C
Heater Temperature	24.50 °C
Set Point Temp	0.00 °C
Dimension Change	-3505.53 µm
Length	0.000 µm
Force	0.0500 N
Heater Power	0.000 W
Sample Purge Flow	0.00 mL/min
- Running Segment Description Table:** A table below the signal table lists the current test segments:

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C
- Graph:** A graph at the bottom right plots "Dimension Change (µm)" on the y-axis (ranging from 0.90 to 2.00) against "Temperature (°C)" on the x-axis (ranging from 0.90 to 2.00). The graph is currently empty.
- Bottom Panel:** Includes a status bar with "Ready", "01 116.20 min", and buttons for "Append", "Apply", "Cancel", and "Help". A red "Stand by" indicator is visible, along with "Standard", "Seg 0 in Run 1", and the time "14:45:54".

編輯樣品測試方法

# TMA Q400操作軟體介面說明

The screenshot displays the TMA Q400 software interface. The main window is titled "QSeries - [Q400-1095 - TMA Q400@mfg-tma]". The interface is divided into several sections:

- Control Panel:** Includes buttons for Start, Stop, Pause, and other control functions.
- Experiment Section:** Contains a "Standard Sequence" list, a "Notes" field, and "Mass Flow Control Settings" where the sample is set to "N1 - Nitrogen" and the flow rate is "100 ml/min".
- Signal Table:** A table with two columns: "Signal" and "Value".
- Running Segment Description:** A list of five segments describing the temperature and dimension change protocol.
- Graph:** A plot of "Dimension Change (µm)" versus "Temperature (°C)".
- Status Bar:** Shows "Stand by", "Standard", "Seg 0 in Run 1", and the time "14:46:21".

**Signal Table Data:**

Signal	Value
Method Time	0.00 min
Segment Time	0.00 min
Remaining Run Time	0 min
Temperature	22.85 °C
Heater Temperature	24.50 °C
Set Point Temp	0.00 °C
Dimension Change	-3505.53 µm
Length	0.000 µm
Force	0.0500 N
Heater Power	0.000 W
Sample Purge Flow	0.00 mL/min

**Running Segment Description:**

- 1 Ramp 5.00 °C/min to 300.00 °C
- 2 Mark end of cycle 1
- 3 Equilibrate at 40.00 °C
- 4 Mark end of cycle 2
- 5 Ramp 5.00 °C/min to 300.00 °C

**Graph Data:**

The graph shows a blank coordinate system with the y-axis labeled "Dimension Change (µm)" ranging from 0.90 to 2.00 and the x-axis labeled "Temperature (°C)" ranging from 0.90 to 2.00.

**Operator and Flow Rate:** The text "操作者，流量設定" (Operator, Flow Rate Setting) is overlaid in red on the interface, pointing to the "Operator" and "Flow Rate" fields in the "Mass Flow Control Settings" section.

# TMA Q400校正操作步驟示範

- TMA 校正功能表可選擇：探針校正、力量校正、爐子常數校正、溫度校正、相位、柔量。

The screenshot displays the TMA Q400 software interface. The 'Calibrate' menu is open, highlighting the following options: Probe..., Force..., Analysis..., Phase..., and Compliance... (all enclosed in a red box). Other visible options include Cell/Temperature Table..., Report..., Touchscreen, and Mass Flow Control... The interface also shows a 'Sample Information' section with fields for Sample Name (TMA-ASE-031714), Comments, Data File Name, and Network Drive. A 'Signal' table is visible on the right, and a graph at the bottom shows Dimension Change (µm) versus Temperature (°C).

Signal	Value
Method Time	0.00 min
Segment Time	0.00 min
Remaining Run Time	0 min
Temperature	22.78 °C
Heater Temperature	24.48 °C
Set Point Temp	0.00 °C
Dimension Change	-3505.53 µm
Length	0.000 µm
Force	0.0500 N
Heater Power	0.000 W
Sample Purge Flow	0.00 mL/min

#	Running Segment Description
1	Ramp 5.00 °C/min to 300.00 °C
2	Mark end of cycle 1
3	Equilibrate at 40.00 °C
4	Mark end of cycle 2
5	Ramp 5.00 °C/min to 300.00 °C

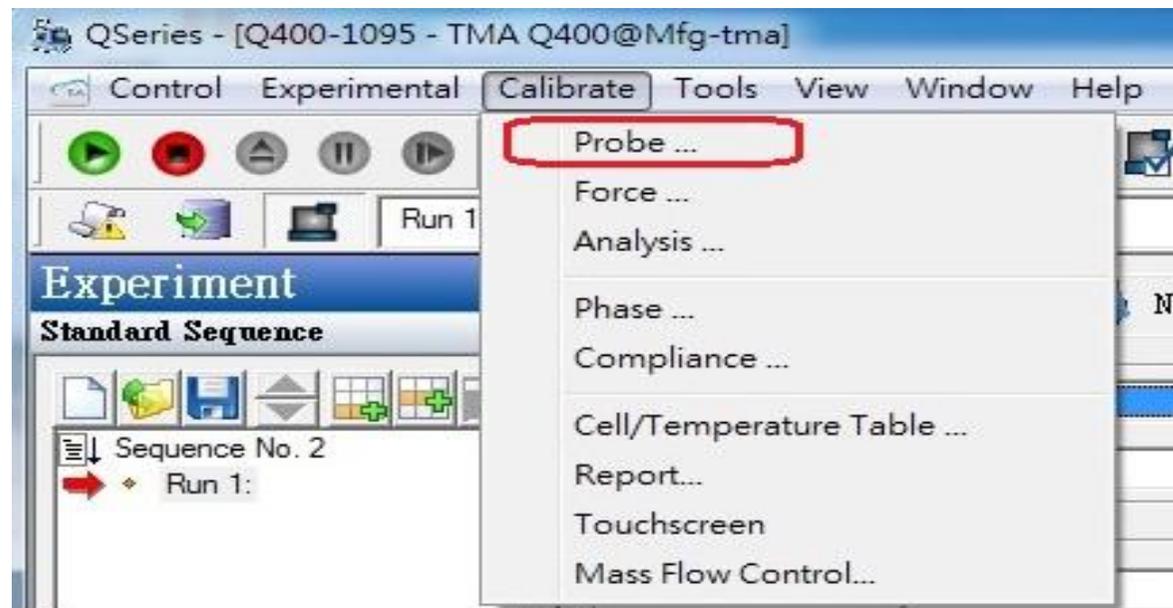
# TMA Q400校正操作步驟示範

- 探針校正：是用來校正LVDT和不同探針所帶來的重量去做平衡校正。
- 力量校正：主要校正由探針施加在樣品平臺上的力量，藉由50G重砝碼和100G重砝碼，計算每克重的牛頓力量。
- 爐子常數校正：爐子常數是透過標準鋁錠來校正膨脹係數。
- 溫度校正：是用來校正熱電偶溫度的準確性。
- 振盪相位校正：利用0.020英寸鋼絲做頻率振盪掃描，得到相位角和彎曲弧度。
- 柔量校正：主要在0.1牛頓內執行1HZ的頻率振盪來校正柔量。

# TMA Q400校正操作步驟示範

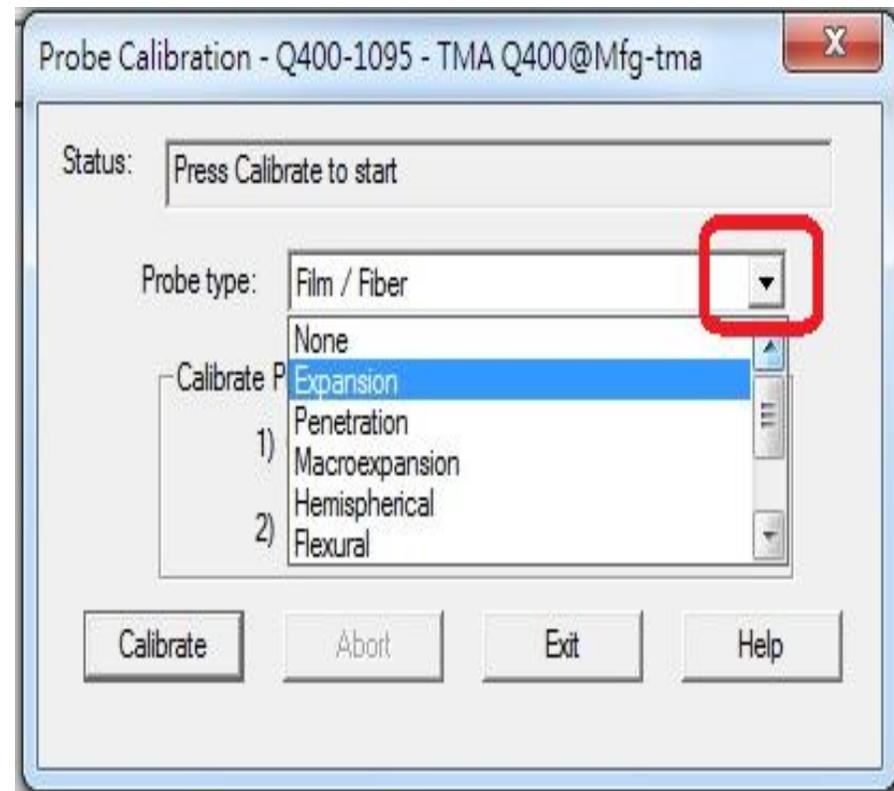
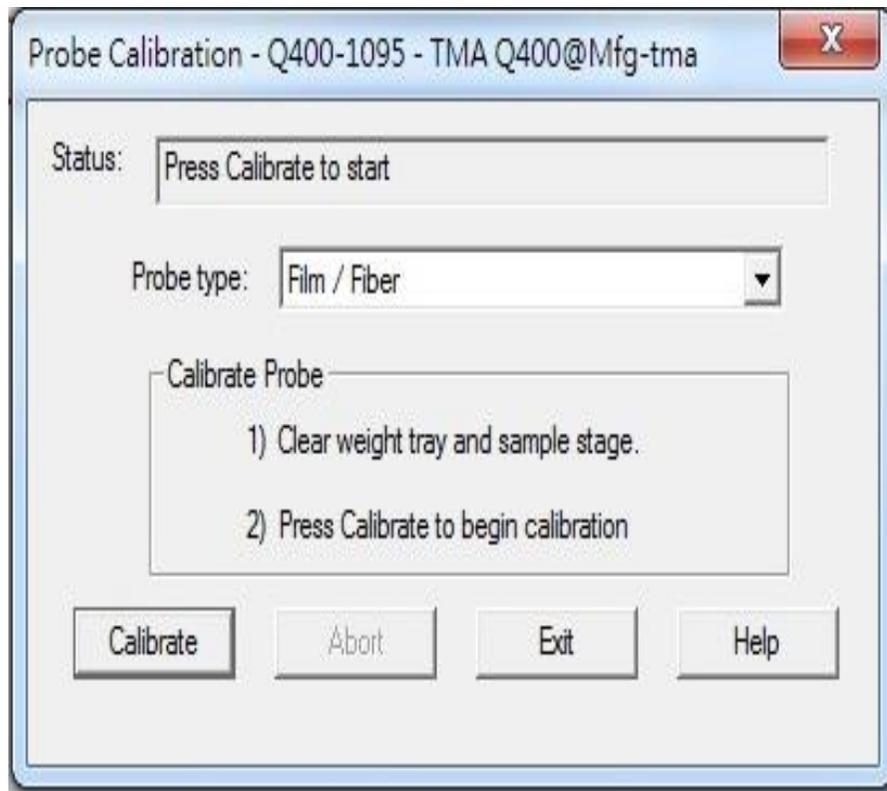
## ■ 探針校正

- 1、點選工具列中Calibrate並在下拉式功能表中選擇probe功能。



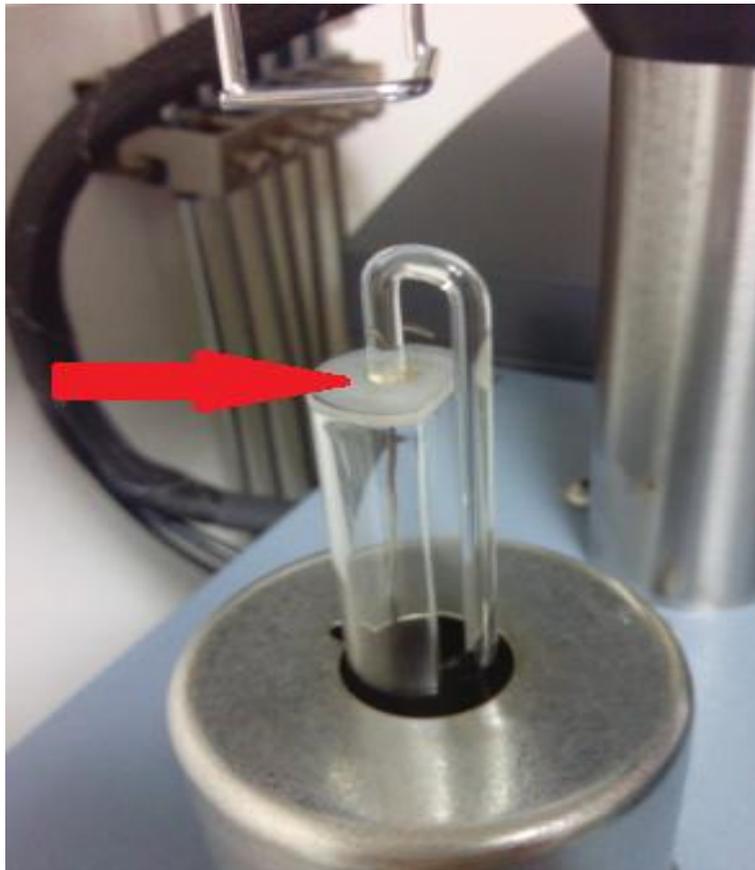
# TMA Q400校正操作步驟示範

- 2、依照每個探針的種類不同，從下拉式選項中選擇正確的探針名稱，並且依照說明把樣品平檯和砝碼盤上物品清除。



# TMA Q400校正操作步驟示範

樣品平臺

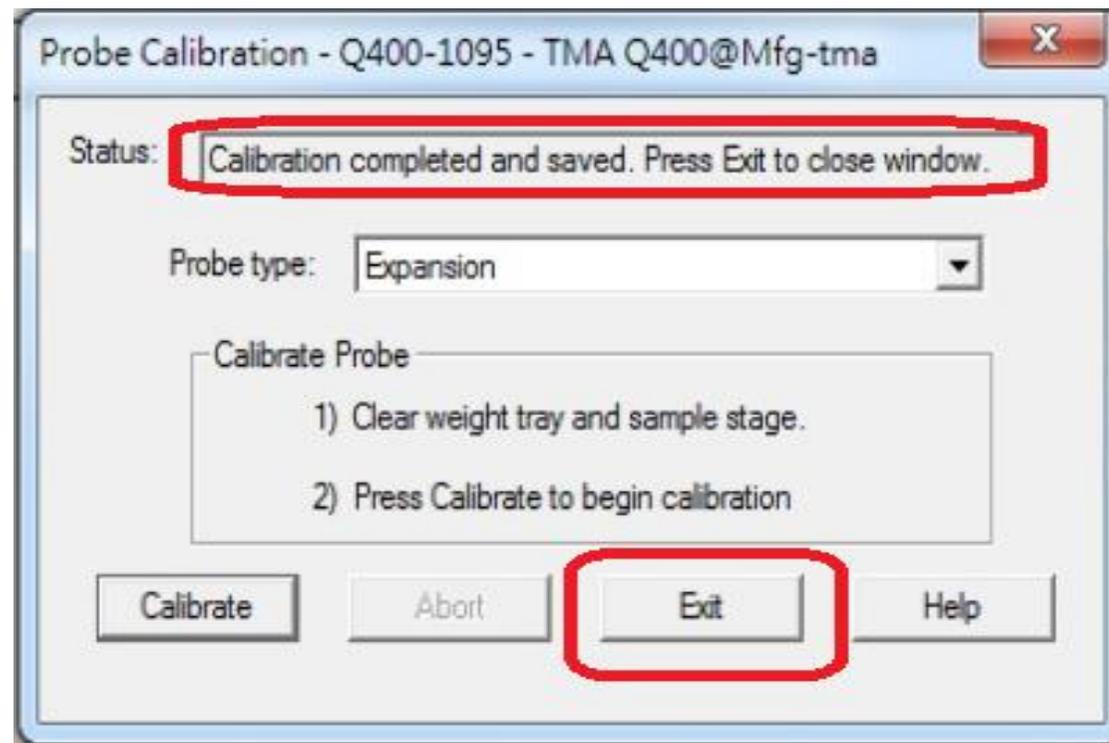


砝碼盤



# TMA Q400校正操作步驟示範

- 3、確認之後選擇Calibrate鍵繼續執行探針校正，當儀器內自我校正完成之後，會有一個訊息顯示提示你是否已成功的完成探針校正。



# TMA Q400校正操作步驟示範

## 力量校正(Force Calibrate)

力量校正可以校正由探針施加在樣品檯上的力量，藉由**50G**重砝碼和**100G**重砝碼，計算每克重的牛頓力量。

在下面的狀況時你會需要校正施力：

- 當新的探針第一次安裝時。
- 機台因大規模搬遷，有使用到固定天平配件時。

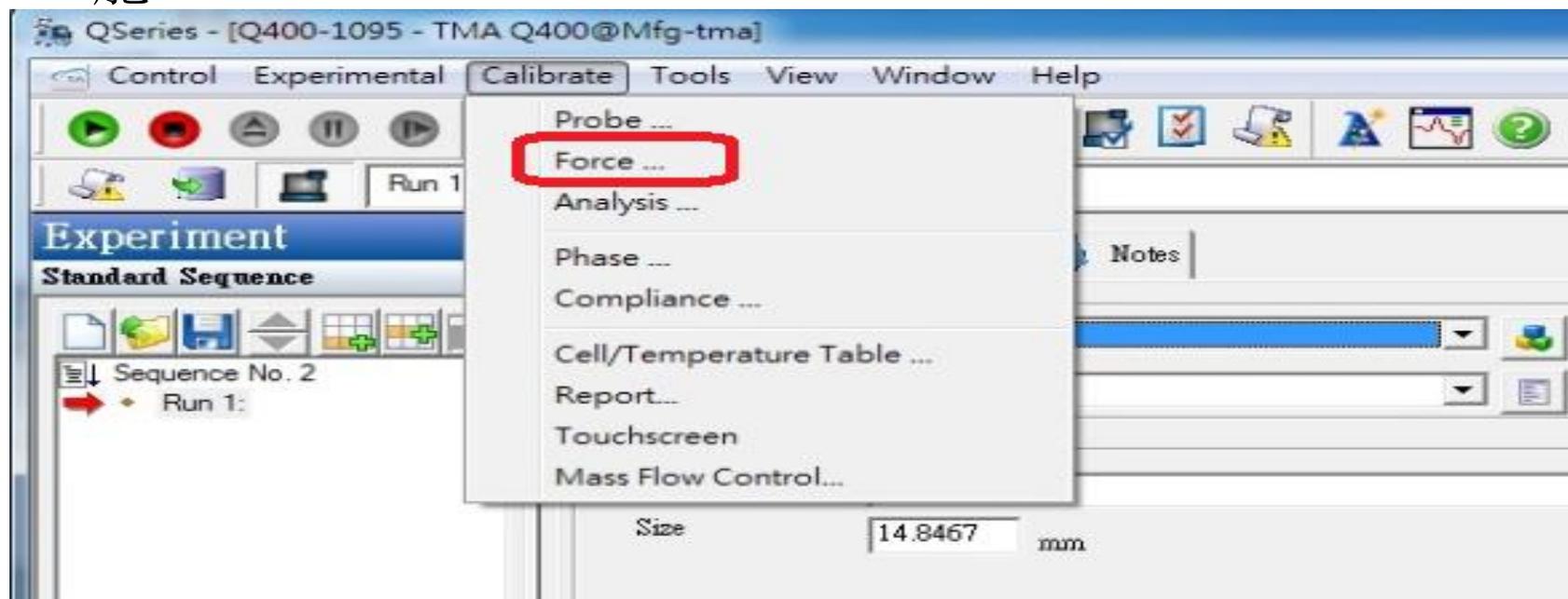
注意事項：**Force Calibrate**若只是近距離移動主機時，通常**Force**都十分穩定，所以不需時常做校正約半年一次即可。

# TMA Q400校正操作步驟示範

步驟一：

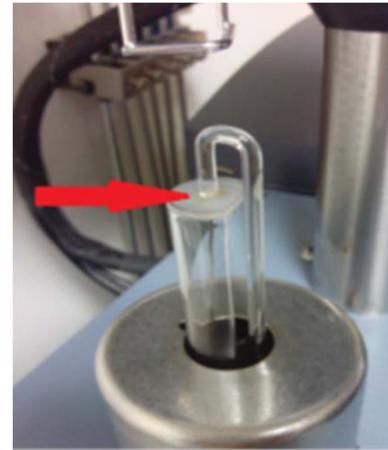
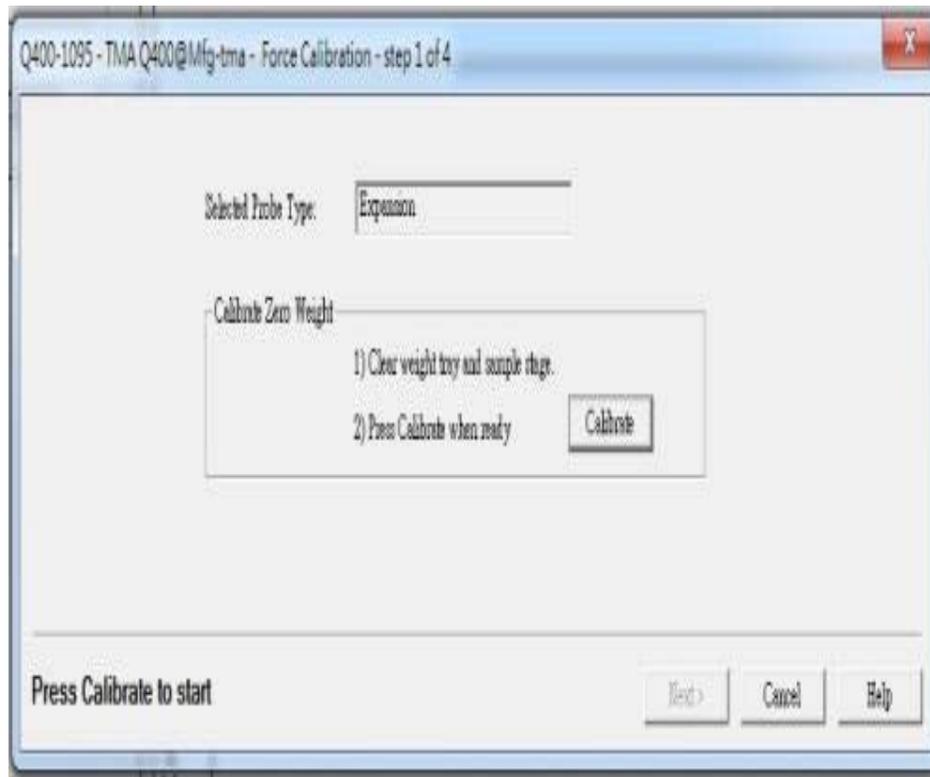
校正零點重量

- 1、在TMA 上安裝標準探針和它的樣品檯。
- 2、點選工具列中Calibrate，並在下拉式功能表中選擇Force功能。



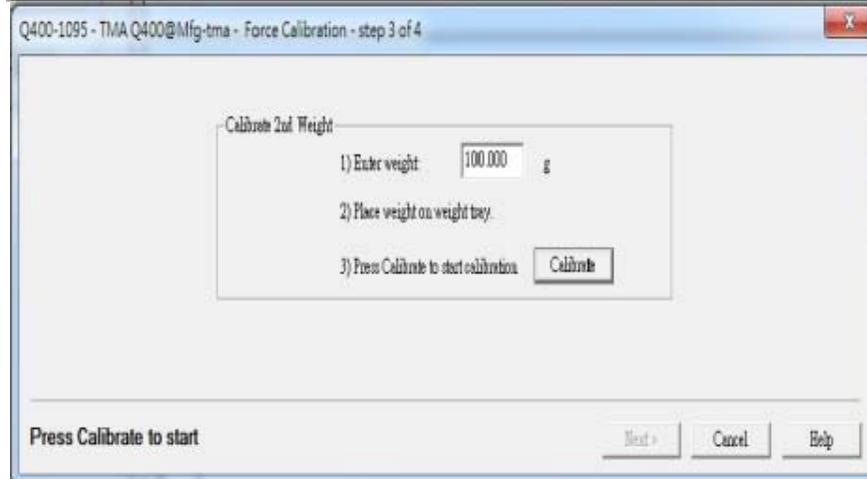
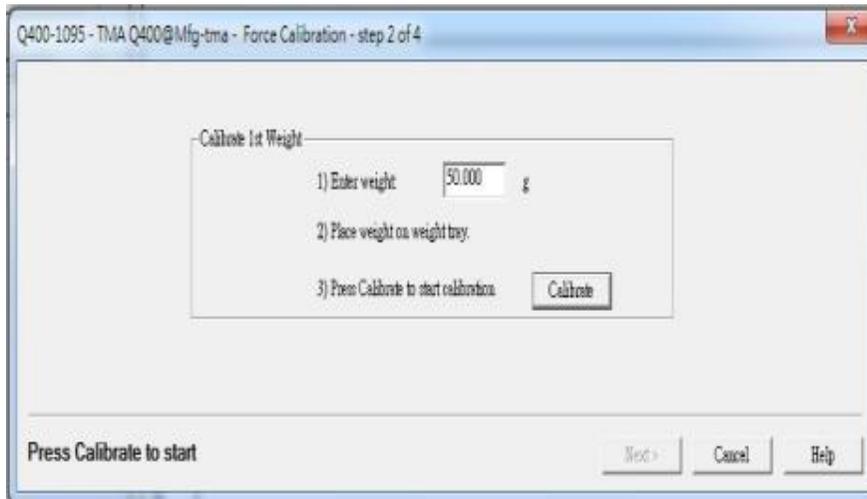
# TMA Q400校正操作步驟示範

- 3、依照說明把砝碼盤和樣品檯上的所有物體移除，確認後直接選擇Calibrate按鍵，完成後執行Next。



# TMA Q400校正操作步驟示範

4、接著依照指示放入50G 和 100G砝碼放入砝碼盤上。



# TMA Q400校正操作步驟示範

- 當所有砝碼步驟完成之後會出現一個視窗所校正完成的數據資料，此時就可以點選Save鍵完成校正，並把砝碼取出

Q400-0064 - TMA Q400@Mfg-tma - Force Calibration - step 4 of 4

Force Weight 1 Calibration  
Force Calibration 0.0 to 50.000 g  
 Slope = 1.0431  Offset = 0.0019

Force Weight 2 Calibration  
Force Calibration 50.000 to 100.000 g  
 Slope = 1.0546  Offset = 0.0075

Specifications  
Slope 1.0 +/- .25      Offset +/- 0.05  
Auto cell constant = 1.000      Spec: 1.0 +/- 0.1

Calibration Notation  
 Passed  
 Failed

Press save to store calibration and exit

Save Cancel Help



# TMA Q400校正操作步驟示範

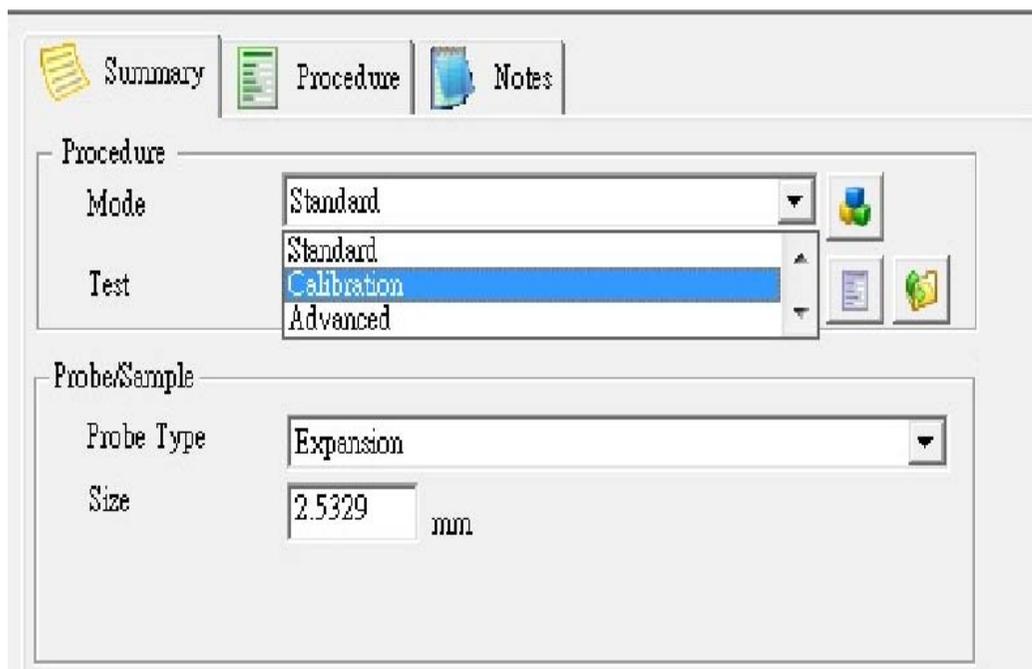
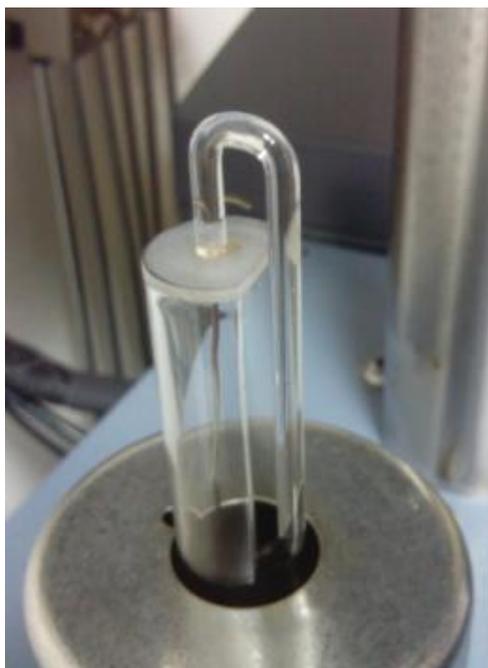
## ■ 爐子常數校正

- 爐子常數是根據一個實驗的測試中，將一個已知的樣品(標準物質)加熱，由實驗結果校正儀器的爐子常數。
- 爐子常數所使用的標準物質為鋁柱，利用鋁柱的標準膨脹係數和量測到的膨脹係數之間的比值，來計算爐子常數。

注意事項：鋁柱為標準配件盒內其中一項物品，請注意此物品切勿放在潮溼地點以免造成氧化生鏽，另外請勿碰撞及掉落地面而造成鋁柱變形。

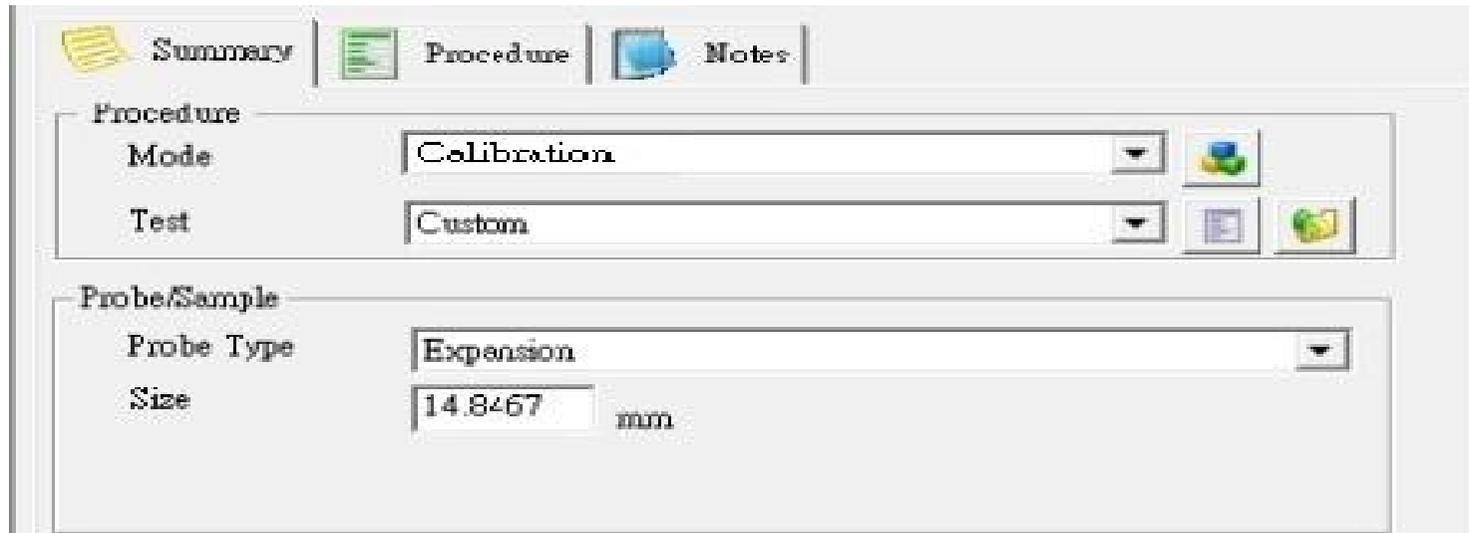
# TMA Q400校正操作步驟示範

- 1、首先選擇標準探針並且正確安裝。
- 2、從Summary主功能表中，Mode功能內把儀器設定為校正模式Calibration。



# TMA Q400校正操作步驟示範

3、接著在Test內的欄位仍然選擇Custom。



4、如果探針是剛安裝上去的，請完成之前的probe校正動作完成校正。

# TMA Q400校正操作步驟示範

- 5、用TMA 面板上的尺寸歸零(ZERO LENGTH)按鍵做探針歸零。
- 6、完成之後在TMA 附件盒中找出鋁製柱狀標準品，放置在樣品平台上。



# TMA Q400校正操作步驟示範

- 7、調整熱電偶位子盡量靠近樣品。
- 8、接著把爐子回正後，按下觸碰面板上的爐子升降按鍵，把爐子關閉。
- 9、在按下TMA 面板上的量測長度(MEASURE LENGTH) 按鍵。



# TMA Q400校正操作步驟示範

- 10、接著在Sample Information內把檔案名稱，檔案路徑輸入完成。

The screenshot displays the TMA Q400 software interface. The 'Sample Information' section is highlighted with red arrows pointing to the 'Sample Name' and 'Data File Name' fields. The 'Sample Name' field contains 'AL CELL CONSTANT' and the 'Data File Name' field contains 'WUSER-PC\TA\Data\TMA\Lawrence\ASE\TMA-ASE-03'. The 'Probe/Sample' section shows 'Probe Type' as 'Expansion' and 'Size' as '2.5329 mm'. The 'Procedure' section shows 'Mode' as 'Calibration' and 'Test' as 'Custom'. The 'Signal' section on the right shows a list of parameters including Method Time, Segment Time, Remaining Run Time, Temperature, Heater Temperature, Set Point Temp, Dimension Change, Length, Force, Heater Power, and Sample Purge Flow. Below this list is a table with two columns: '#', 'Running Segment', and 'Force'. The table contains two rows: '1' with 'Force 0.0200 N' and '2' with 'Ramp 5.00 °C/'.

#	Running Segment
1	Force 0.0200 N
2	Ramp 5.00 °C/

# TMA Q400校正操作步驟示範

11、點選Procedure進入實驗方法設定：

(a)設定起始溫度為常溫狀態。

(b)加熱速率和爾後實驗者中所需相同，一直加熱到  
300°C。

Ext.Method：

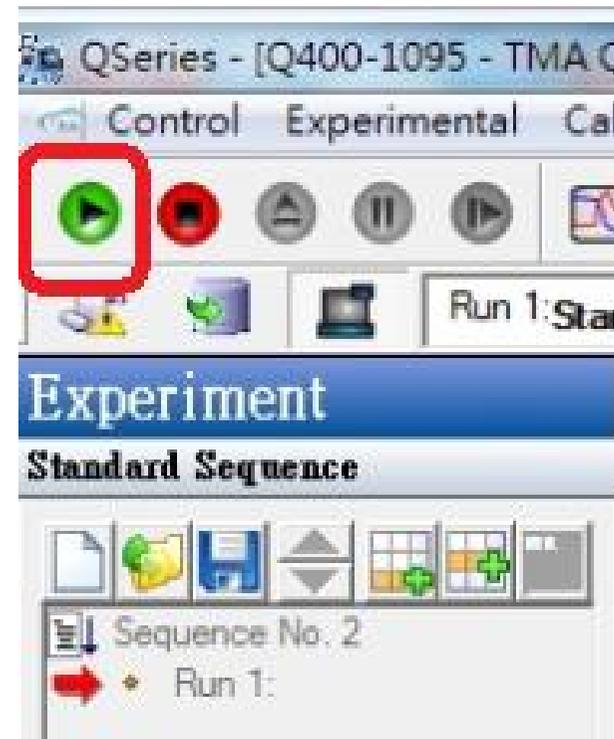
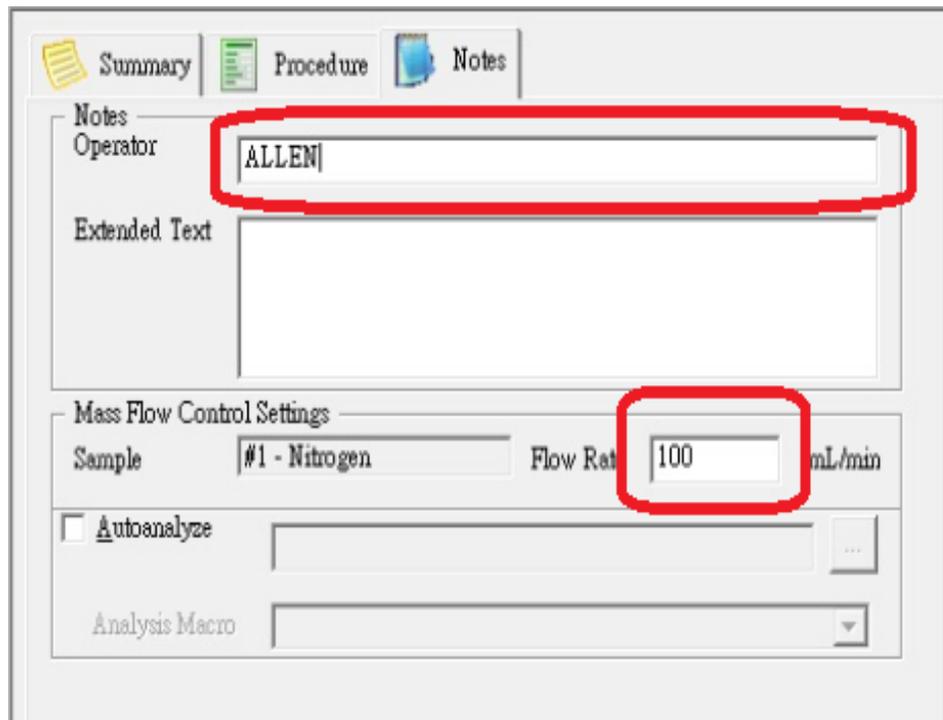
Applied Force 0.05N

1.Equilibrate at 30°C

2.Ramp 10°C/min to 300°C

# TMA Q400校正操作步驟示範

- 12、接著點選Notes，輸入操作者，並且把它調整為所需的流量(100 mL/min)。
- 13、按下開始鍵啟動校正實驗，並且等待實驗完畢。



# TMA Q400校正操作步驟示範

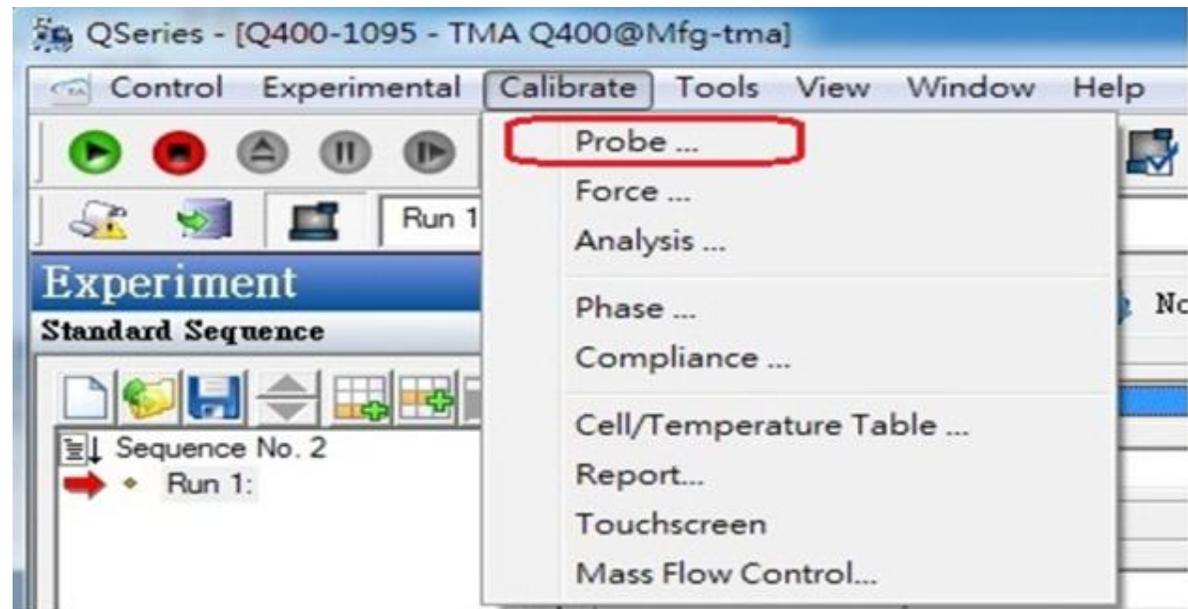
- TMA 溫度校正

- 此校正正是用來校正儀器溫度的準確性，並且完成溫度校正後，實驗的結果會自動輸入溫度校正表中。
- 注意：多點校正會比單點校正更精確，最多可校正5種不同的金屬校正溫度點。
- 單點校正會把樣品溫度調整一個固定量。
- 二個以上的溫度校正時，第一點會以固定量調整，在中間的校正點間會使用最小平方曲線做校正調整，最後一個點也是以固定量調整。

# TMA Q400校正操作步驟示範

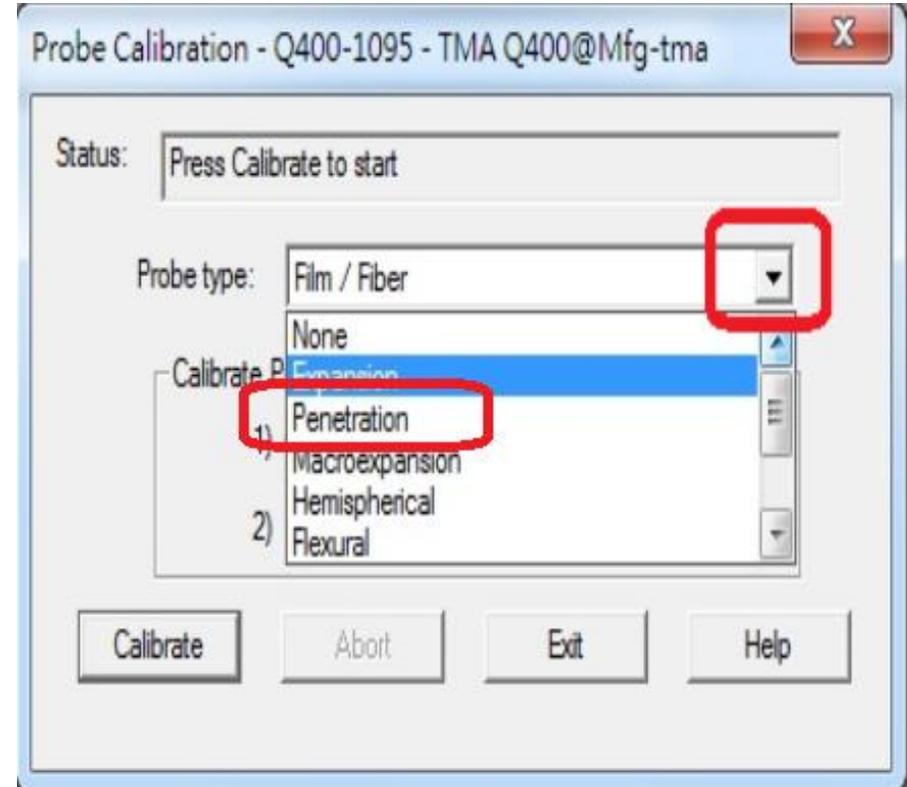
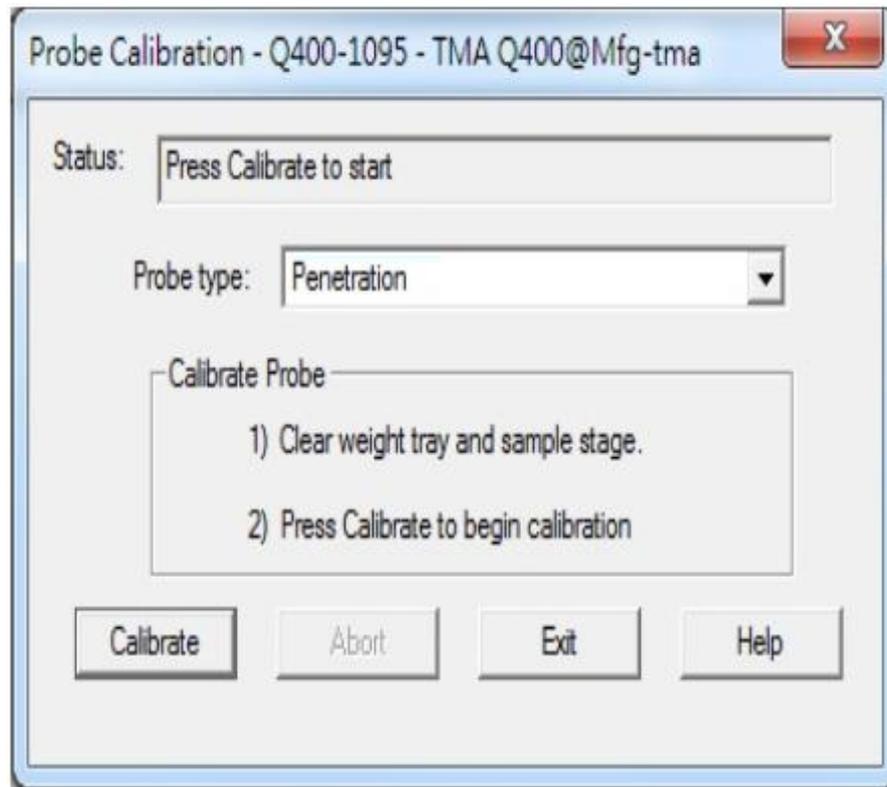
溫度校正步驟如下：

- 1、做溫度校正前必須先換成穿透探針，並且完成探針校正步驟。
- 2、點選工具列中Calibrate並在下拉式功能表中選擇probe功能。



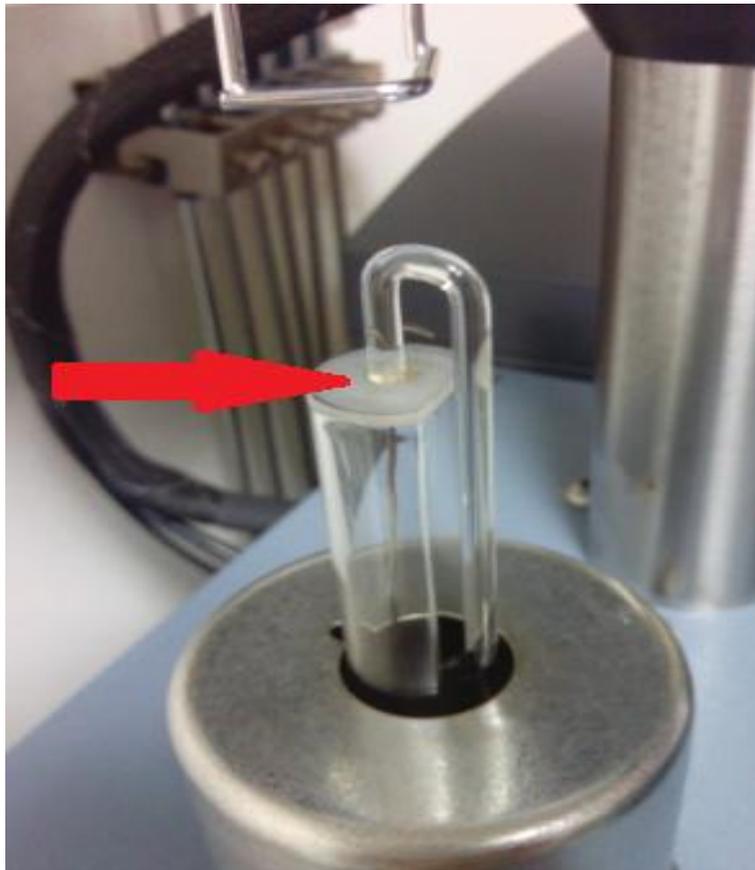
# TMA Q400校正操作步驟示範

- 3、從下拉式選項中選擇Penetration(穿透探針)，並且依照說明把樣品平台和砝碼盤上物品清除。



# TMA Q400校正操作步驟示範

樣品平檯

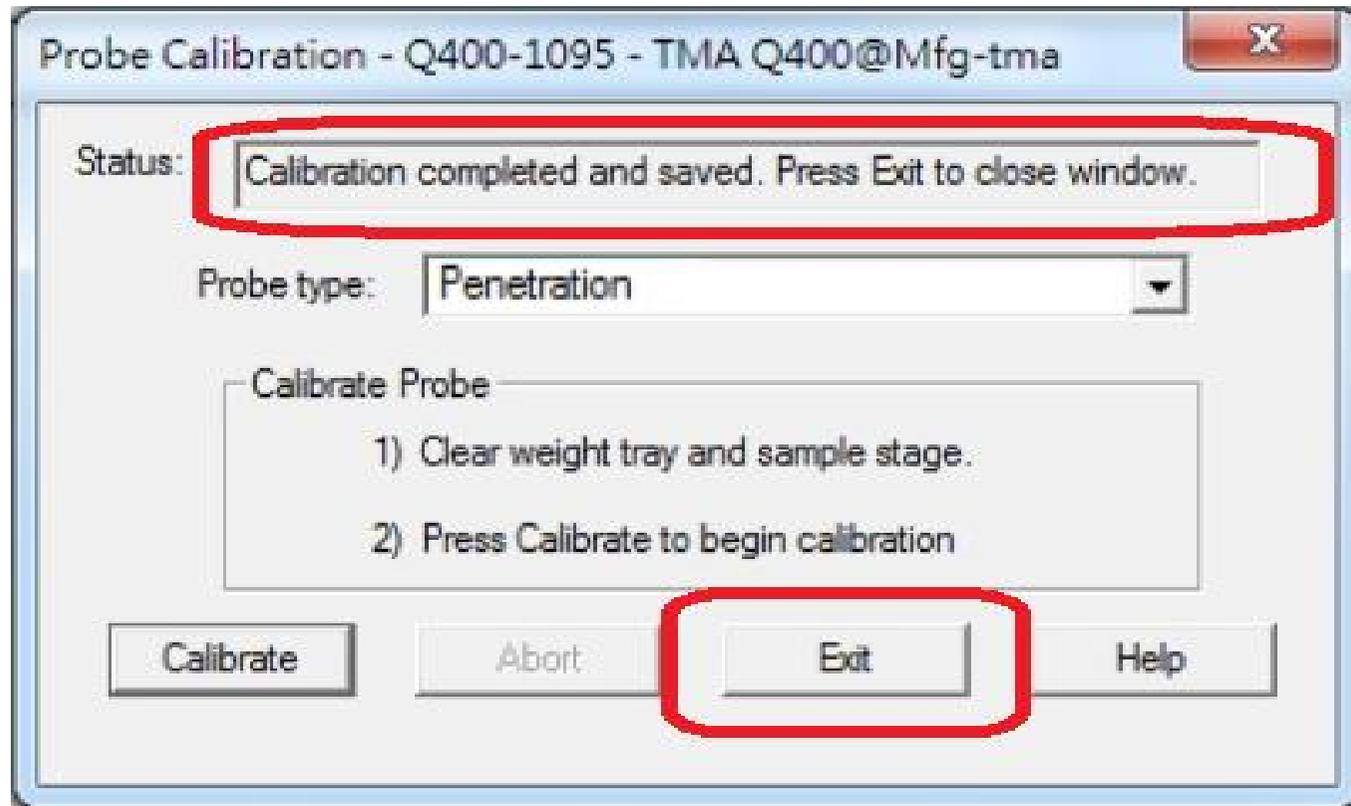


砝碼盤



# TMA Q400校正操作步驟示範

- 4、確認之後選擇Calibrate鍵繼續執行探針校正，當儀器內自我校正完成之後，會有一個訊息顯示提示你是否已成功的完成探針校正。



# TMA Q400校正操作步驟示範

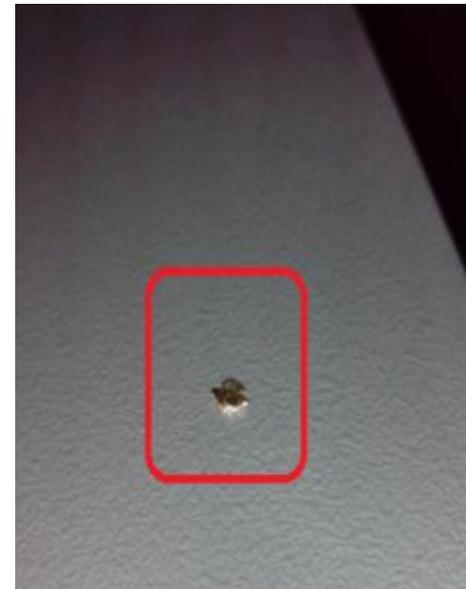
5、選擇已知熔點(例：鈹和鋅)通常會選擇標準金屬的溫度熔點，是必須通過平常所測試的實驗範圍，若溫度範圍廣時，可能就必須準備多個標準金屬，這些標準金屬的熔點相隔至少 $10^{\circ}\text{C}$ 。

6、用TMA 觸碰面板上的尺寸歸零(ZERO LENGTH) 鍵做探針歸零。



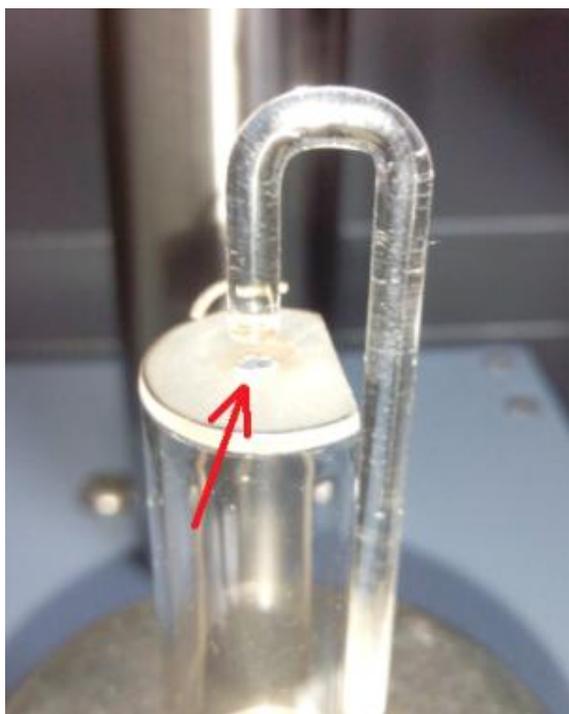
# TMA Q400校正操作步驟示範

- 7、取出TMA標準配件盒內的小罐銦金屬，並且用鑷子取出一塊金屬，直接用鑷子切除一小塊金屬樣品，並且輾平備用。



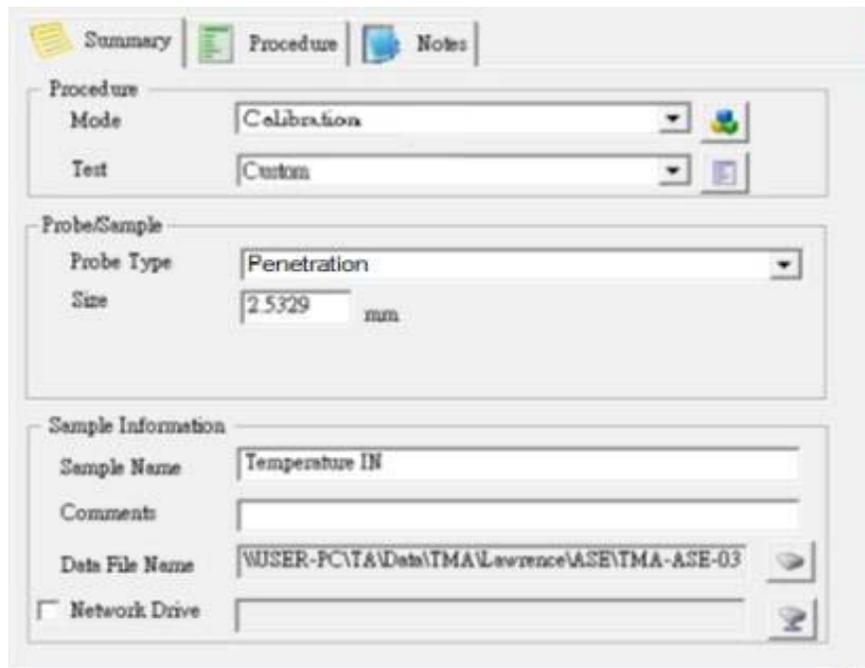
## TMA Q400校正操作步驟示範

- 8、接著把鋼金屬平放至Stage上，並且把熱電偶的位子盡量靠近樣品，另外，為了執行一個良好的校正，熱電偶的前端盡量平躺貼近樣品。



# TMA Q400校正操作步驟示範

- 9、按下TMA 面板上的尺寸量測(MEASURE LENGTH)鍵等待儀器測量尺寸完成。



- 10、接著在Sample Information 內把檔案名稱，檔案路徑輸入完成。

# TMA Q400校正操作步驟示範

11、點選Procedure進入實驗方法設定：

(a)在標準品材料的開始熔點之下50°C 達到平衡，

(b)加熱速率和爾後實驗者中所需相同，一直加熱到設定溫度上限以上約50°。

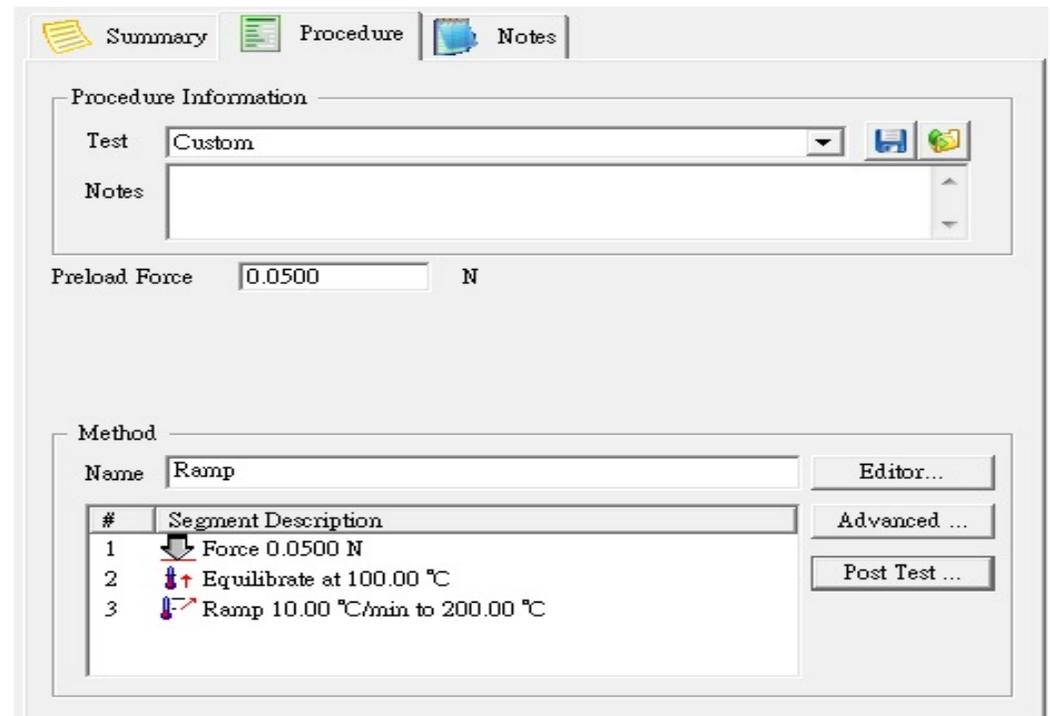
Ext Method：

Indium 銻  $T_m=156.61^\circ\text{C}$

Applied Force 0.05N

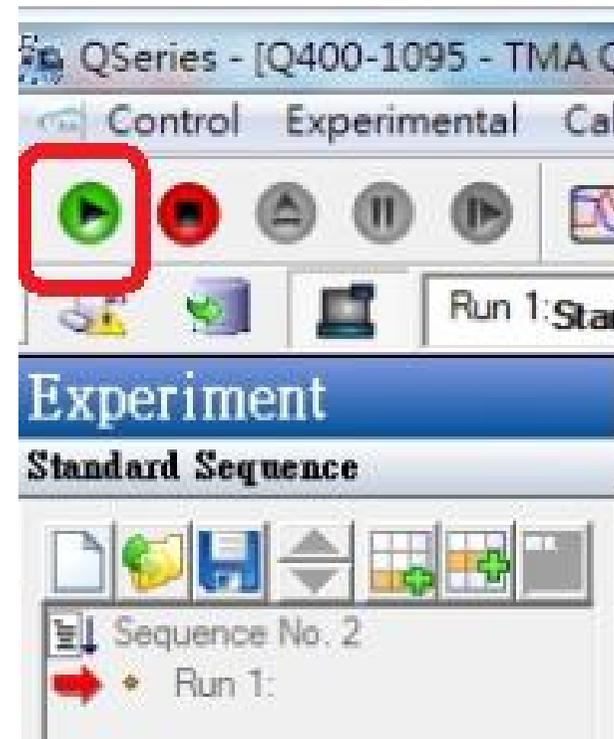
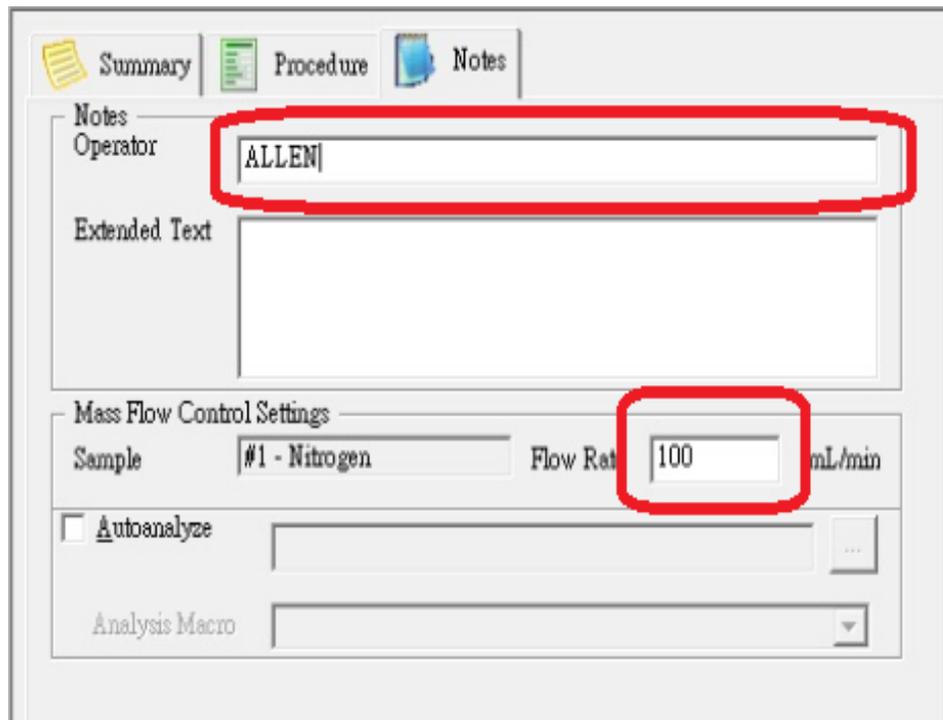
1.Equilibrate at  $100^\circ\text{C}$

2.Ramp  $10^\circ\text{C}/\text{min}$  to  $200^\circ\text{C}$



# TMA Q400校正操作步驟示範

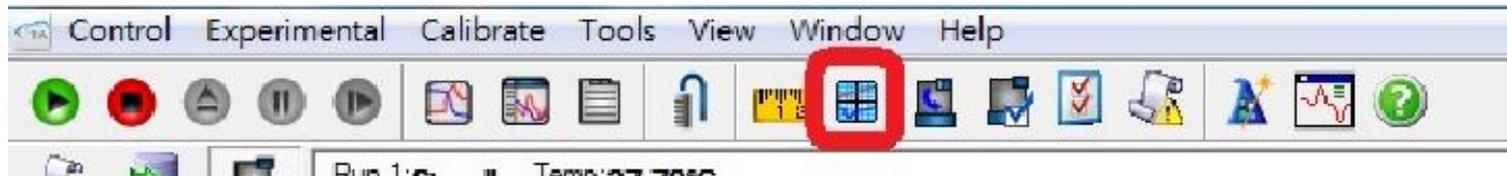
- 12、接著點選Notes，輸入操作者，並且把它調整為所需的流量(100 mL/min)。
- 13、按下開始鍵啟動校正實驗，並且等待實驗完畢。



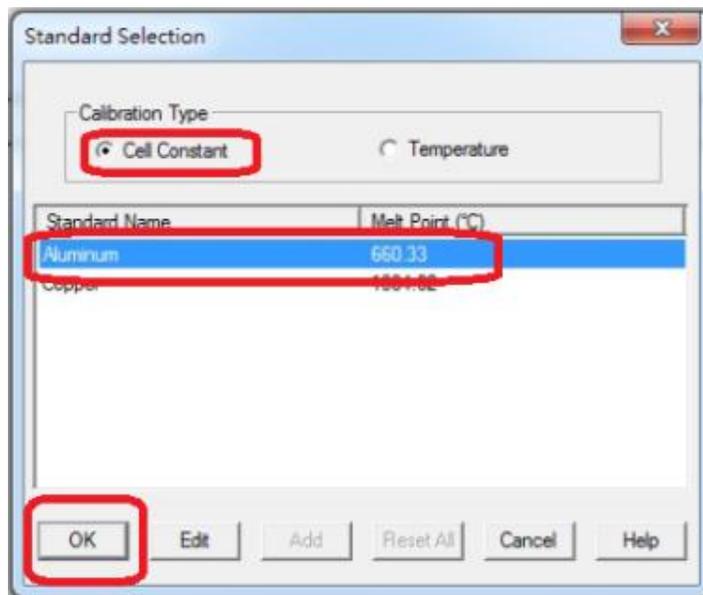
# TMA Q400校正操作步驟示範

校正分析數據步驟如下：

1、點選校正分析程序按鍵。

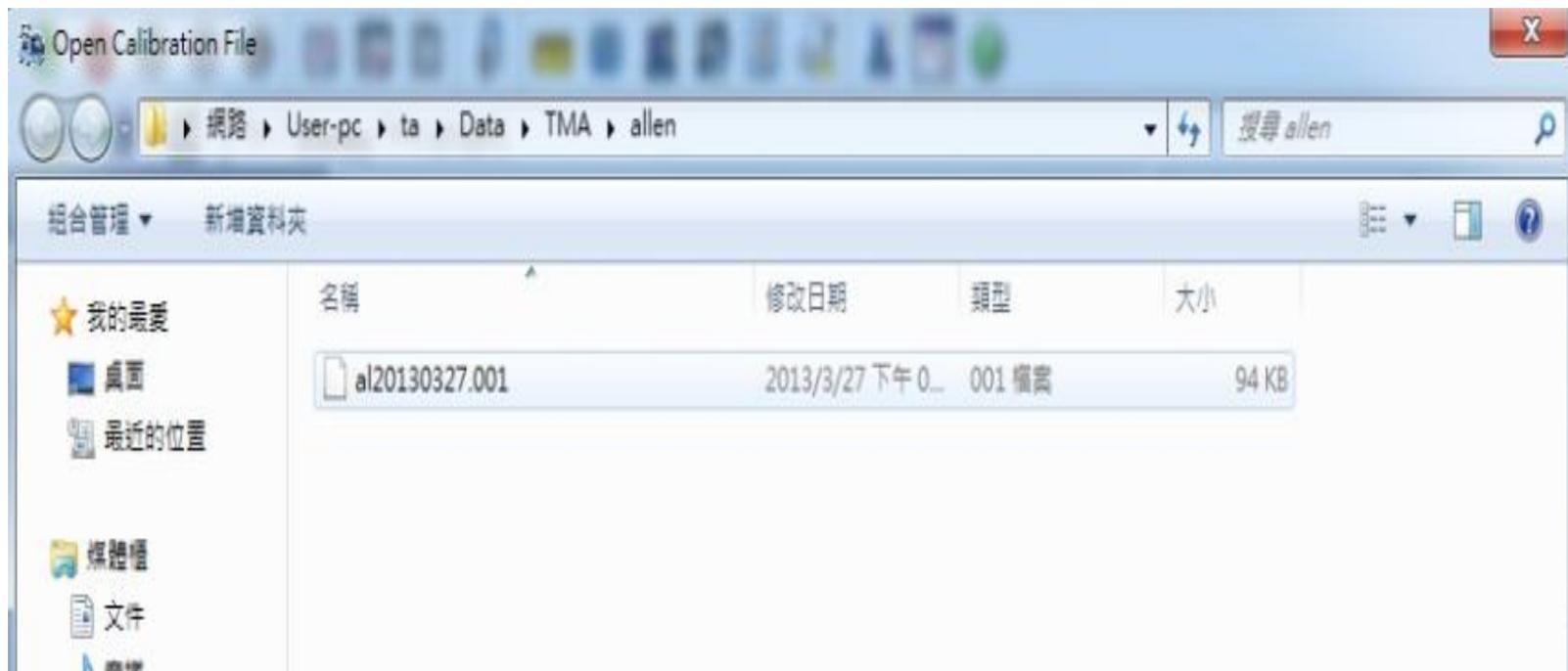


2、校正視窗出現後，請選擇“Cell Constant”後再點選ok



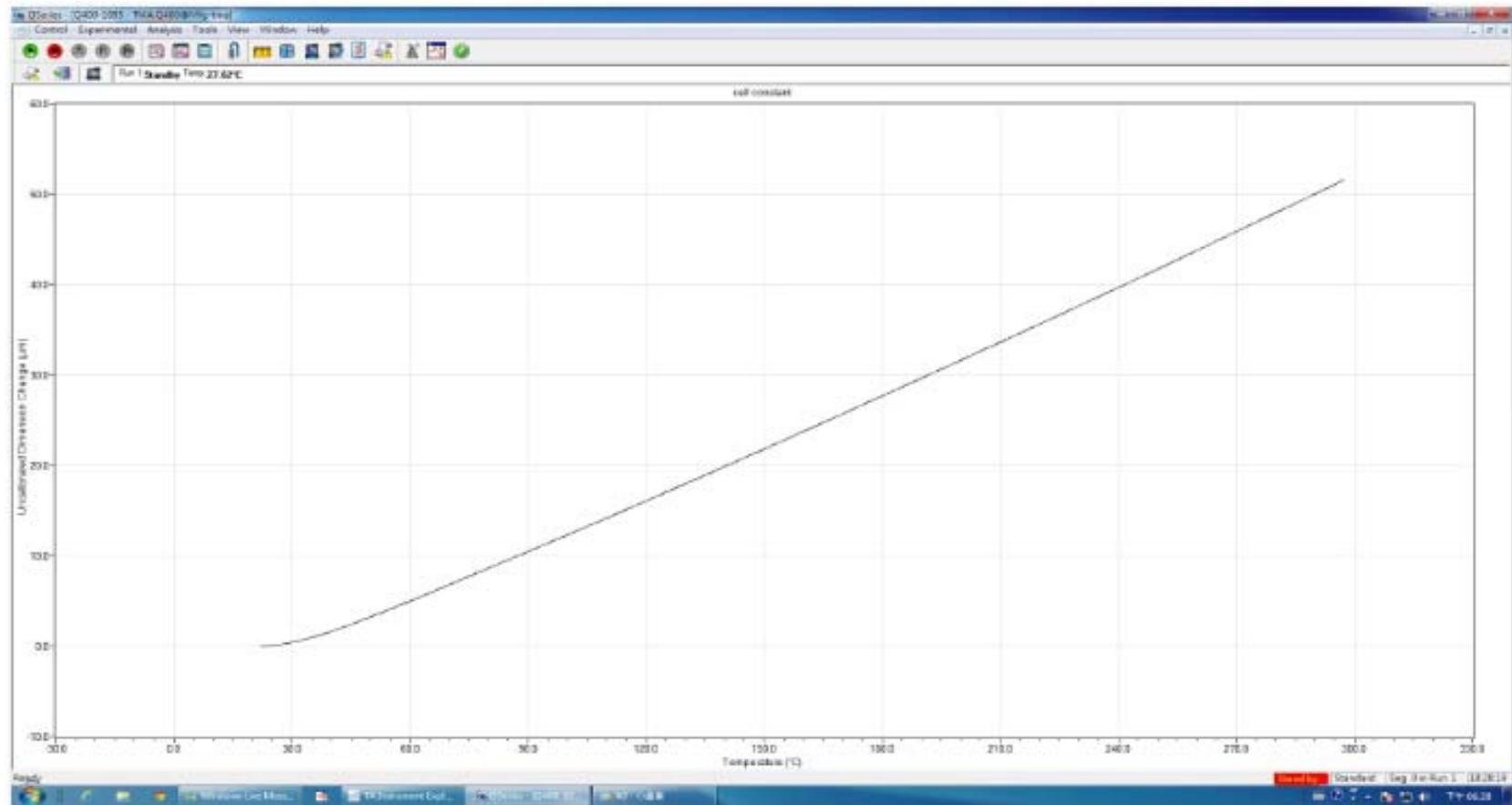
# TMA Q400校正操作步驟示範

- 3、此時軟體會開啟校正檔案，去選擇當初做爐子常數的校正檔案後選擇開啟舊檔。



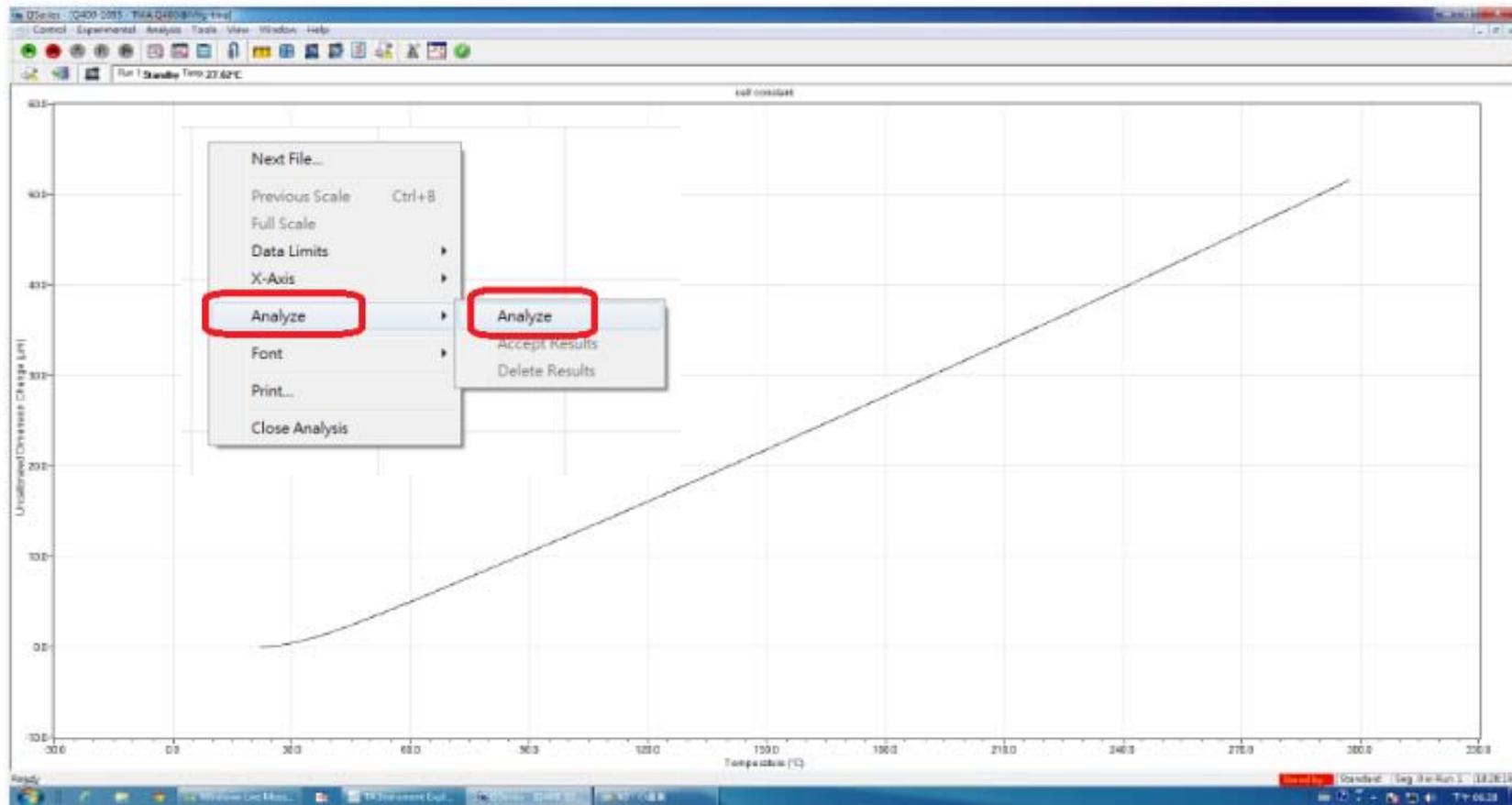
# TMA Q400校正操作步驟示範

4、此時校正分析視窗會開啟全畫面。



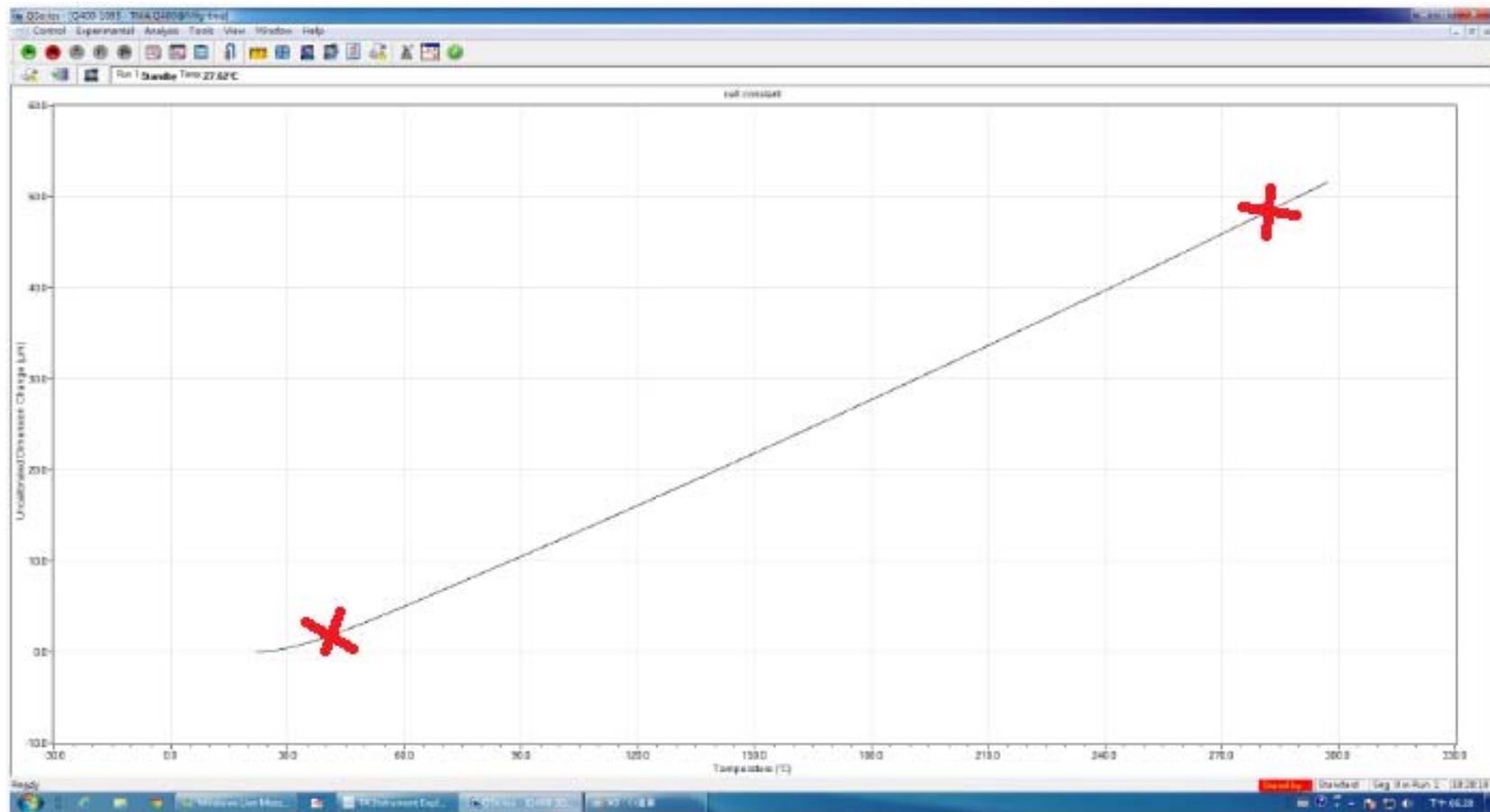
# TMA Q400校正操作步驟示範

- 5、此時在畫面的空白處，按滑鼠右鍵，會出現一個視窗，點選Analyze後，再點選Analyze去做圖表分析。



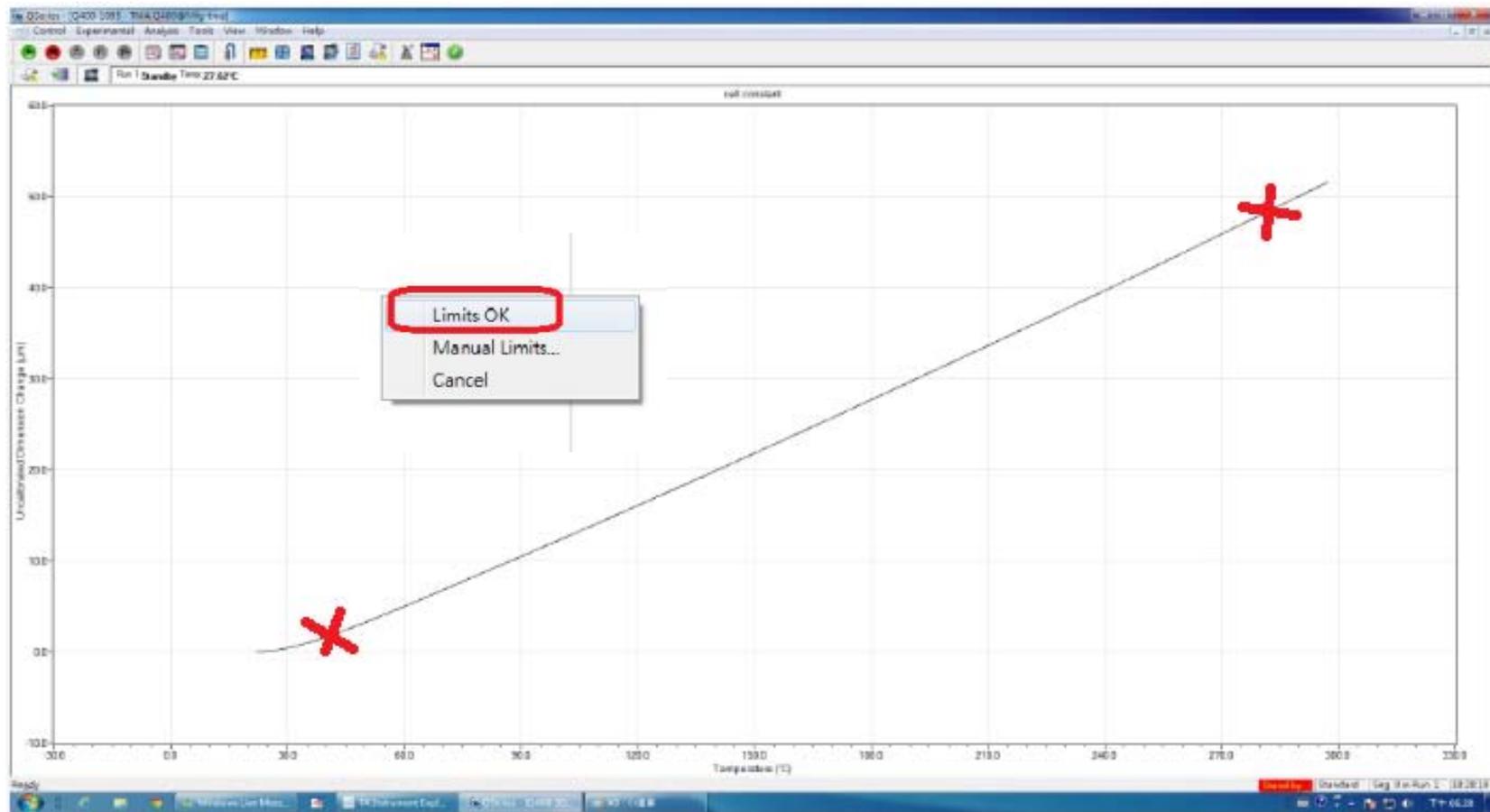
# TMA Q400校正操作步驟示範

6、接著在這條斜線上的頭尾會出現兩個紅色十字符號。



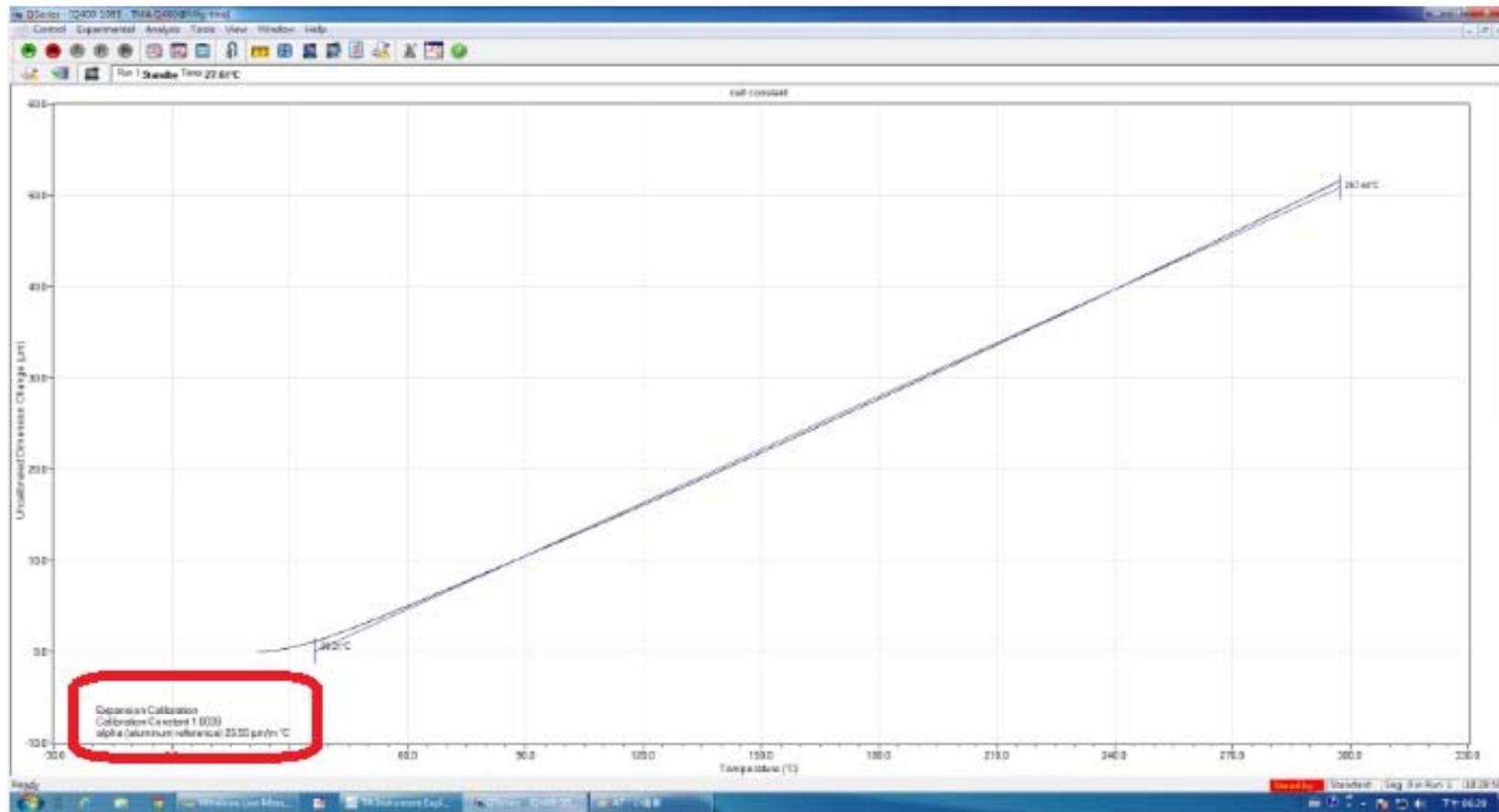
# TMA Q400校正操作步驟示範

- 7、接著仍然在畫面的空白處按滑鼠右鍵，此時會出現一個確認視窗，點選Limits OK。



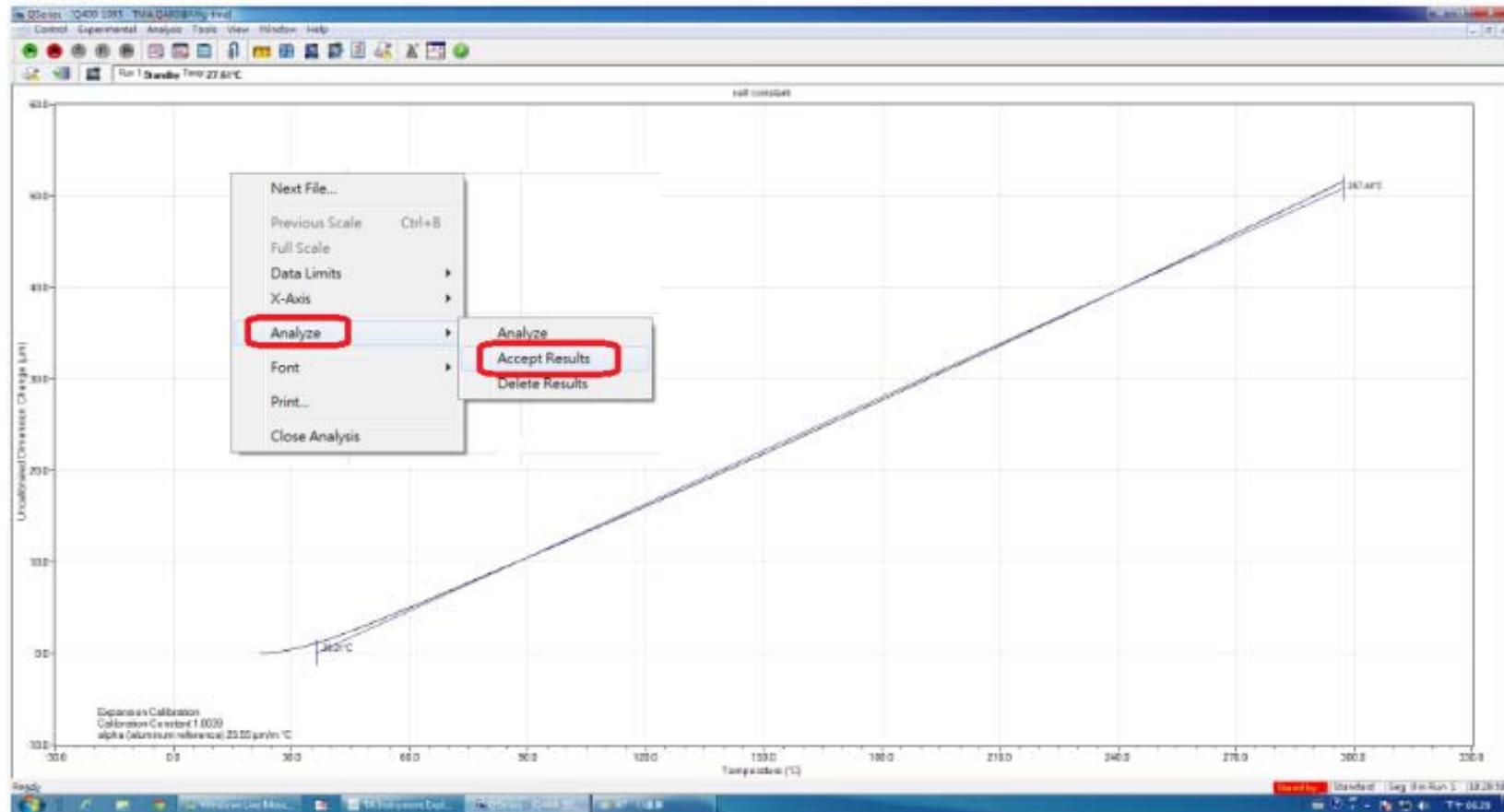
# TMA Q400校正操作步驟示範

8、此時儀器會自動換算爐子常數的數據和膨脹值。



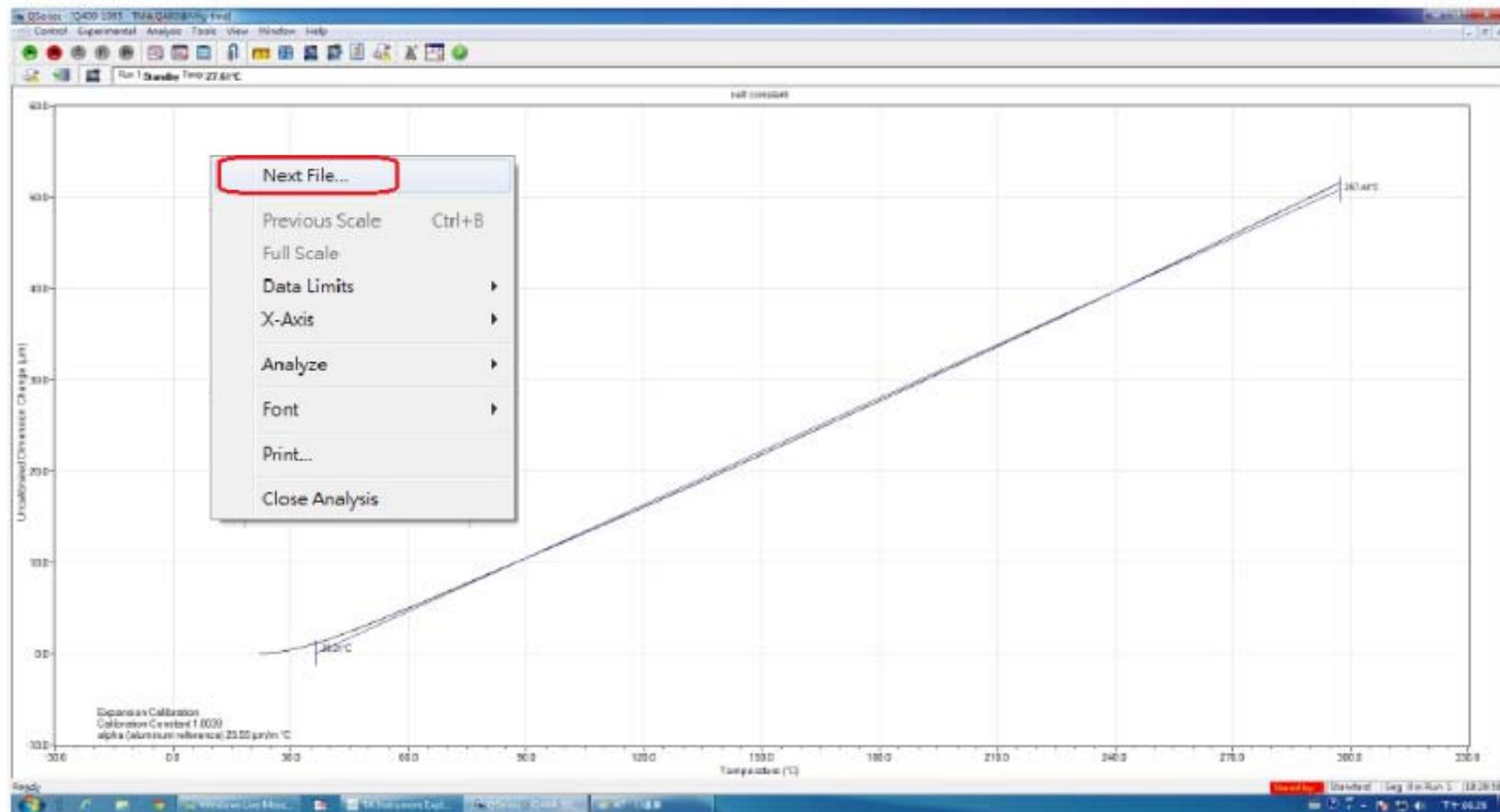
# TMA Q400校正操作步驟示範

- 9、校正數據顯示後，再把滑鼠移到空白處點選滑鼠右鍵，在這個小視窗上點選Analyze，在選擇Accept Results。



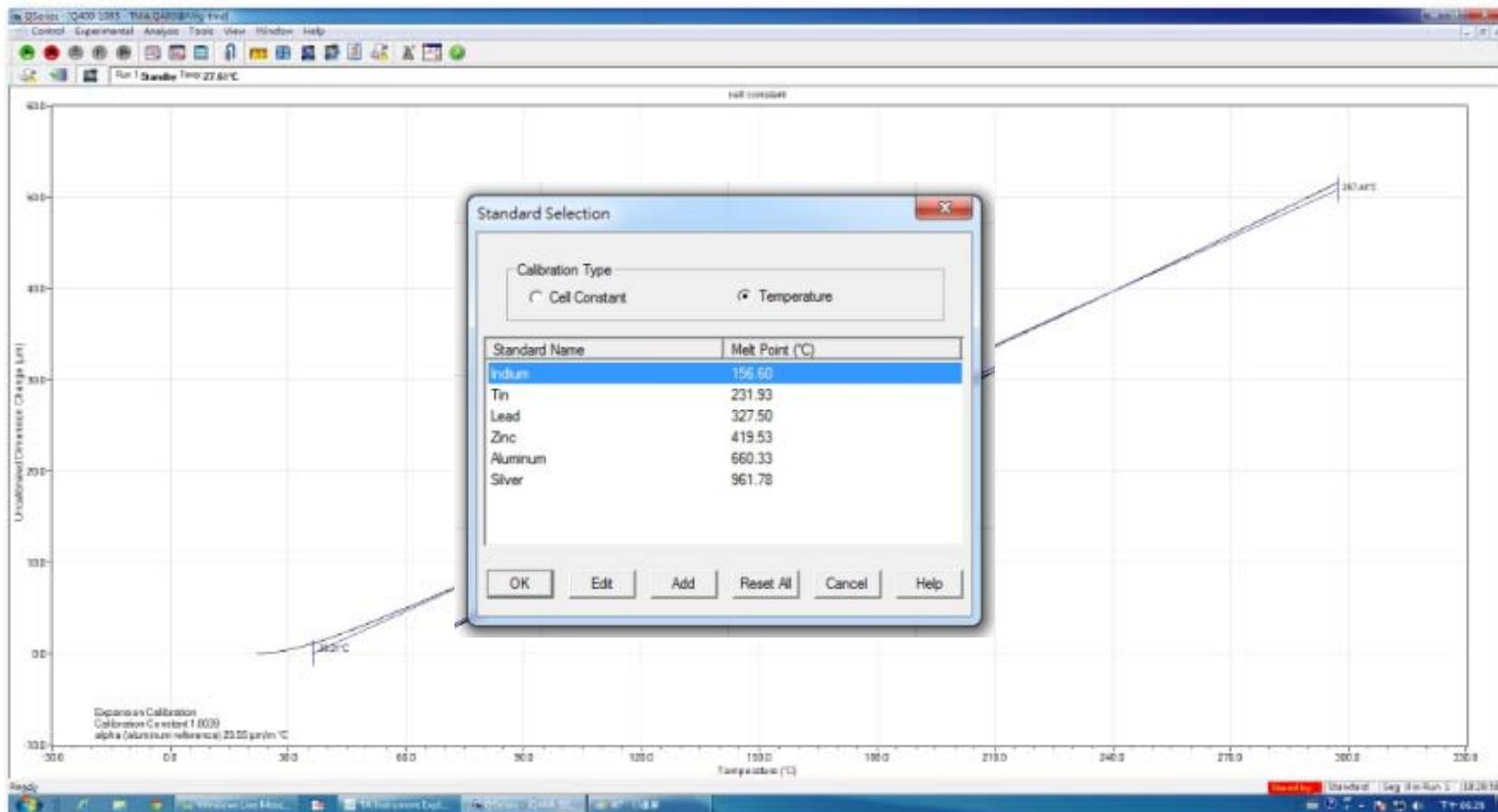
# TMA Q400校正操作步驟示範

10、接下來我們要完成溫度校正分析，同樣把滑鼠移到空白處點選滑鼠右鍵，在這個視窗上選Next File。



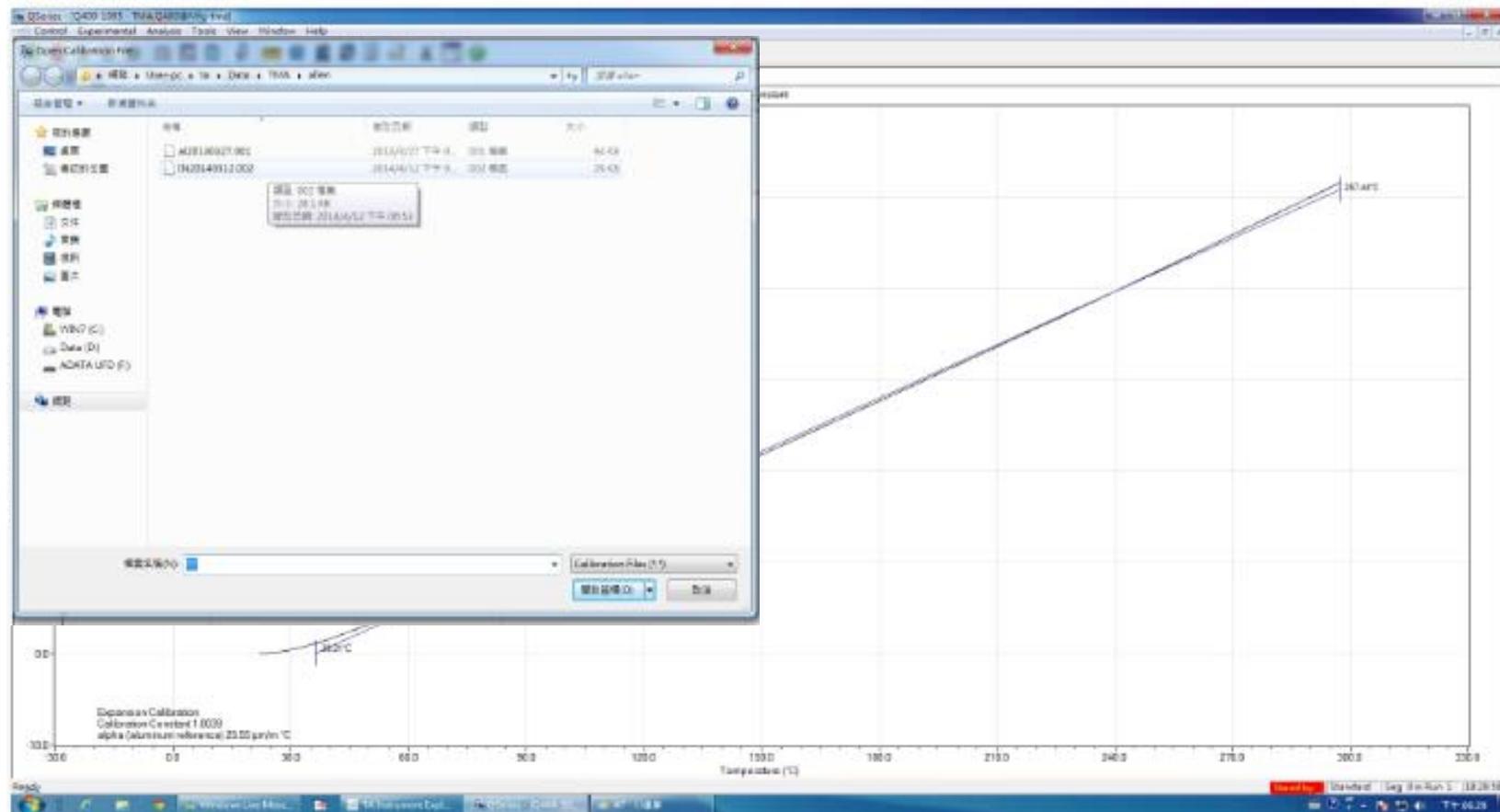
# TMA Q400校正操作步驟示範

- 11、接著選擇Temperature，再點選目前所做的金屬名稱，完成之後點選ok。



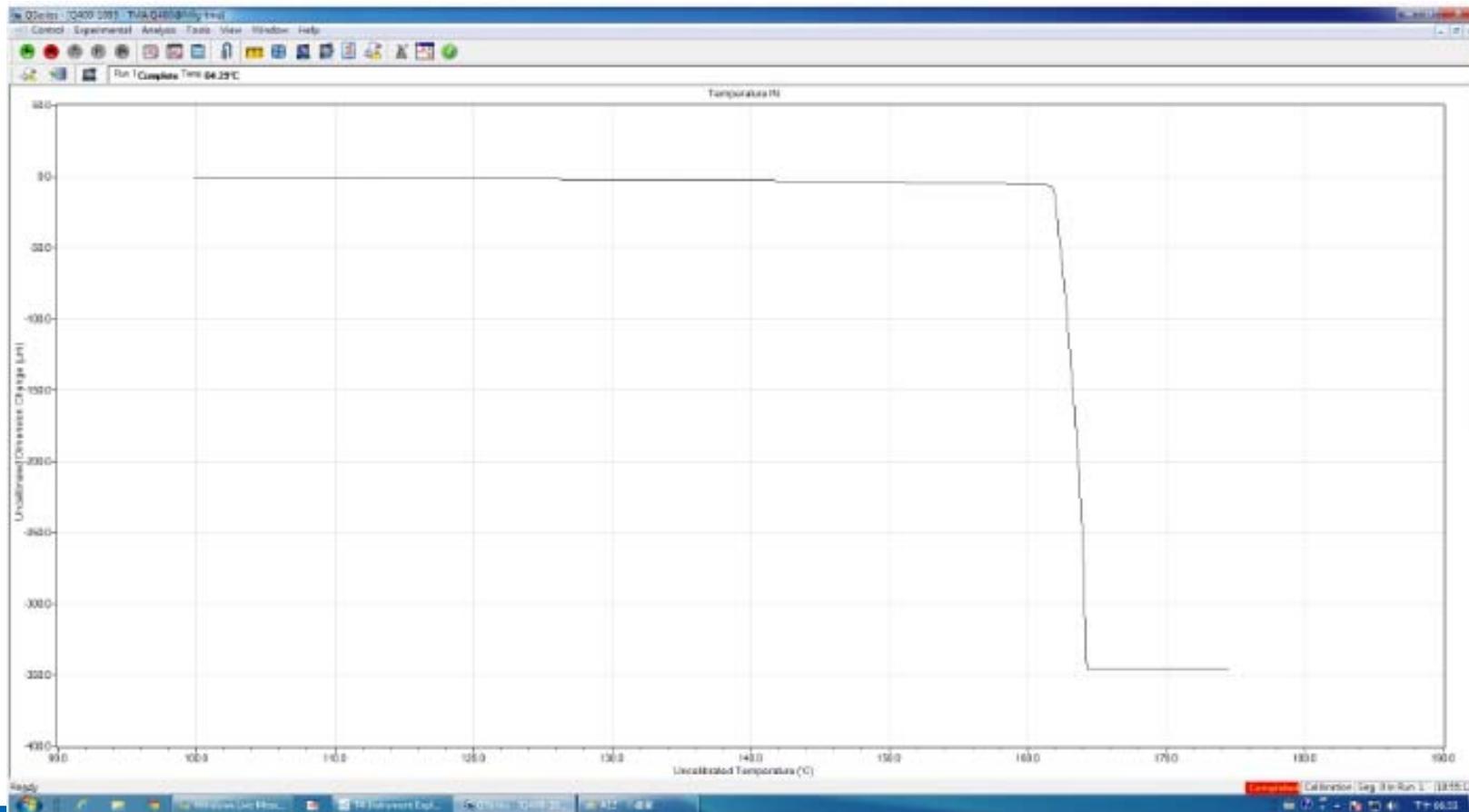
# TMA Q400校正操作步驟示範

12、此時軟體會開啟校正檔案，去選擇當初做溫度校正輸入的檔案名稱後選擇開啟舊檔。



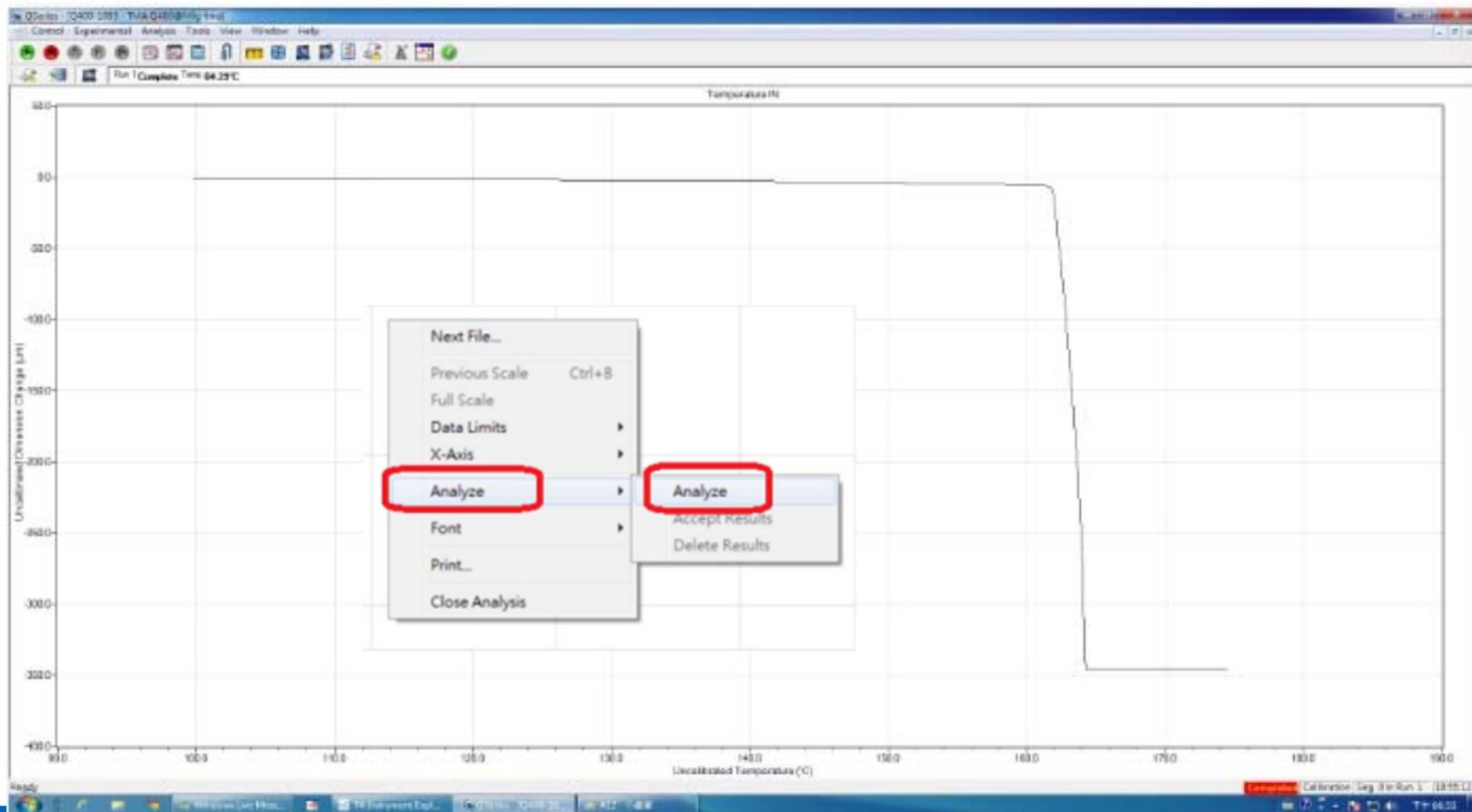
# TMA Q400校正操作步驟示範

13、此時當初做的溫度校正圖形，就會開啟全視窗畫面模式。



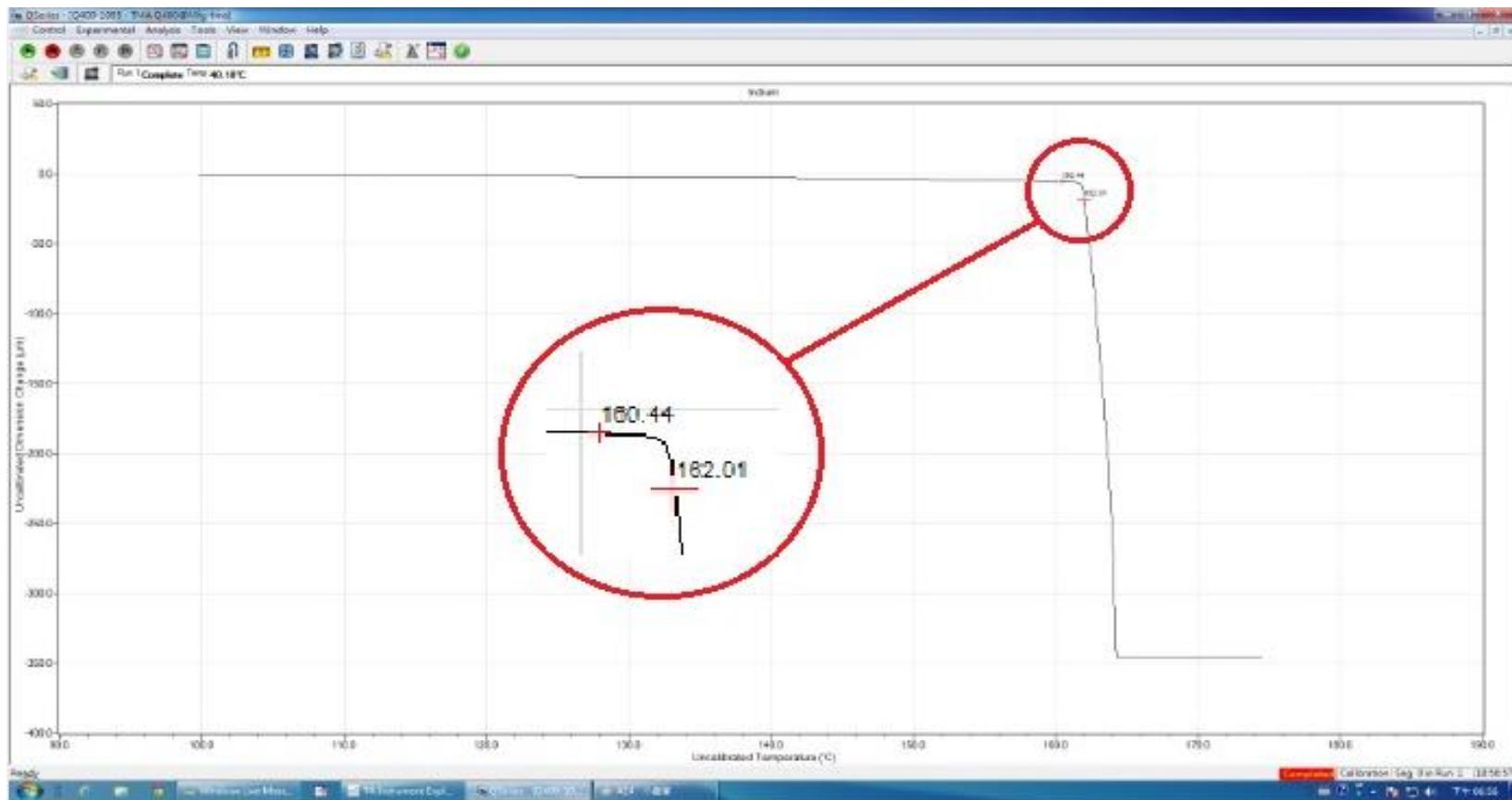
# TMA Q400校正操作步驟示範

14、此時在畫面的空白處，按滑鼠右鍵，會出現一個視窗點選Analyze後，再點選Analyze去做圖表分析。



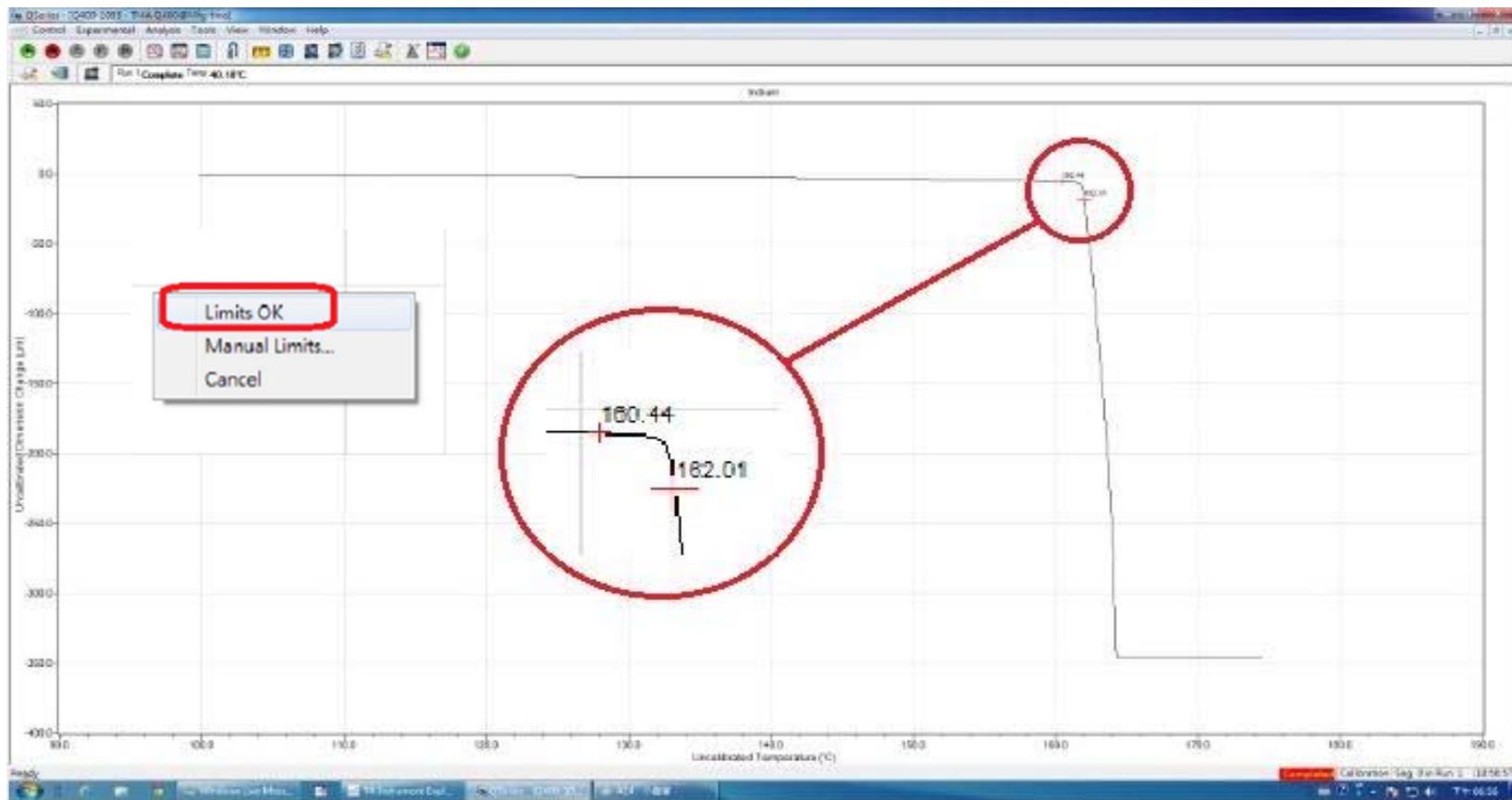
# TMA Q400校正操作步驟示範

15、接著在這個溫度的轉折點前後各標上一個點。



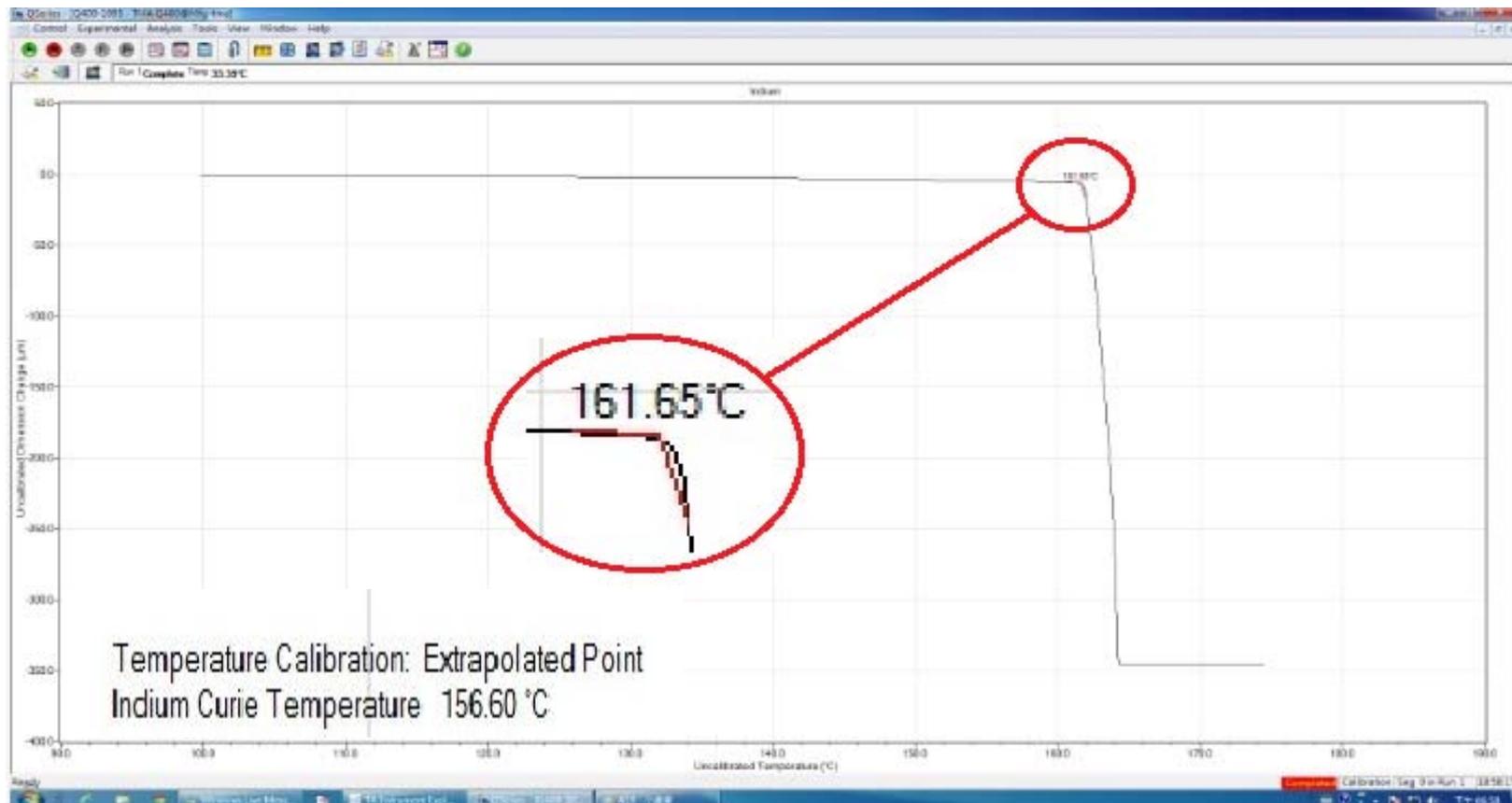
# TMA Q400校正操作步驟示範

- 16、接著仍然在畫面的空白處按滑鼠右鍵，此時會出現一個確認視窗，點選Limits OK。



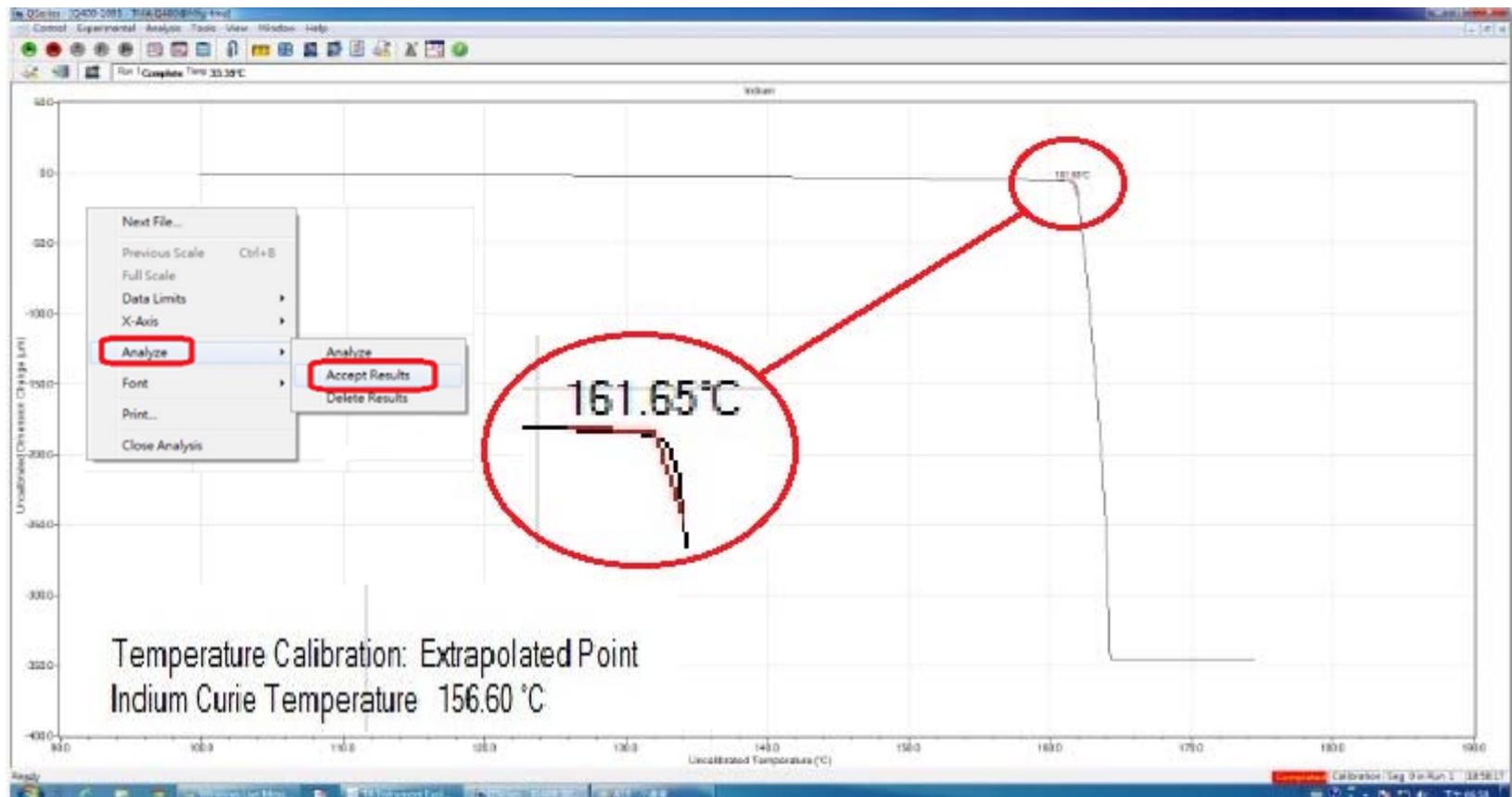
# TMA Q400校正操作步驟示範

17、此時儀器會自動標註轉折溫度點，並且做修正的動作。



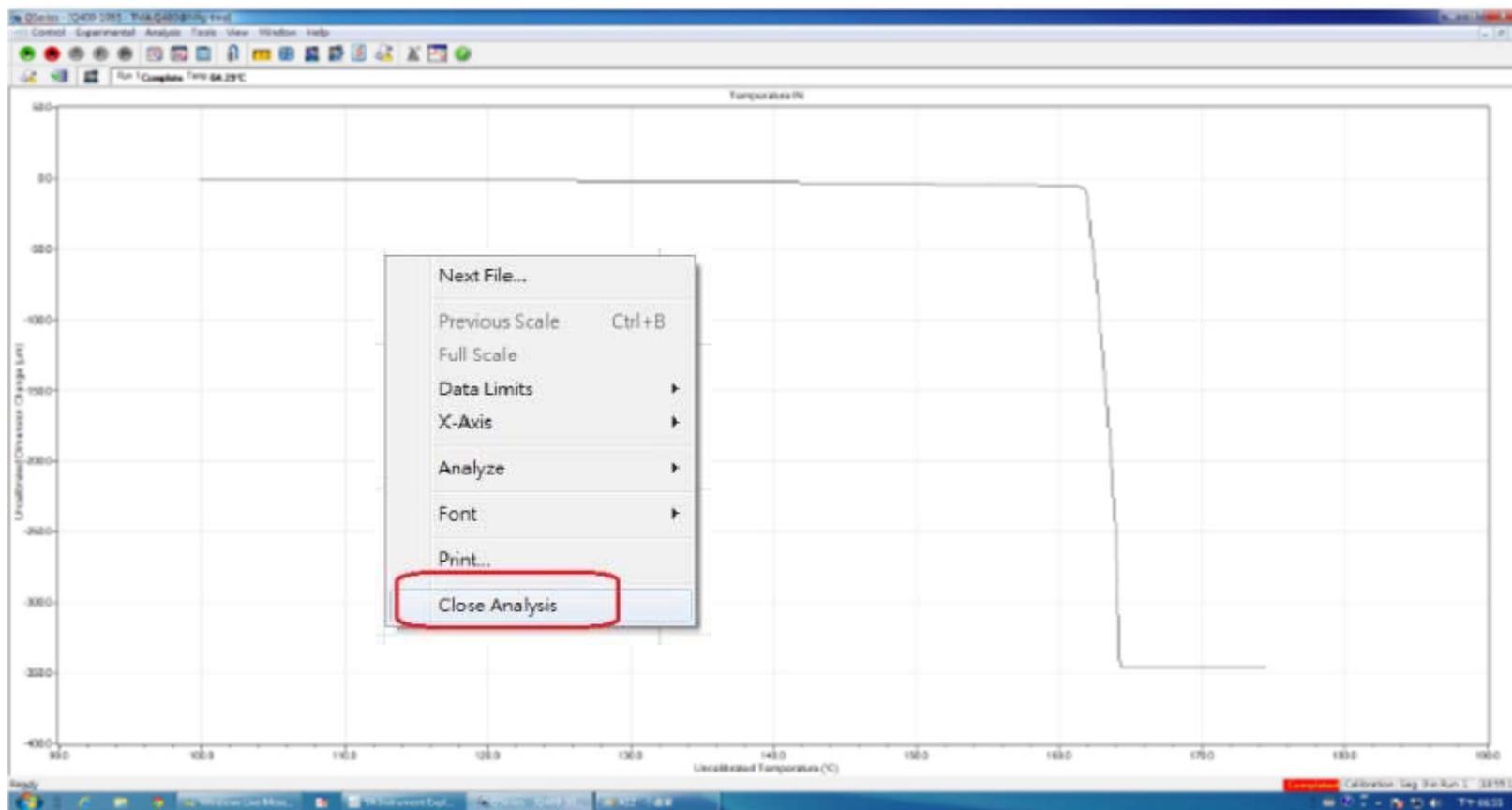
# TMA Q400校正操作步驟示範

- 18、校正數據顯示後，再把滑鼠移到空白處點選滑鼠右鍵，在這個小視窗上點選Analyze，在選擇Accept Results。



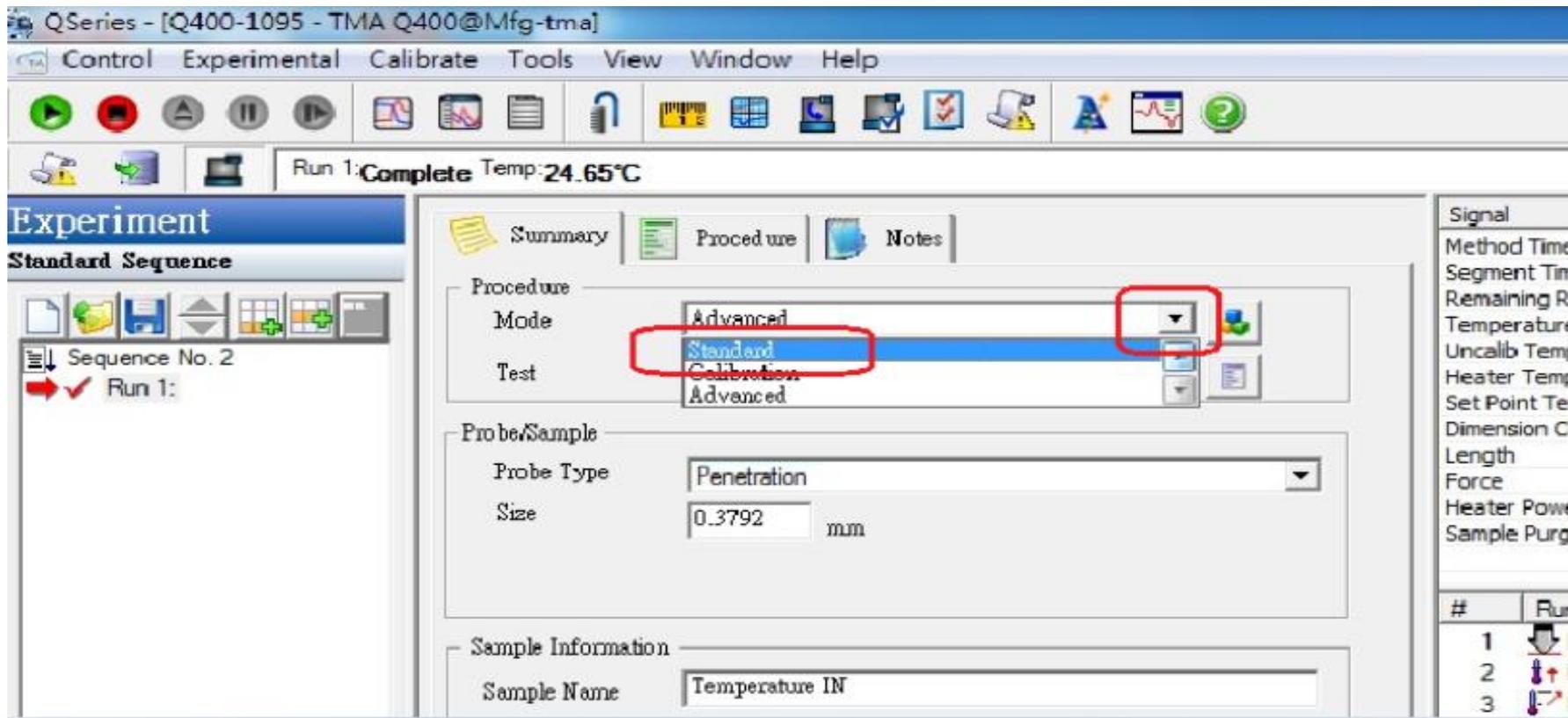
# TMA Q400校正操作步驟示範

19、校正數據接受完成之後，再把滑鼠移到空白處點選滑鼠右鍵，在這個小視窗上點選Close Analysis。



# TMA Q400校正操作步驟示範

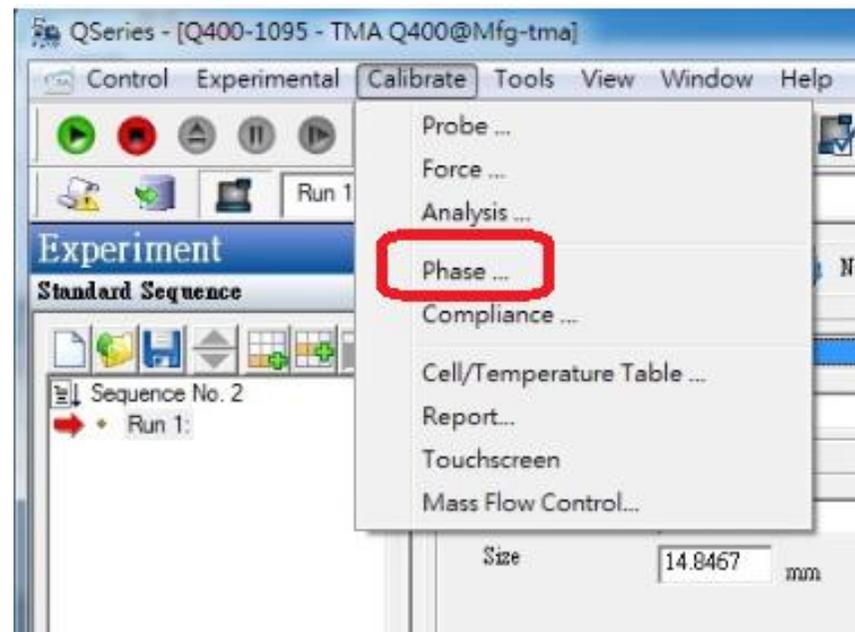
20、此時校正分析軟體會恢復成操作畫面，接著把Mode內切換成標準模式，即可完成所有的校正。



# TMA Q400校正操作步驟示範

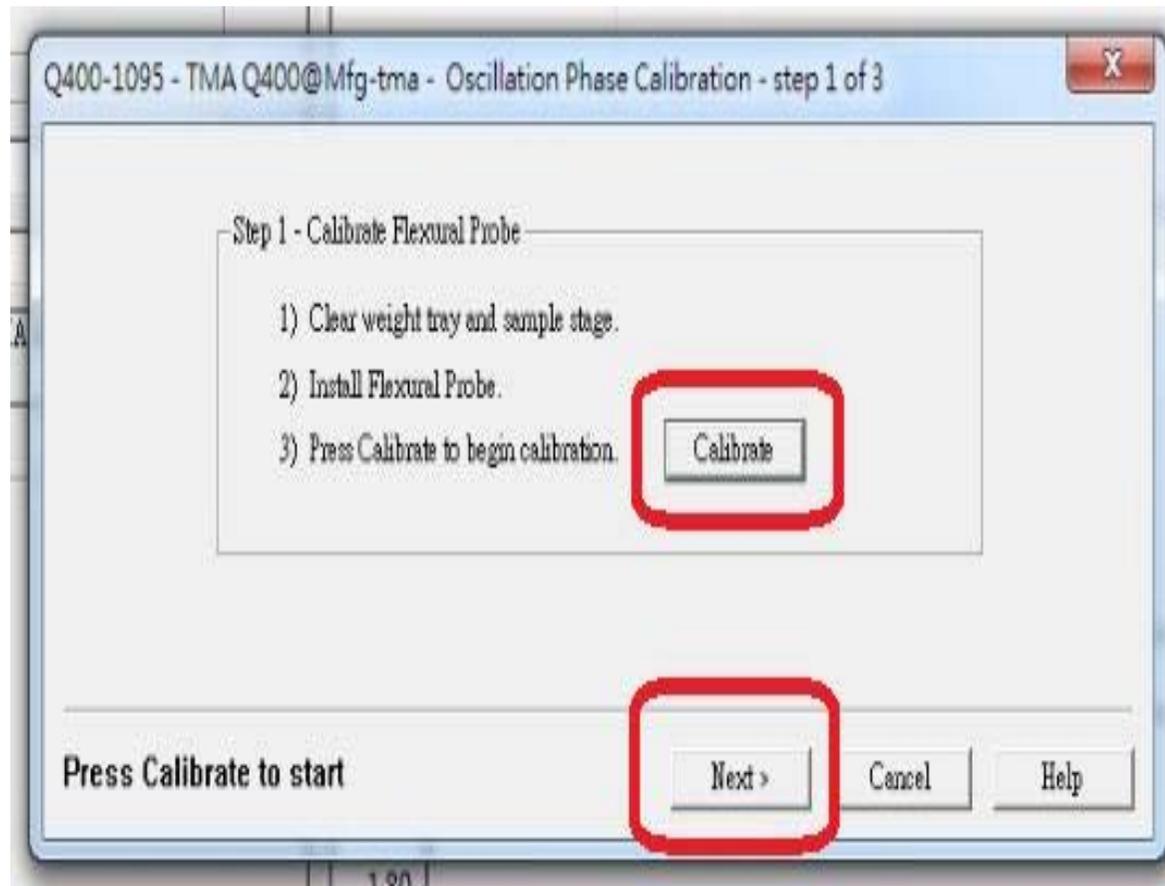
## ■ 振盪相位校正(Phase)

- 1、點選工具列中Calibrate並在下拉式功能表中選擇Phase功能。



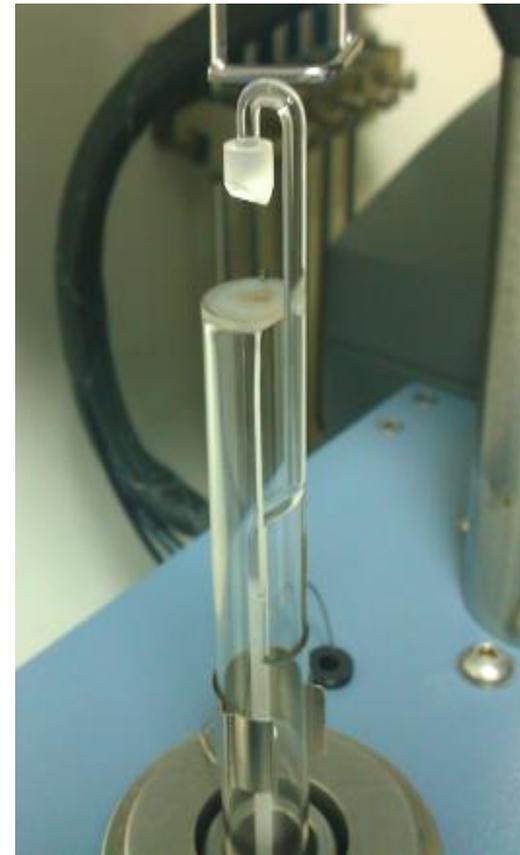
# TMA Q400校正操作步驟示範

2、依照視窗說明把樣品平檯及砝碼盤清除乾淨。



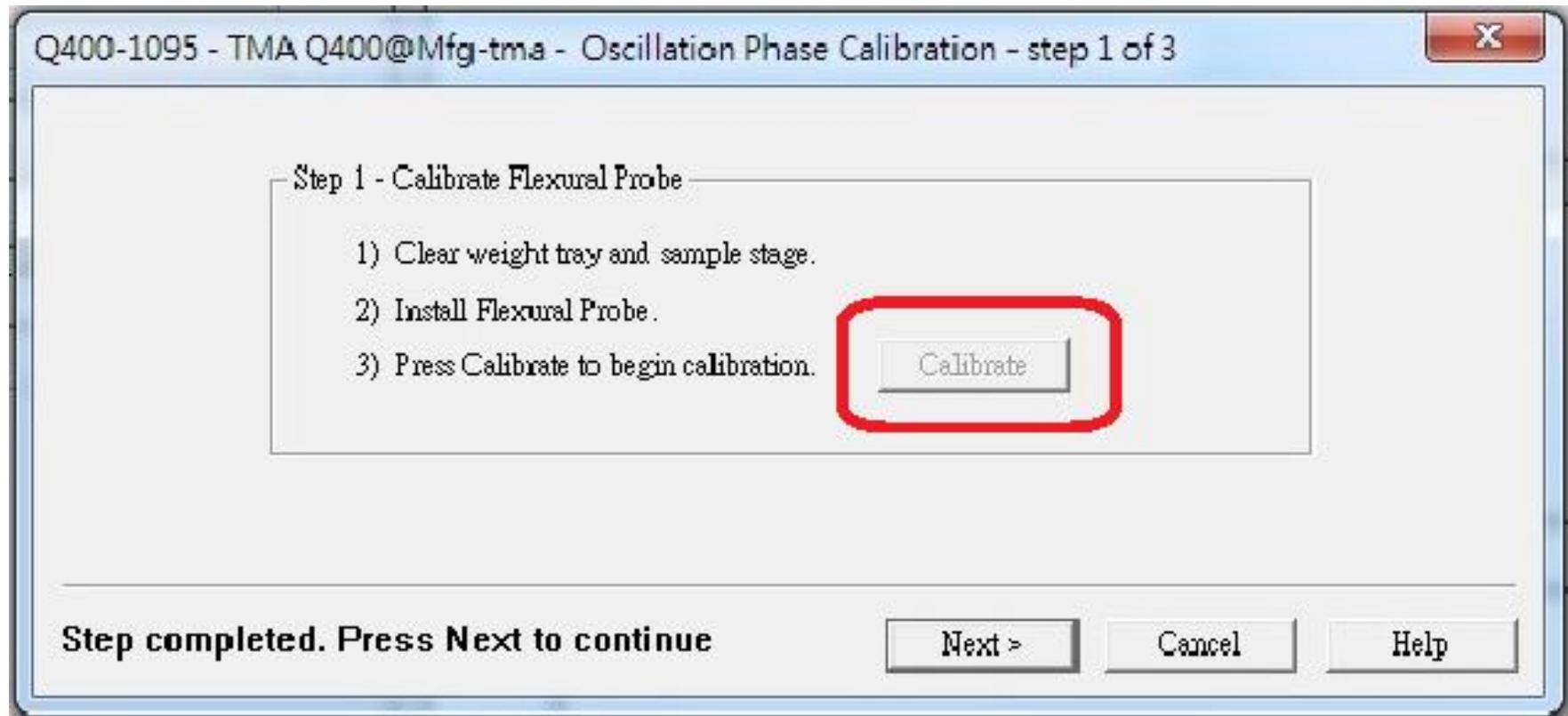
# TMA Q400校正操作步驟示範

3、按照安裝探針方式安裝Flexural Probe。



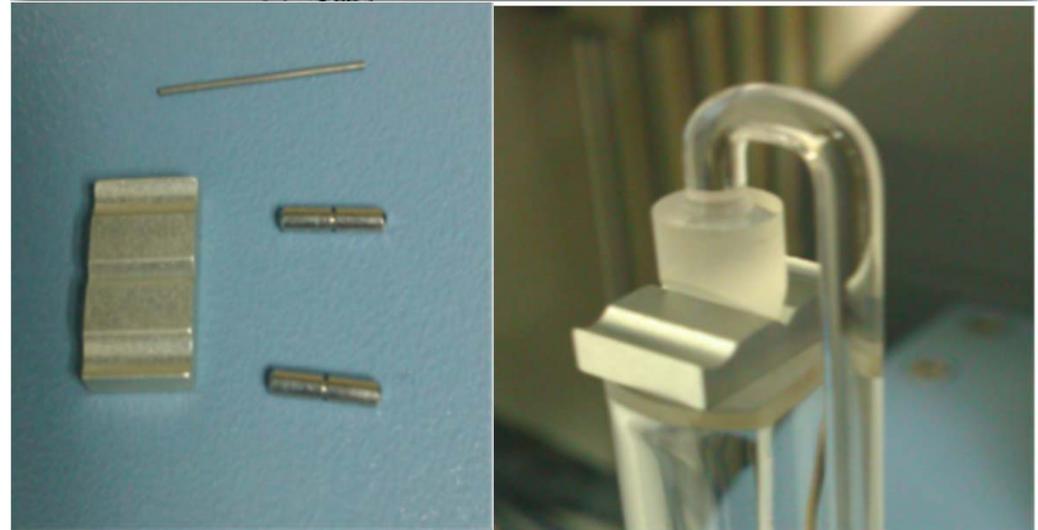
# TMA Q400校正操作步驟示範

- 4、完成安裝動作之後直接點選Calibrate按鍵，等儀器自動完成校正動作後請接著點選Next按鍵。



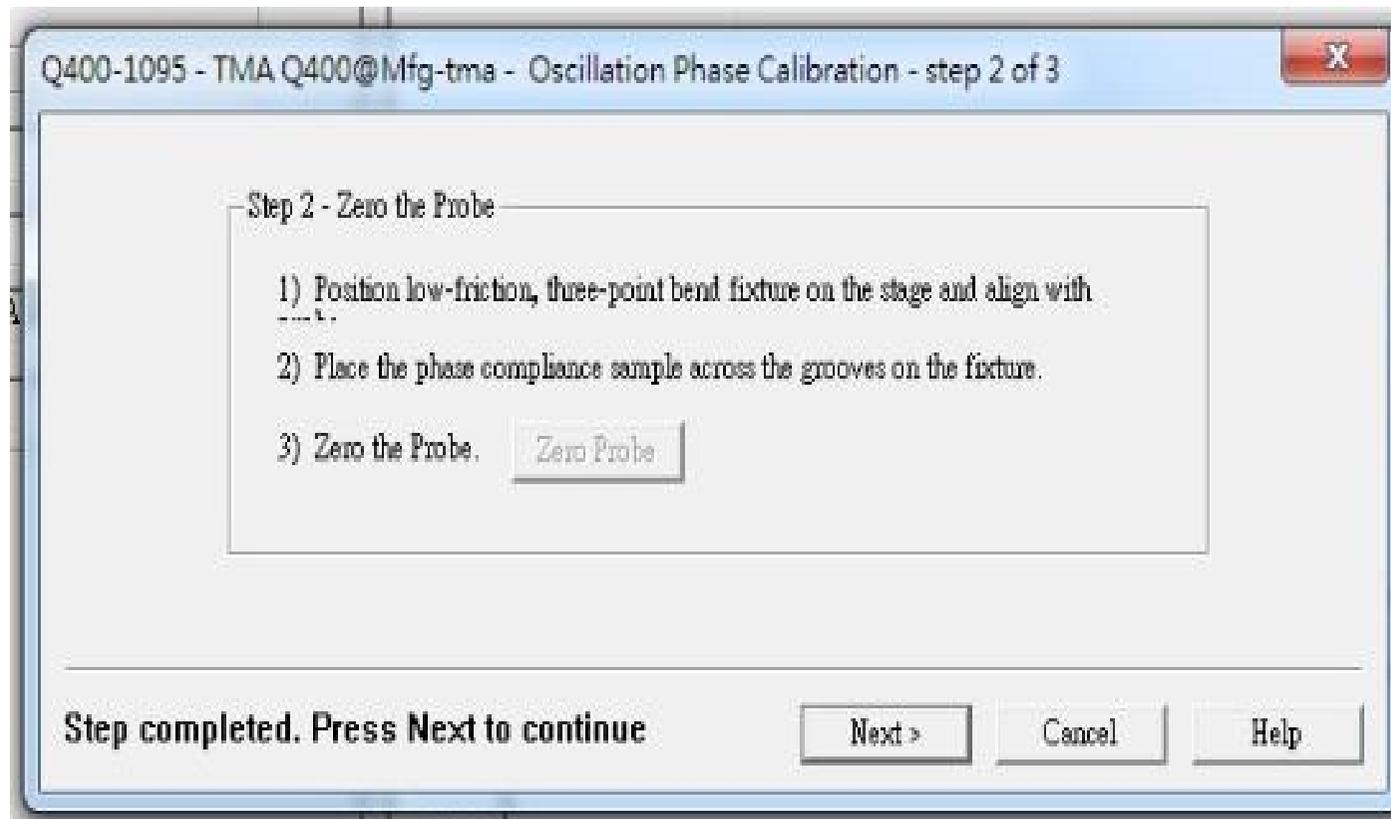
# TMA Q400校正操作步驟示範

- 5、按照說明取出三點彎曲配件放置樣品平臺上。
- 6、放置時請小心擺放避免掉落，三點彎曲中間溝槽必須讓探針能夠順利的下壓在中間溝槽內。如圖所示。
- 7、接著點選Zero Probe按鍵。



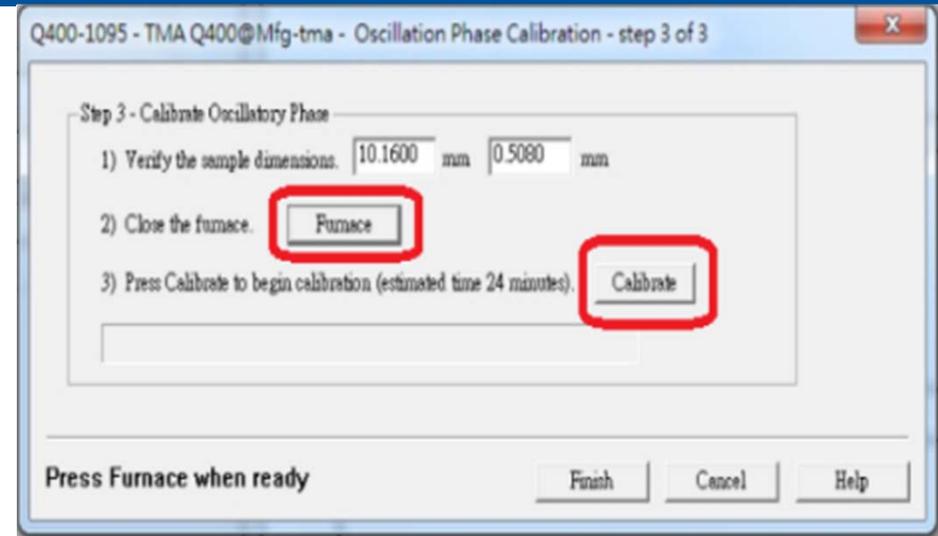
# TMA Q400校正操作步驟示範

8、等校正完成再點選Next。



# TMA Q400校正操作步驟示範

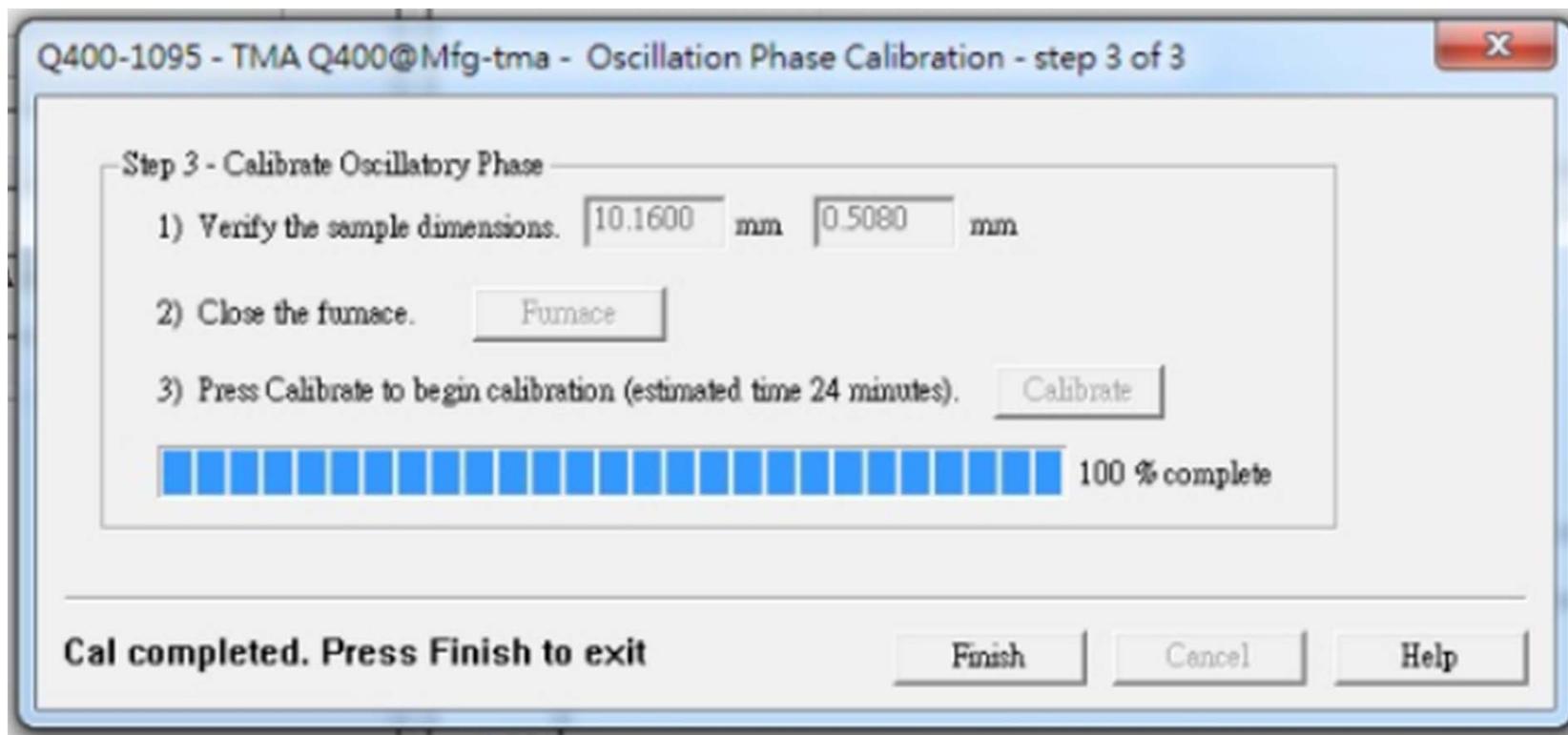
- 9、此時軟體視窗會出現一個對話視窗，請測量一根金屬絲的長和粗細尺寸，輸入在對話視窗上。



- 10、完成之後用手動方式把爐子回正，點選Furnace後，等爐子確實關閉妥善後，再點選Calibrate按鍵。

# TMA Q400校正操作步驟示範

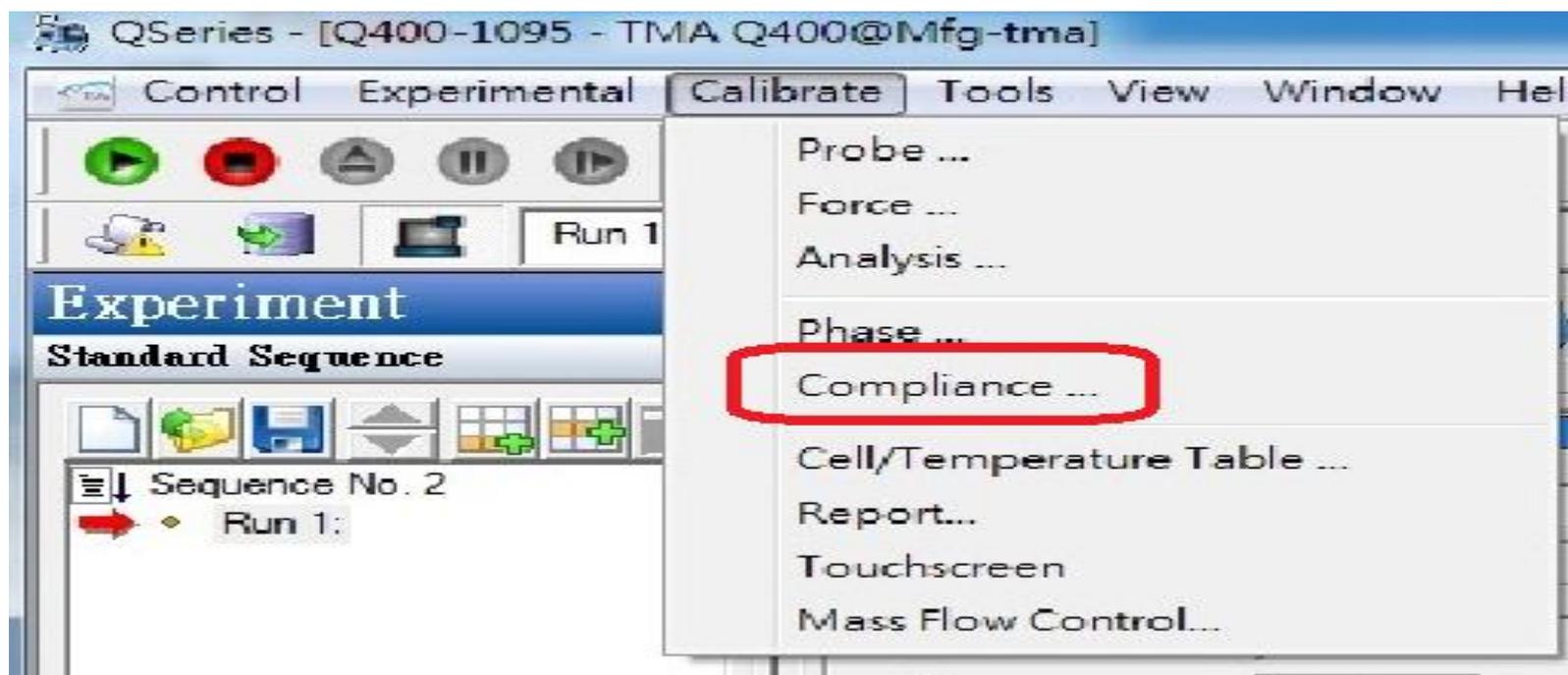
- 11、此時校正所需花費24min的時間，接著等到儀器完成之後，就可以點選Finish完成校正。



# TMA Q400校正操作步驟示範

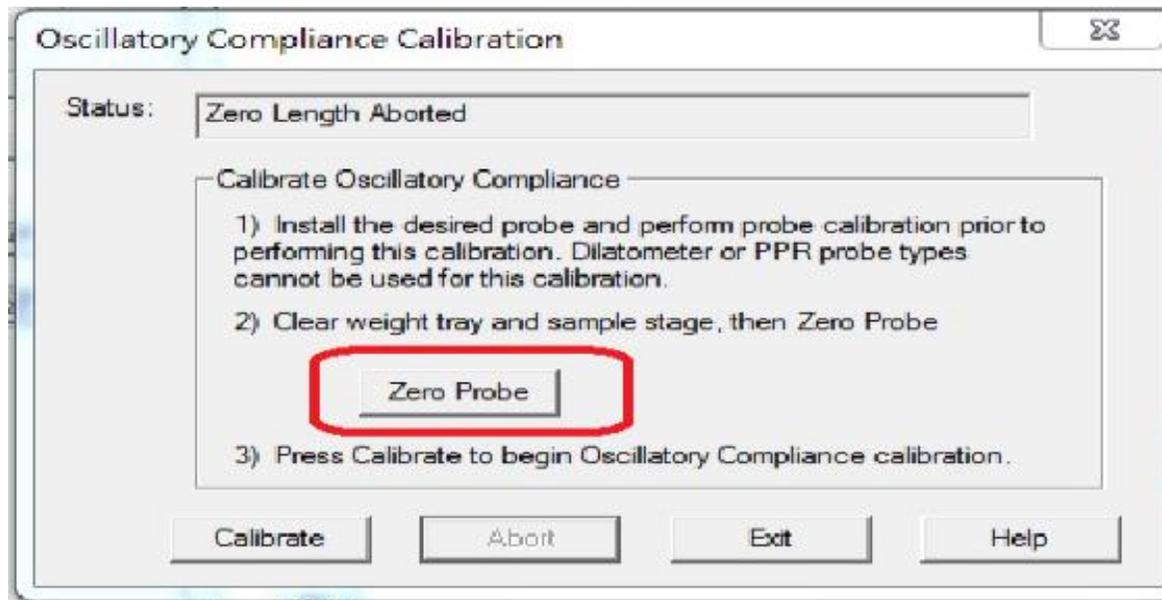
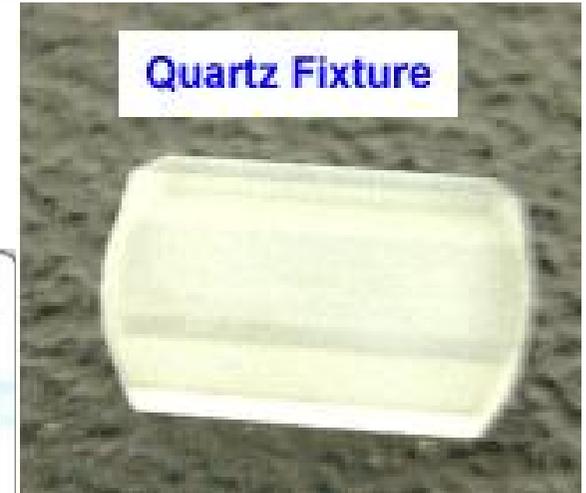
## ■ 柔量校正(Compliance)

- 1、點選工具列中Calibrate並在下拉式功能表中選擇Compliance功能。



# TMA Q400校正操作步驟示範

- 2、探針仍然繼續使用Flexural Probe，並且把三點彎曲的石英平檯取出放於樣品平檯上。

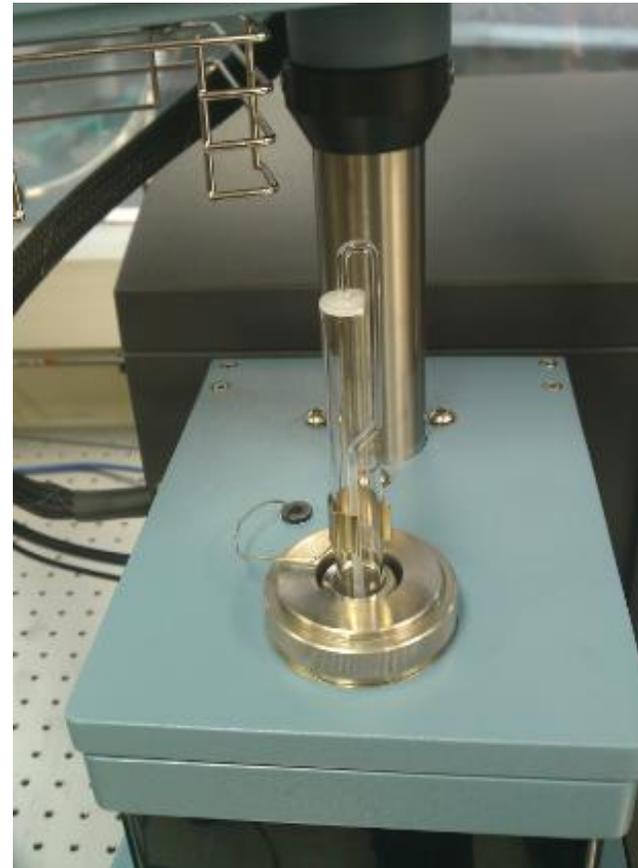


- 3、接著點選Zero Probe。
- 4、歸零完成請點選Calibrate，完成所有的校正。

# TMA Q400校正操作步驟示範

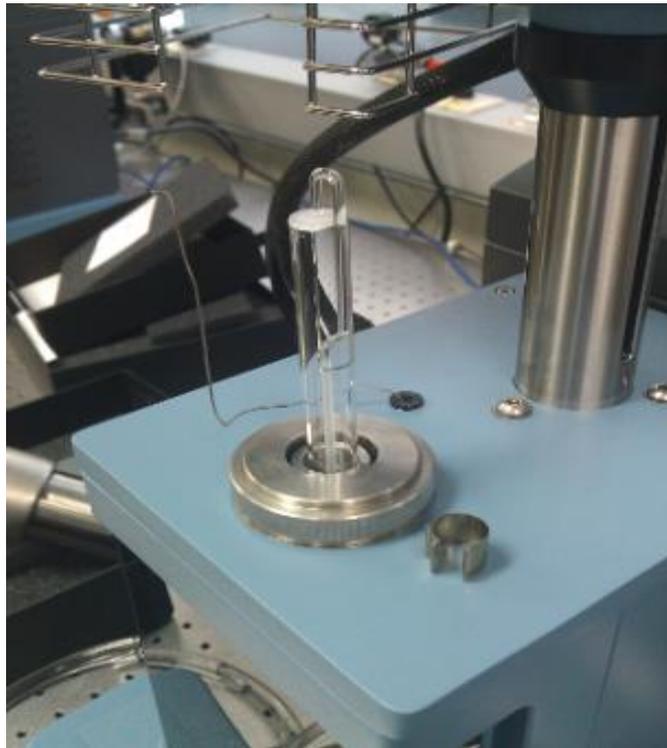
## 更換薄膜探針及校正

- 從軟體及觸碰面板中開啟爐子，並把Stage保護罩取下。



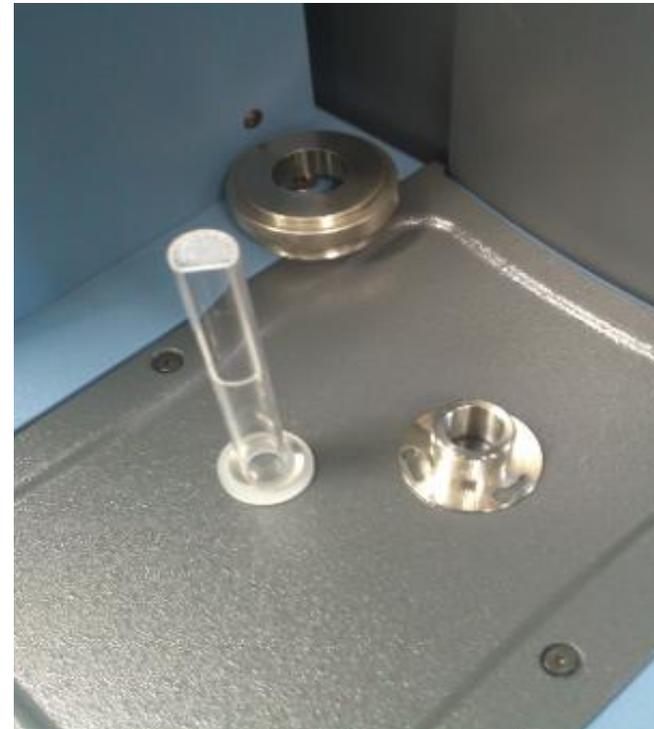
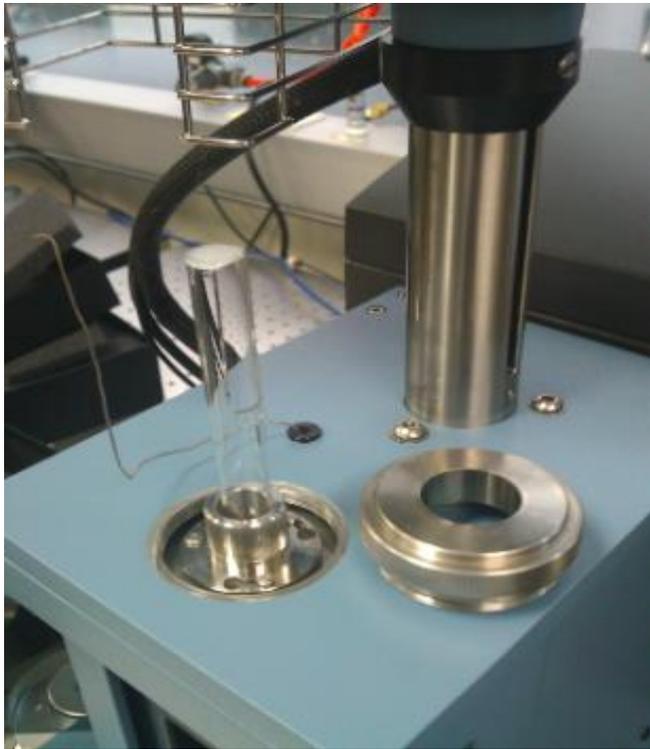
# TMA Q400校正操作步驟示範

- 接著取下彈簧夾，讓熱電偶和Stage分離。
- 用右手固定Probe，左手逆時針旋轉放鬆，右手斜向右上方緩緩取出Probe。



# TMA Q400校正操作步驟示範

- 接著把螺帽逆時針旋轉取下。
- 把Stage固定圈旋轉放鬆之後，並連同Stage一起取出(如右圖)



# TMA Q400校正操作步驟示範

- 取出波浪墊圈。
- 從薄膜配件盒內取出薄膜探針並且直接安裝上去。



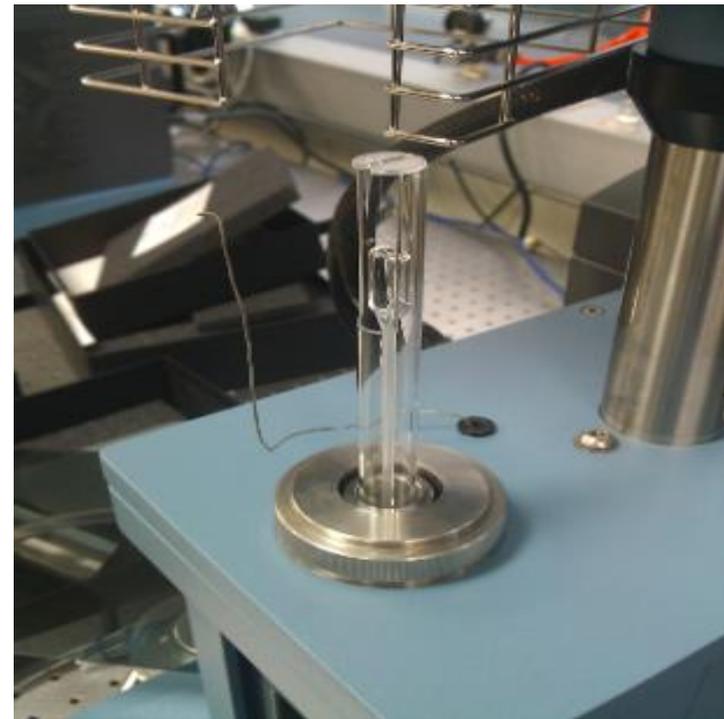
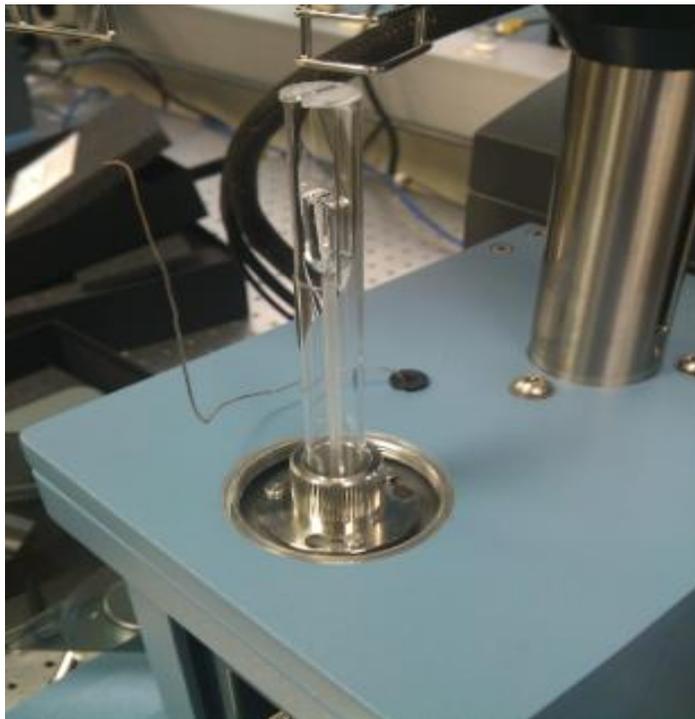
# TMA Q400校正操作步驟示範

- 取出薄膜Stage把波浪墊圈放上去。
- 再把Stage固定圈放上去。



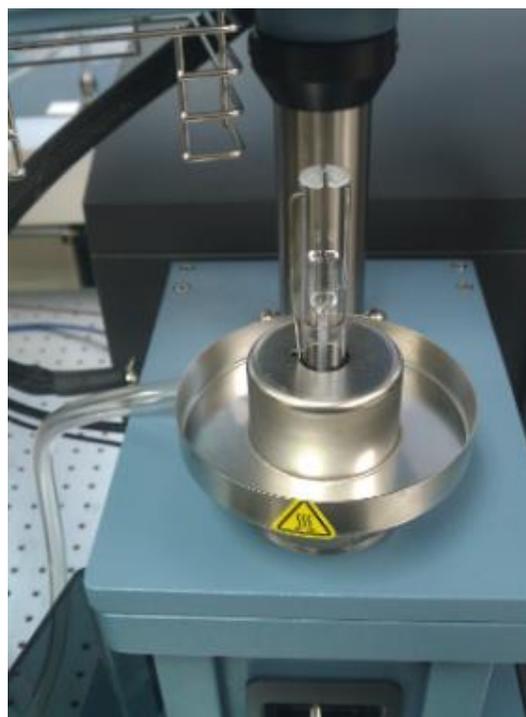
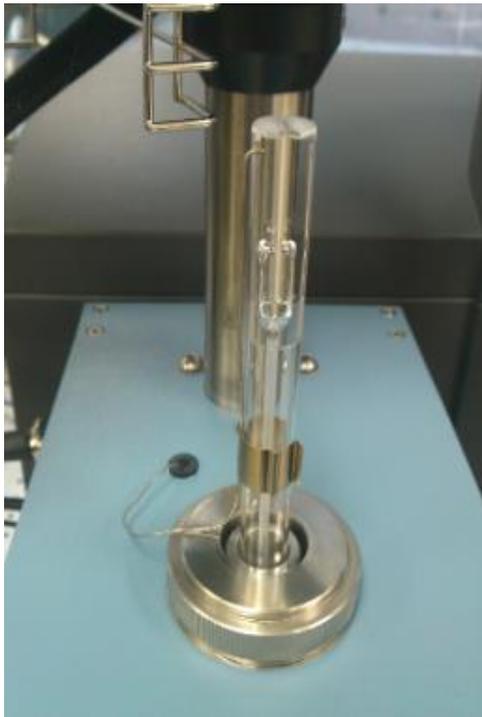
# TMA Q400校正操作步驟示範

- 把Stage緩緩的套住薄膜探針往下放入底部。
- 再把Stage螺帽放入後鎖緊。



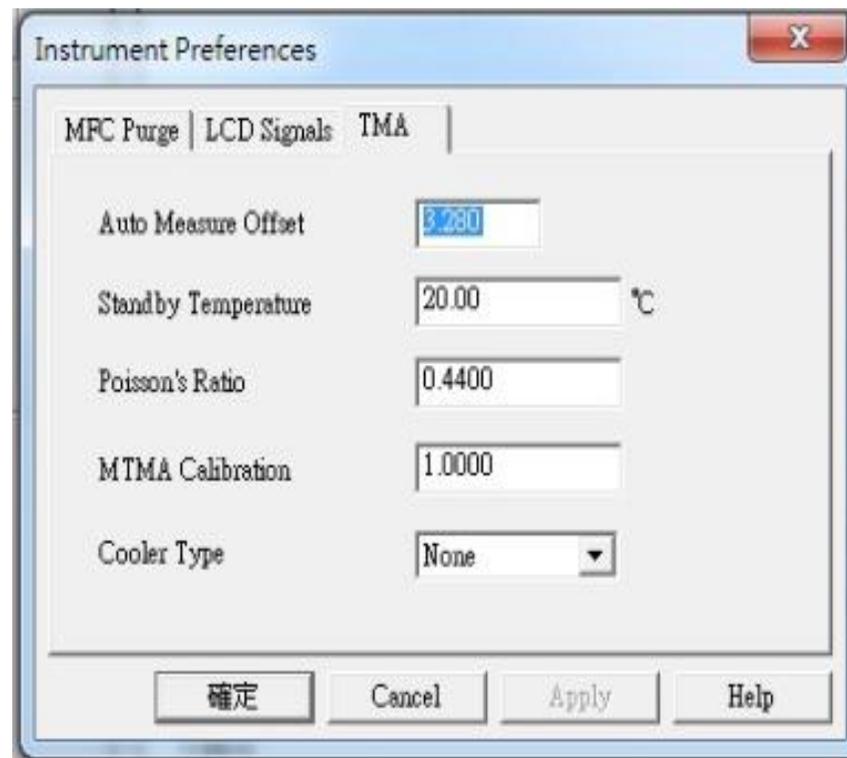
# TMA Q400校正操作步驟示範

- 把彈簧夾固定住熱電偶。
- 再把Stage保護罩放上去，並且特別要注意下方處不要擠壓熱電偶。



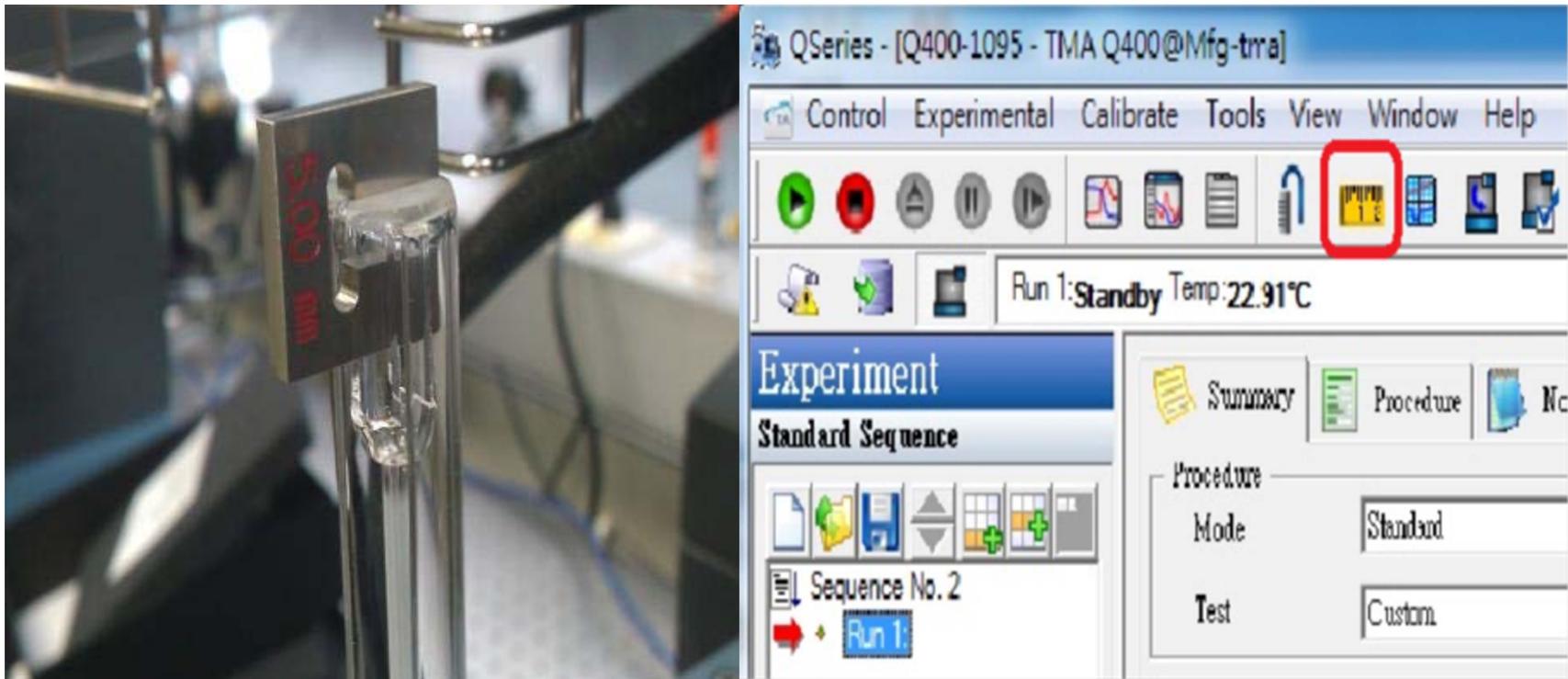
# TMA Q400校正操作步驟示範

- 安裝完成之後如同探針校正方式一樣完成探針校正。
- 接著打開Instrument Preferences內Auto Measure Offset內輸入“1”。



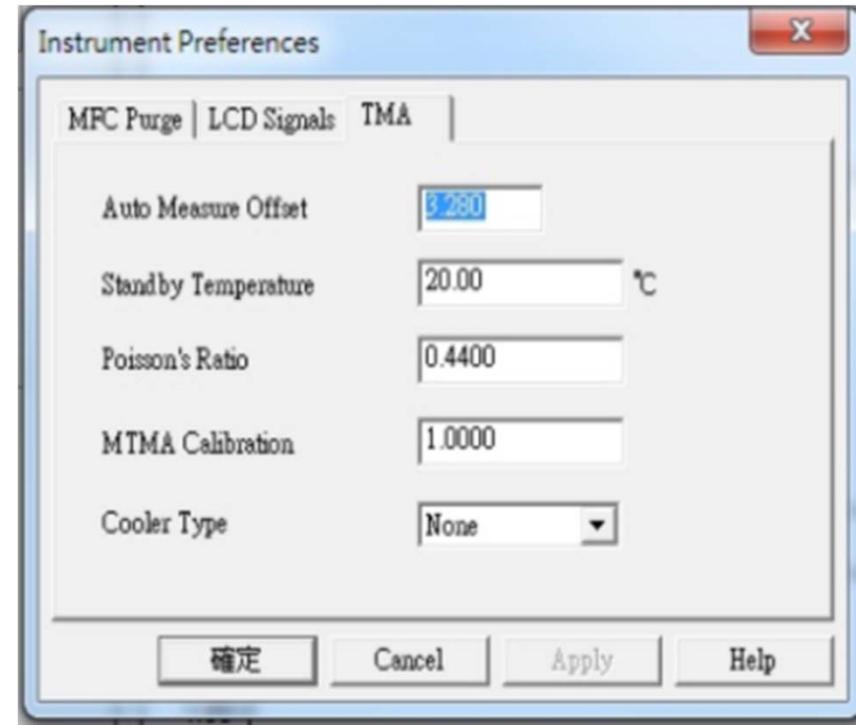
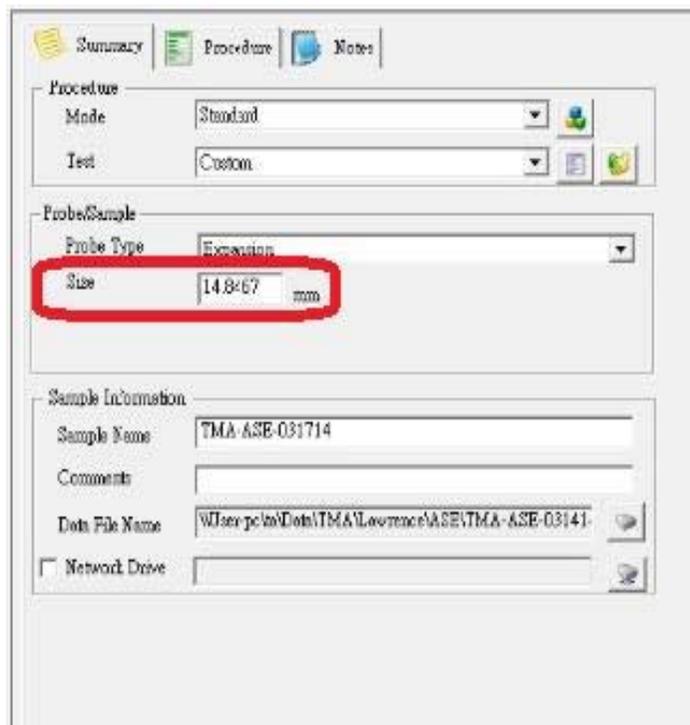
# TMA Q400校正操作步驟示範

- 接著從薄膜配件盒內取出5.00mm製具，放入Stage and Probe
- 直接點選螢幕上的Measure功能鍵，測量尺寸變化。



# TMA Q400校正操作步驟示範

- 完成之後尺寸會顯示在Size上，接著把標準尺規的5mm減掉量測出來的值，將相減之後的值再加上“1”，輸入到Auto Measure Offset內即可完成。(例: $5-2.6397+1=3.3603$ )



# 如何做一個簡單樣品實驗

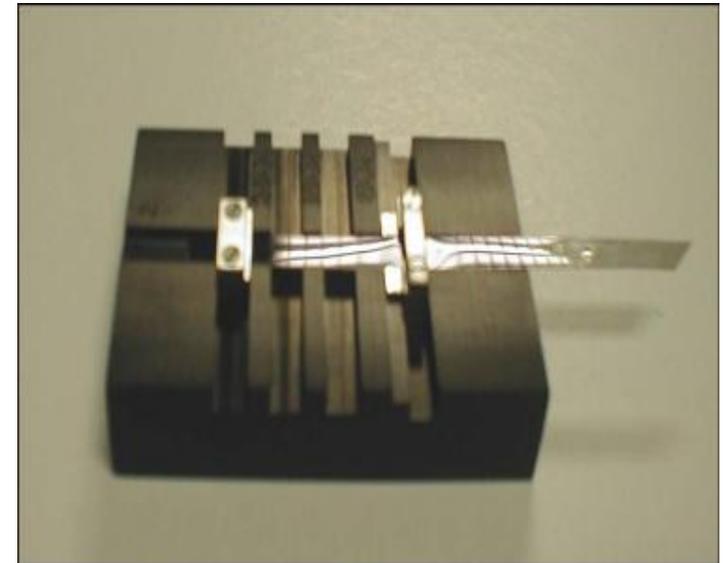
標準探針實驗前準備事項：

1. 探針使用前需注意是否殘留樣品或受污染，要確保探針清潔平整。
2. Purge Gas(如N<sub>2</sub>)流量100cc/min，此流量固定不需調整。
3. TMA 內部構造具有一個非常精密之LVDT 量距系統及力量驅動系統，因此建議機台必須放置在防震桌或是非常穩固的實驗桌，再實驗中也要切記避免震動。
4. 樣品之製備儘可能厚度均勻，表面平整。
5. 探針及樣品平檯側邊需保持至少1mm 的距離避免摩擦。

# 如何做一個簡單樣品實驗

薄膜探針實驗前準備事項：

- 1.取出薄膜探針配件，先按照探針校正模式完成校正。
- 2.取出薄膜樣品專用的製備工具。
- 3.將欲量測之Thin Film Sample 依照欲量測方向(長軸方向)，裁成8,16,24mm長 x 4.5mm 寬的Sample。
- 4.參考右圖，將sample 穿過固定治具後，選擇要量測的長度範圍定位，於固定治具中，使用一字起均勻鎖緊螺絲。
- 5.取下sample，剪去前後多於長度sample即完成sample 製作。



# 如何做一個簡單樣品實驗

The screenshot displays the TA QSeries software interface. The main window is titled "QSeries - [Q400-1095 - TMA Q400]". The "Experimental Wizard" is active, showing the "Procedure" tab. The "Mode" is set to "Standard", the "Test" is "Carbon", and the "Probe/Quartz" is "Explosion". The "Sample Information" section shows "Sample Name: Temperature IM", "Concntrt", and "Data File Name: \\Data\p\Q\TMA\data\DH20140312002".

The "Signal" table shows the following values:

Signal	Value
Method Time	0.00 min
Segment Time	0.00 min
Remaining Run Time	0 min
Temperature	23.90 °C
Heater Temperature	113.74 °C
Set Point Temp	0.00 °C
Dimension Change	-377.810 µm
Length	15.085 µm
Force	0.1000 N
Heater Power	0.000 W
Sample Purge Flow	0.00 mL/min

The "Running Segment Description" table shows the following segments:

#	Running Segment Description
1	Force 0.1000 N
2	Equilibrate at 100.00 °C
3	Ramp 10.00 °C/min to 200.00 °C

The graph shows "Heater Temperature (°C)" on the y-axis (ranging from -360.0 to 0.0) and "Temperature (°C)" on the x-axis (ranging from 90.0 to 180.0). The graph is currently blank.

The status bar at the bottom indicates "Completed Standard Seg 0 in Run 1 | 19:01:04".

實驗精靈圖示

# 如何做一個簡單樣品實驗

QSeries - [Q400-1095 - TMA Q400Q/Mfg-tma]

Control Experimental Calibrate Tools View Window Help

Run 1 Complete Temp 23.66°C

**Experiment**

Standard Sequence

Sequence No. 2  
Run 1

This wizard helps you setup and start typical TMA experiments. Prior to using this wizard, the TMA must be properly calibrated. (consult online help for additional details)

Before selecting the type of experiment you want to perform, indicate the probe type you wish to use.

- Expansion  
Coefficient of thermal expansion (CTE), glass transition temperatures and expansion anisotropy of solid materials
- Permeation  
Softening and melting temperatures
- Microexpansion  
Expansion studies for soft or irregular samples, powders, films and frozen liquids
- Flexural  
Deflection (bending) properties of stiff materials
- Film/Fiber  
Dimensional properties of films and fibers

Next > Cancel Help

Completed Standard Seg 0 in Run 1 19:01:32

Windows Live Mess... TA Instrument Expl... QSeries - [Q400-10... E1 - 登錄

下午 07:01

TA

選擇探針種類

# 如何做一個簡單樣品實驗

QSeries - [Q400-1095 - TMA.Q400QV.Mg-tma]

Control Experimental Calibrate Tools View Window Help

Run 1 Standby Temp: 23.45°C

### Experiment

Standard Sequence

Sequence No. 2  
Run 1

Select the operating mode you want to use.

- Standard Mode**  
Material is exposed to (a) temperature ramp of a constant force; or (b) force ramp of a constant temperature. Measures dimension changes, transition temperatures, and force/displacement relationships.
- Advanced Mode**  
Material is exposed to (a) temperature ramp of a constant stress (or strain); or (b) stress ramp of a constant temperature. Measures dimension changes, transition temperatures, and stress/strain relationships.
- Creep Mode**  
Sample is subjected to a constant force (stress) or constant strain (strain/strain). Change in strain (deformation) or force (stress) respectively is measured with time while holding isothermal.
- Stress Relaxation Mode**  
Material is subjected to a specified strain and the decay in force (stress) is measured while the temperature is held isothermal. Used to assess viscoelastic properties.
- Modulated TMA Mode**  
Material experiences a combined sinusoidal and linear temperature ramp, at a constant stress. This provides signals relating to total displacement, CTE and their reversing and non-reversing components.
- Dynamic TMA Mode**  
Material is heated at a constant rate. While heating, the material is deformed (oscillated) at a constant force (stress) and the mechanical properties measured.

< Back Next > Cancel Help

Ready Standby Standard Seg. 0 in Run 1 19:02:00

Windows Live Mess... TA Instrument Expl... QSeries - [Q400-10... E2 - 登录

下午 07:02

TA

選擇測試模式

# 如何做一個簡單樣品實驗

The screenshot displays the TA QSeries software interface for configuring an experiment. The window title is "QSeries - [Q400-1095 - TMA.Q400QV.Mg-tma]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". The status bar at the top indicates "Run 1 Standby Temp: 23.13°C".

The main interface is titled "Experiment" and shows a "Standard Sequence" on the left. The central area contains a graph of Force vs. Time and a text description: "Material is heated (or cooled) at a constant linear rate and at a constant force while resultant changes in dimensions are measured." Below this, it says "Enter the desired parameters:".

The parameter settings are as follows:

Parameter	Value	Unit
Preload Force	0.1000	N
Applied Force	0.0200	N
Start Temperature	50.00	°C
Final Temperature	300.00	°C
Ramp Rate	5.00	°C/min

Buttons for "Advanced Parameters..." and "Test-Test Conditions..." are located below the parameter fields. At the bottom of the main area are navigation buttons: "< Back", "Next >", "Cancel", and "Help".

The Windows taskbar at the bottom shows the system is "Ready" and the time is 19:02:57. The TA logo is visible in the bottom right corner of the slide.

選擇實驗測試力量，結束溫度及每分鐘升溫速率

# 如何做一個簡單樣品實驗

The screenshot displays the TA QSeries software interface. The main window is titled "QSeries - [Q400-1095 - TMA Q400QV.tma]". The interface includes a menu bar (Control, Experimental, Calibrate, Tools, View, Window, Help) and a toolbar with various icons. The status bar at the top indicates "Run 1 Standby Temp: 22.91°C".

The "Experiment" section on the left shows a "Standard Sequence" with "Sequence No. 2" and "Run 1". The main area displays the following parameters:

**General**  
Instrument: Q400-1095 - TMA Q400  
Location: Mfg.tma  
Model: Standard  
Probe Type: Expansion  
Test: Temperature Ramp  
Signal List:  
1. Dimension Change ( $\mu\text{m}$ )  
2. Sample Purge Flow (mL/min)  
3. Temperature ( $^{\circ}\text{C}$ )  
4. Force (N)  
5. Time (min)  
Preload Force: 0.1000 N

**Method**

At the bottom of the main area, there are navigation buttons: "< Back", "Next >", "Cancel", and "Help".

The Windows taskbar at the bottom shows the system tray with "Standby", "Standard", "Seg. 0 in Run 1", and "19:09:53". The taskbar also includes icons for "Windows Live Mess...", "TA Instrument Expl...", and "QSeries - [Q400-10...".

各項參數註解

# 如何做一個簡單樣品實驗



The screenshot displays the TA QSeries software interface. The window title is "QSeries - [Q400-1095 - TMA.Q400QV.Mg-tma]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". The status bar at the top indicates "Run 1 Standby Temp 22.85°C".

The main interface is divided into several sections:

- Experiment Summary:** A sidebar on the left shows "Sequence No. 2" and "Run 1".
- Sample Information:** A central panel with the following fields:
  - Sample:** Size: 0.3792 mm
  - Sample Information:** Sample Name: Temperature IR, Comments: (empty), Data File Name: \\laser-pc\td\Data\TMA\data\IN20140312.003
  - Autosave:** (unchecked), Analytic Macro: (empty)
- Navigation:** Buttons for "< Back", "Next >", "Cancel", and "Help" are located at the bottom of the main panel.

The Windows taskbar at the bottom shows the system is "Ready" and the time is 19:04:22. The TA logo is visible in the bottom right corner.

編輯樣品名稱及檔案名稱

# 如何做一個簡單樣品實驗

The screenshot displays the TA QSeries software interface. The window title is "QSeries - [Q400-1095 - TMA.Q400QV.Mg-tma]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". The status bar at the top indicates "Run 1 Standby Temp 22.82°C".

The main interface is divided into several sections:

- Experiment Panel (Left):** Shows "Standard Sequence" with icons for "Sequence No. 2" and "Run 1".
- Notes Section:** Contains a "Notes" icon, a text field for "Operator" (filled with "Alba"), and a larger text area for "Entered Test".
- Main Flow Control Settings:** Includes a "Sample" dropdown menu (set to "N1 - Nitrogen") and a "Flow Rate" input field (set to "0") with units "mL/min".

At the bottom of the main interface, there are four buttons: "< Back", "Next >", "Cancel", and "Help".

The Windows taskbar at the bottom shows the system tray with "Standby", "Standard", "Seg. 0 in Run 1", and "19:04:40". The taskbar also displays several open applications, including "Windows Live Mess...", "TA Instrument Expl...", and "QSeries - [Q400-10...".

操作者及流量設定

# 如何做一個簡單樣品實驗

The screenshot displays the QSeries software interface for a TMA experiment. The main window is titled "QSeries - [Q400-1095 - TMA.Q400QV.Mg-tma]". The status bar at the top indicates "Run 1 Standby Temp: 22.80°C". The interface is divided into several sections:

- Experiment**: A sidebar on the left shows a "Standard Sequence" with icons for various steps. The current step is "Run 1".
- Checklist**: The main area contains a checklist of five items, each with a checked box and a "Zero Length" or "Measure Length" button:
  - Purge Gas**: Be sure that your purge gases are connected and properly regulated. Purge gas is recommended for all TMA experiments.
  - Cooling Capability**: Many materials exhibit low temperature transitions (e.g. polymer glass transitions) which can be measured by TMA. An external source of cooling allows TMA measurements to 150°C (using liquid nitrogen in the furnace reservoir) or to -70°C (with the optional mechanical cooling accessory).
  - Zeroing the Probe**: Before loading the sample on the probe/stage assembly, zero the probe. [Zero Length](#)
  - Loading the Sample/ Positioning the Sample Thermocouple**: Prepare a sample with well-defined dimensions to fit on the sample stage. Raise the probe and place the sample on the quartz stage. Then lower the Probe to make contact with the sample. If necessary, adjust the sample thermocouple position.
  - Measuring the Sample Length**: Once the sample is in place, rotate the furnace so it is vertically above the sample, then close the furnace. Measure the sample length before starting the experiment. [Measure Length](#)
- Buttons**: At the bottom of the checklist area, there are buttons for "Append Run", "Start Run", "< Back", "Finish", "Cancel", and "Help".

The Windows taskbar at the bottom shows the system is "Ready" and the time is 19:04:57. The TA logo is visible in the bottom right corner.

確認前置作業

# 分析軟體(簡易示範)

開啟分析軟體的兩種方式

The screenshot displays the QSeries software interface for a TMA Q400. The window title is "QSeries - [Q400-1095 - TMA Q400@Mfg-trm]". The menu bar includes "Control", "Experimental", "Calibrate", "Tools", "View", "Window", and "Help". A toolbar at the top contains various icons, with one icon circled in red. The main interface is divided into several sections:

- Experiment Standard Sequence:** Shows "Sequence No. 2" and a "Run" button.
- Procedure:** "Mode" is set to "Standard" and "Test" is set to "Custom".
- Probe/Sample:** "Probe Type" is "Expansion" and "Size" is "14 S467 mm".
- Sample Information:** "Sample Name" is "TMA-ASE-031714" and "Data File Name" is "W:\log\ts\Dat\TMA\Lowrance\ASE\TMA-ASE-03141".
- Signal Table:** Lists various signals and their values, such as "Head Time" (3.00 min), "Temperature" (22.91 °C), and "Dimension Change" (-3505.53 µm).
- Running Segment Description:** A list of 5 segments with descriptions like "Ramp 5.00 °C/min to 300.00 °C".
- Graph:** A plot of "Dimension Change (µm)" vs "Temperature (°C)". The y-axis ranges from 0.90 to 2.00, and the x-axis ranges from 0.90 to 2.00.

At the bottom, the status bar shows "Ready", "01 11:20 min", and "Stand by Standard Seg 0 in Run 1 14:44:33".

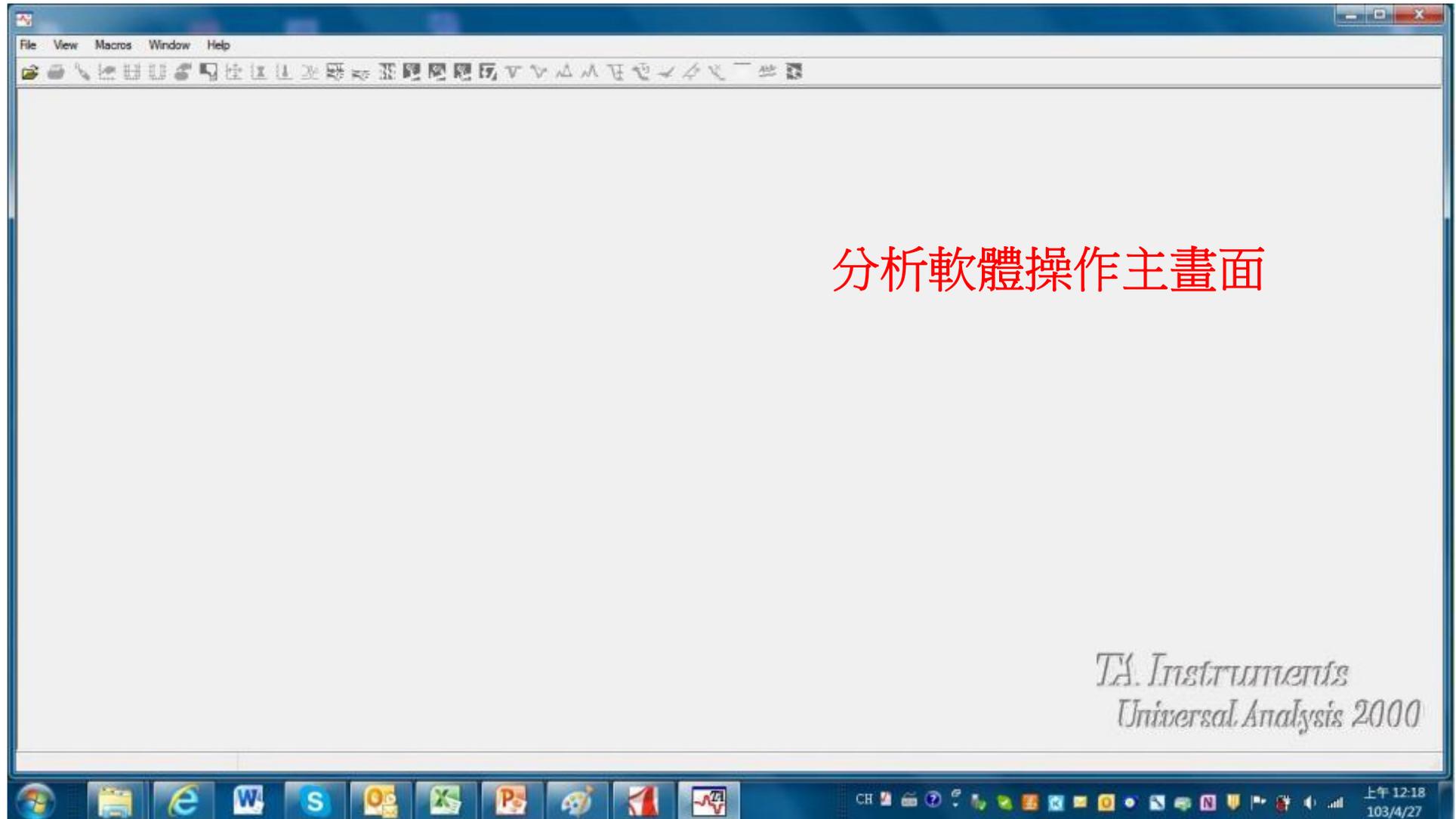
其一、開啟操作軟體點選工具列，分析軟體功能。

# 分析軟體(簡易示範)

開啟分析軟體的兩種方式

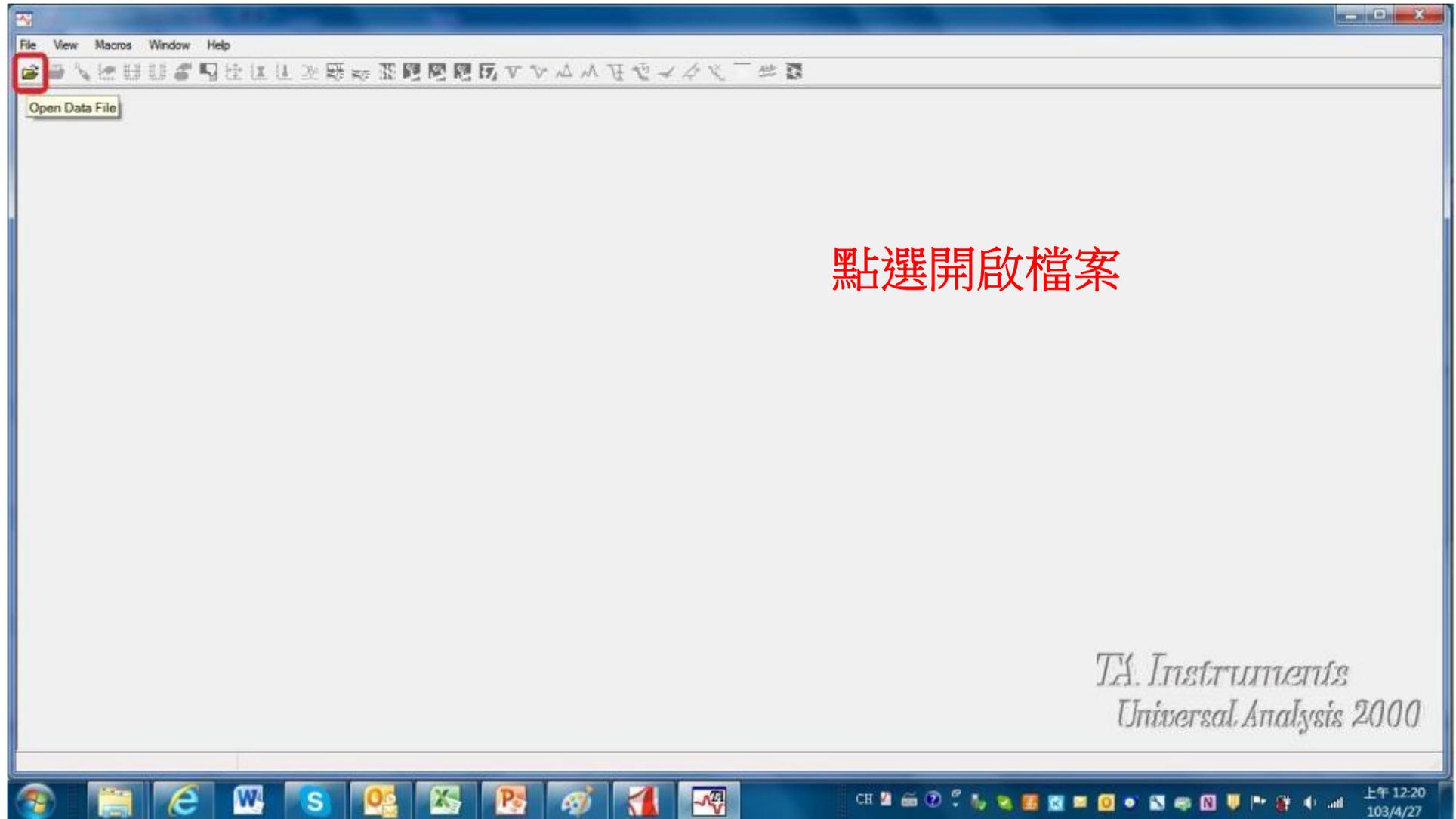


# 分析軟體(簡易示範)

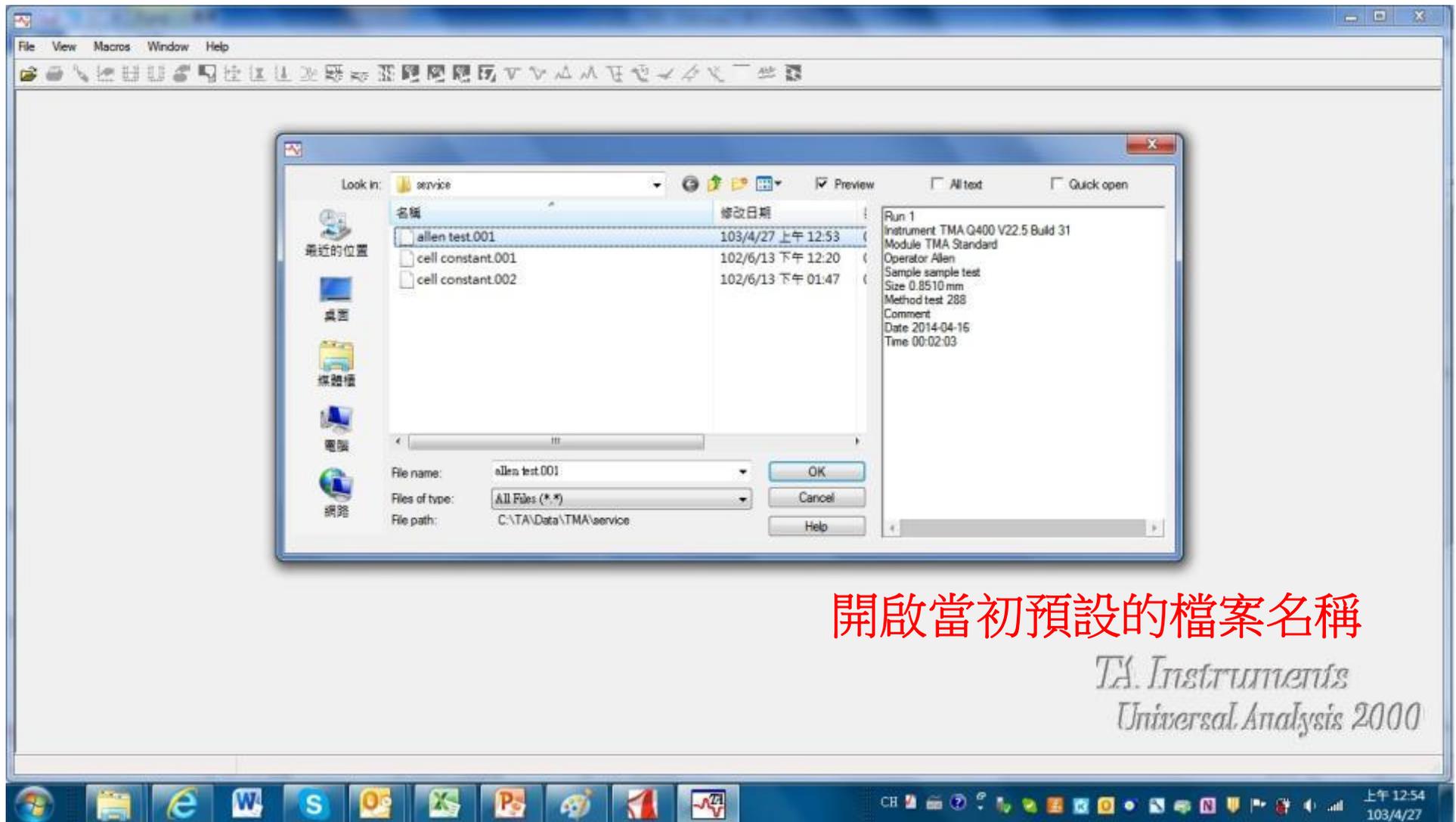


分析軟體操作主畫面

# 分析軟體(簡易示範)

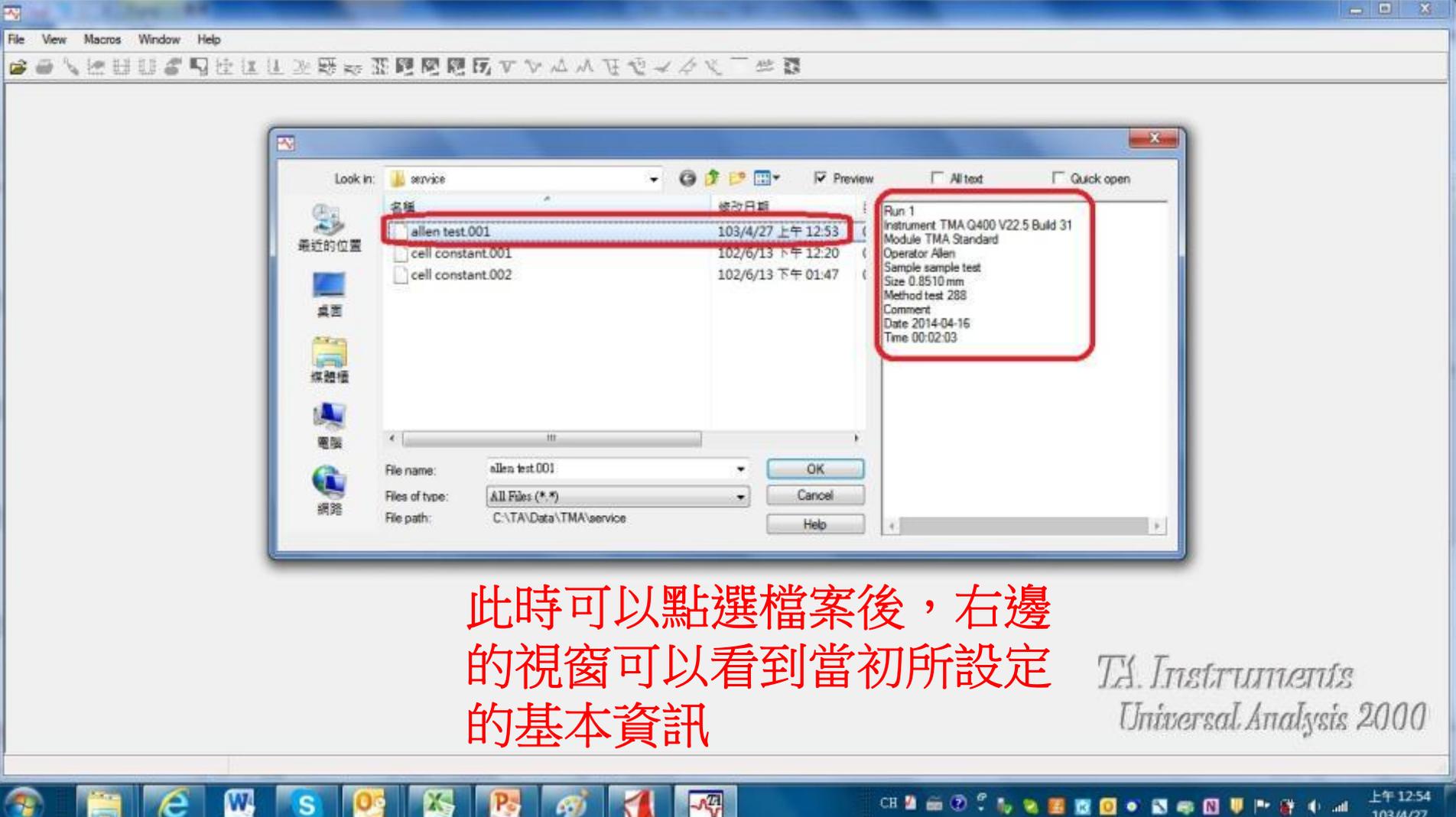


# 分析軟體(簡易示範)



開啟當初預設的檔案名稱

# 分析軟體(簡易示範)



The screenshot shows the TA Instruments Universal Analysis 2000 software interface. A file selection dialog box is open, displaying a list of files in the 'service' folder. The file 'allen test.001' is selected and highlighted with a red box. To the right of the file list, a preview window displays the following metadata for the selected file:

Run 1
Instrument TMA Q400 V22.5 Build 31
Module TMA Standard
Operator Allen
Sample sample test
Size 0.8510 mm
Method test 288
Comment
Date 2014-04-16
Time 00:02:03

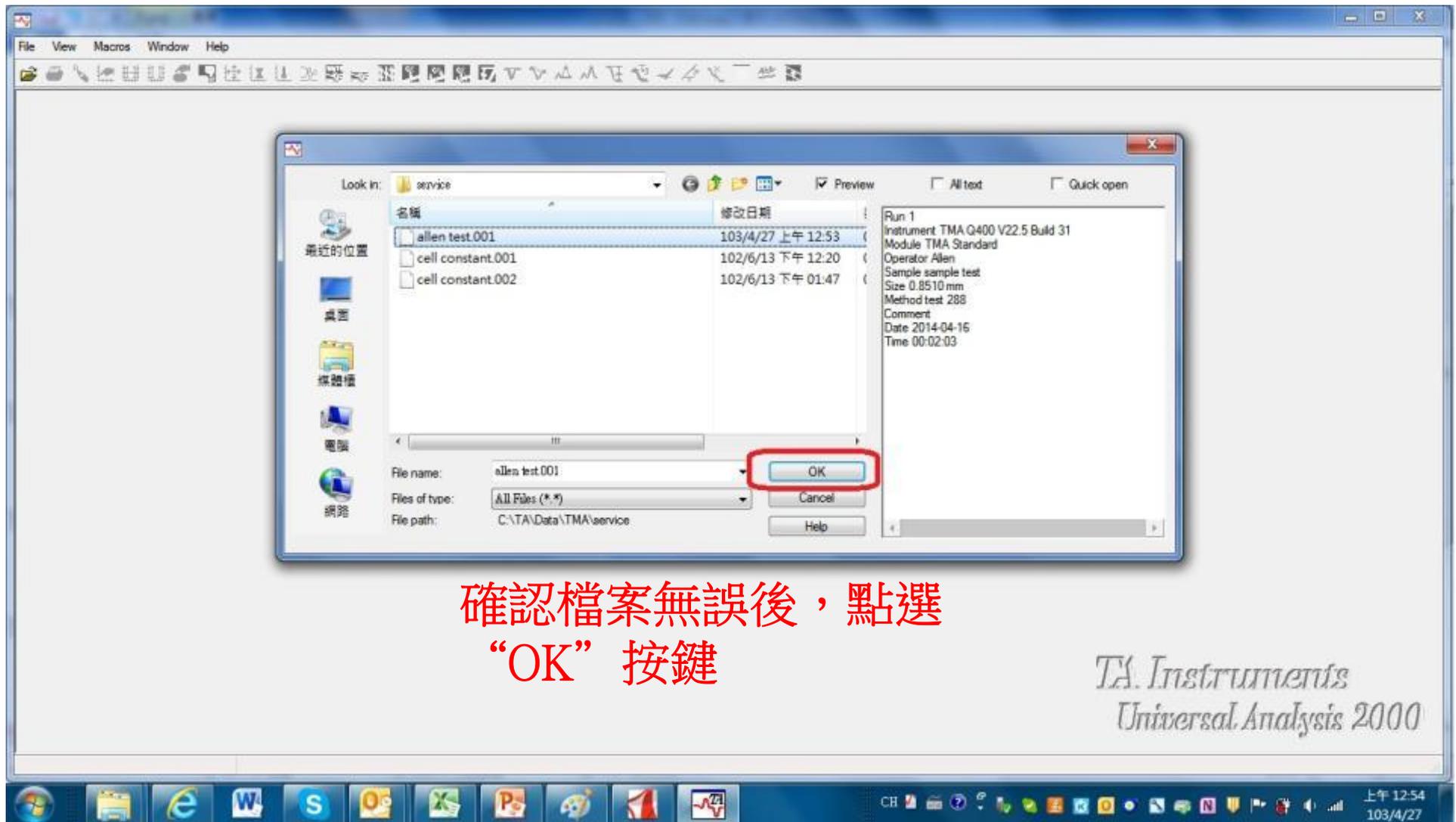
Below the file list, the 'File name' field contains 'allen test.001', 'Files of type' is set to 'All Files (\*.\*)', and 'File path' is 'C:\TA\Data\TMA\service'. The 'OK', 'Cancel', and 'Help' buttons are visible at the bottom of the dialog box.

此時可以點選檔案後，右邊的視窗可以看到當初所設定的基本資訊

TA Instruments  
Universal Analysis 2000

上午 12:54  
103/4/27

# 分析軟體(簡易示範)

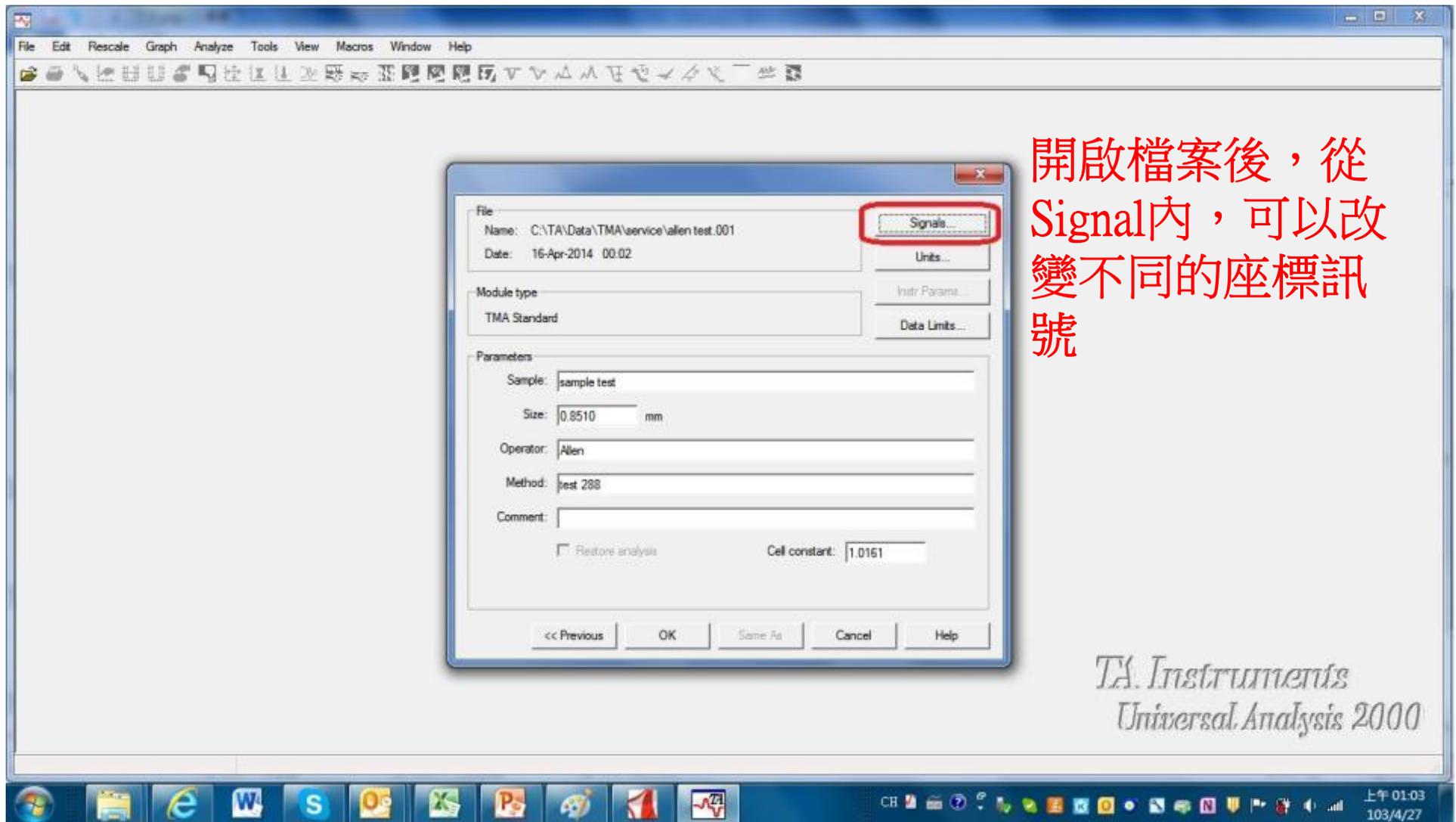


確認檔案無誤後，點選  
“OK” 按鍵

TA Instruments  
Universal Analysis 2000

# 分析軟體(簡易示範)

開啟檔案後，從  
Signal內，可以改  
變不同的座標訊  
號

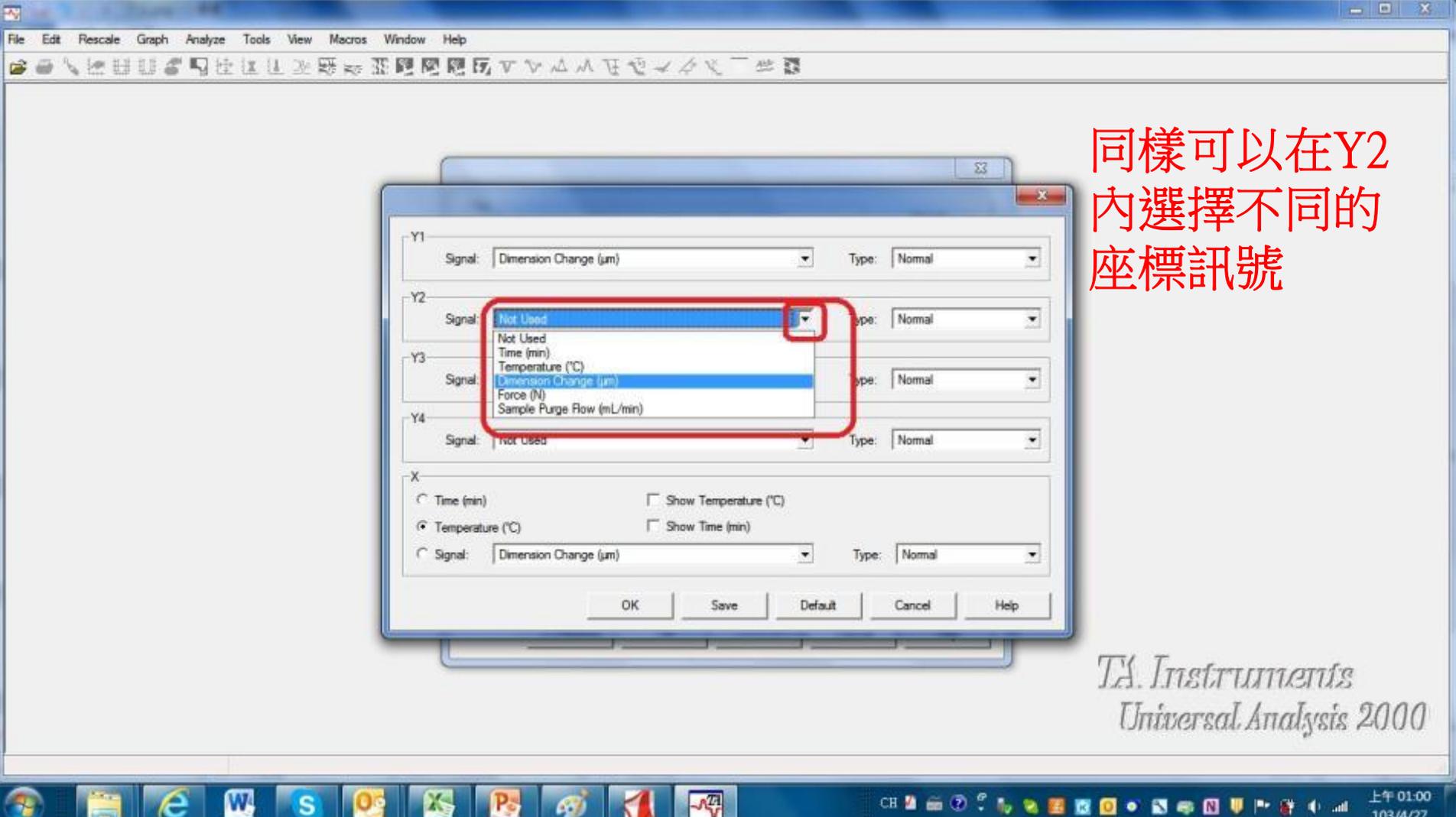


# 分析軟體(簡易示範)

The screenshot displays the TA Instruments Universal Analysis 2000 software interface. A dialog box is open, allowing the user to select a signal for the Y1 axis. The Y1 signal dropdown menu is highlighted with a red box, and its options are: Dimension Change (µm), Not Used, and Time (min). The Y2 signal dropdown menu is also open, showing options: Temperature (°C), Dimension Change (µm), Force (N), and Sample Purge Flow (mL/min). The Y3 and Y4 axes are currently set to 'Not Used'. The X-axis section includes radio buttons for 'Time (min)' and 'Temperature (°C)', with 'Temperature (°C)' selected. There are also checkboxes for 'Show Temperature (°C)' and 'Show Time (min)'. The dialog box has buttons for 'OK', 'Save', 'Default', 'Cancel', and 'Help'. The software title bar reads 'File Edit Rescale Graph Analyze Tools View Macros Window Help'. The Windows taskbar at the bottom shows various application icons and the system clock indicating '上午 12:58 103/4/27'. The TA Instruments logo and 'Universal Analysis 2000' are visible in the bottom right corner of the software window.

在Y1選項內下拉式選單可以選擇不同的座標訊號顯示

# 分析軟體(簡易示範)



同樣可以在Y2  
內選擇不同的  
座標訊號

TA Instruments  
Universal Analysis 2000

上午 01:00  
103/4/27

# 分析軟體(簡易示範)

在Type功能內  
可以針對所選  
的訊號做微分  
處理

TA Instruments  
Universal Analysis 2000

上午 01:01  
103/4/27

# 分析軟體(簡易示範)

The screenshot displays the TA Instruments Universal Analysis 2000 software interface. A dialog box is open, allowing configuration of signals for Y1, Y2, Y3, Y4, and X. The Y1 signal is set to "Dimension Change (µm)" with a "Normal" type. The Y2 signal is set to "Derv. Dimension Change (µm/min)" with a "Derivative (time)" type. Y3 and Y4 are set to "Not Used" with "Normal" types. The X-axis is configured with radio buttons for "Time (min)" and "Temperature (°C)", and checkboxes for "Show Temperature (°C)" and "Show Time (min)". The "Signal" dropdown is set to "Dimension Change (µm)" and the "Type" is "Normal". The "OK" button is highlighted with a red rectangle.

Y1  
Signal: Dimension Change (µm) Type: Normal

Y2  
Signal: Derv. Dimension Change (µm/min) Type: Derivative (time)

Y3  
Signal: Not Used Type: Normal

Y4  
Signal: Not Used Type: Normal

X  
 Time (min)  Show Temperature (°C)  
 Temperature (°C)  Show Time (min)  
Signal: Dimension Change (µm) Type: Normal

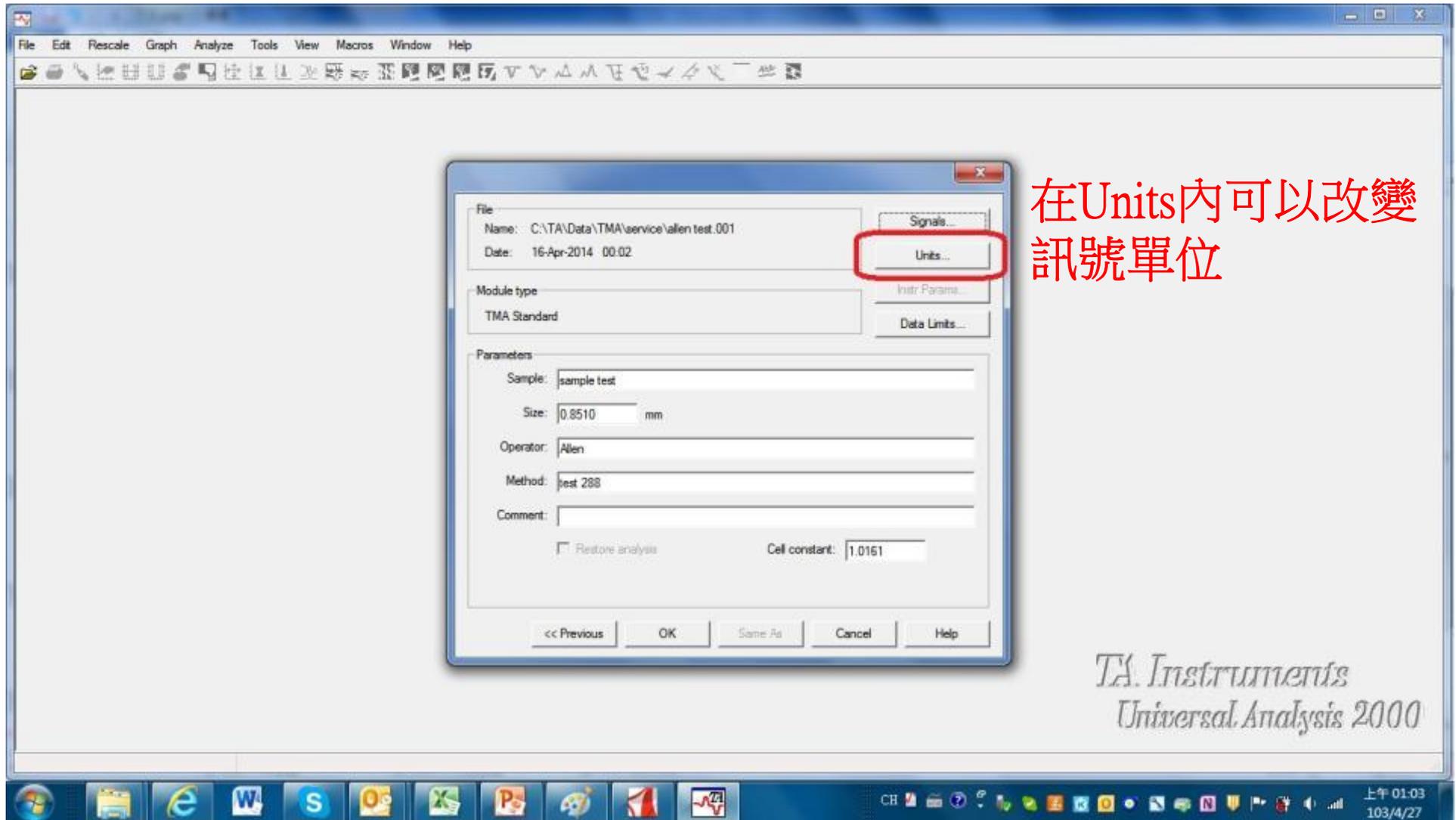
OK Save Default Cancel Help

確認後點選ok

TA Instruments  
Universal Analysis 2000

上午 01:03  
103/4/27

# 分析軟體(簡易示範)



# 分析軟體(簡易示範)

The screenshot displays the TA Instruments Universal Analysis 2000 software interface. A configuration dialog box is open, showing settings for various testing methods:

- General:** Time: min, Temperature: °C, Frequency: Hz, Pressure: kPa.
- DSC:** Heat Flow: W/g, Heat Capacity: J/(g·°C).
- DTA:** Difference: °C/mg, Microvolts: μV/mg.
- TGA:** Weight: %, MS, Current: nA.
- TMA:** Dimension: μm, Offset: No offset.
- DMA:** Modulus: MPa, Compliance: μm²/N, Viscosity: MPa sec, N/tex, tex/N, N/(tex sec), Strain: %.
- TMA:** Coordinate: μm.

Buttons at the bottom of the dialog include OK, Save, Default, Cancel, and Help.

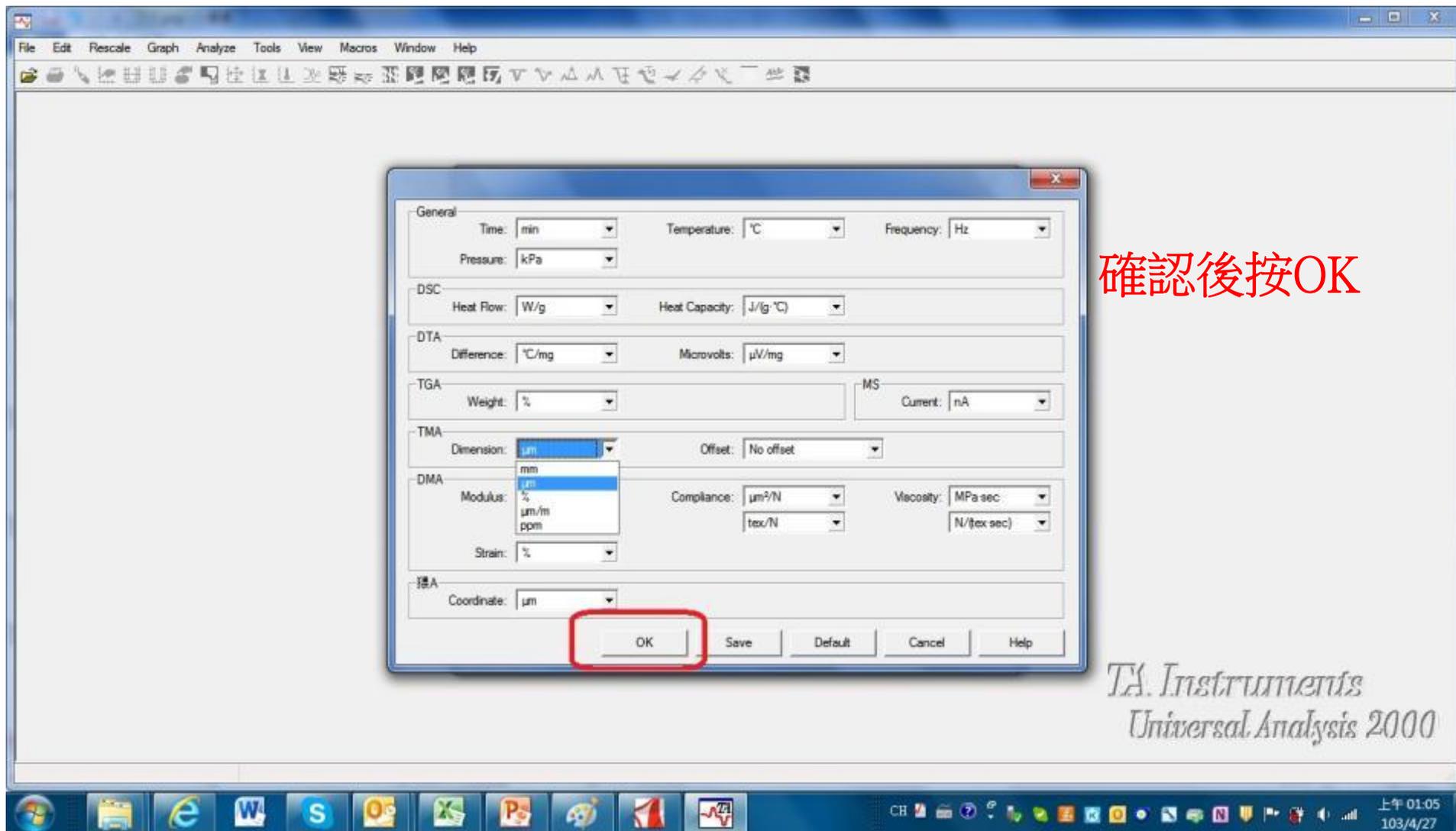
TA Instruments  
Universal Analysis 2000

上午 01:05  
103/4/27

開啟後先選擇  
測試的儀器



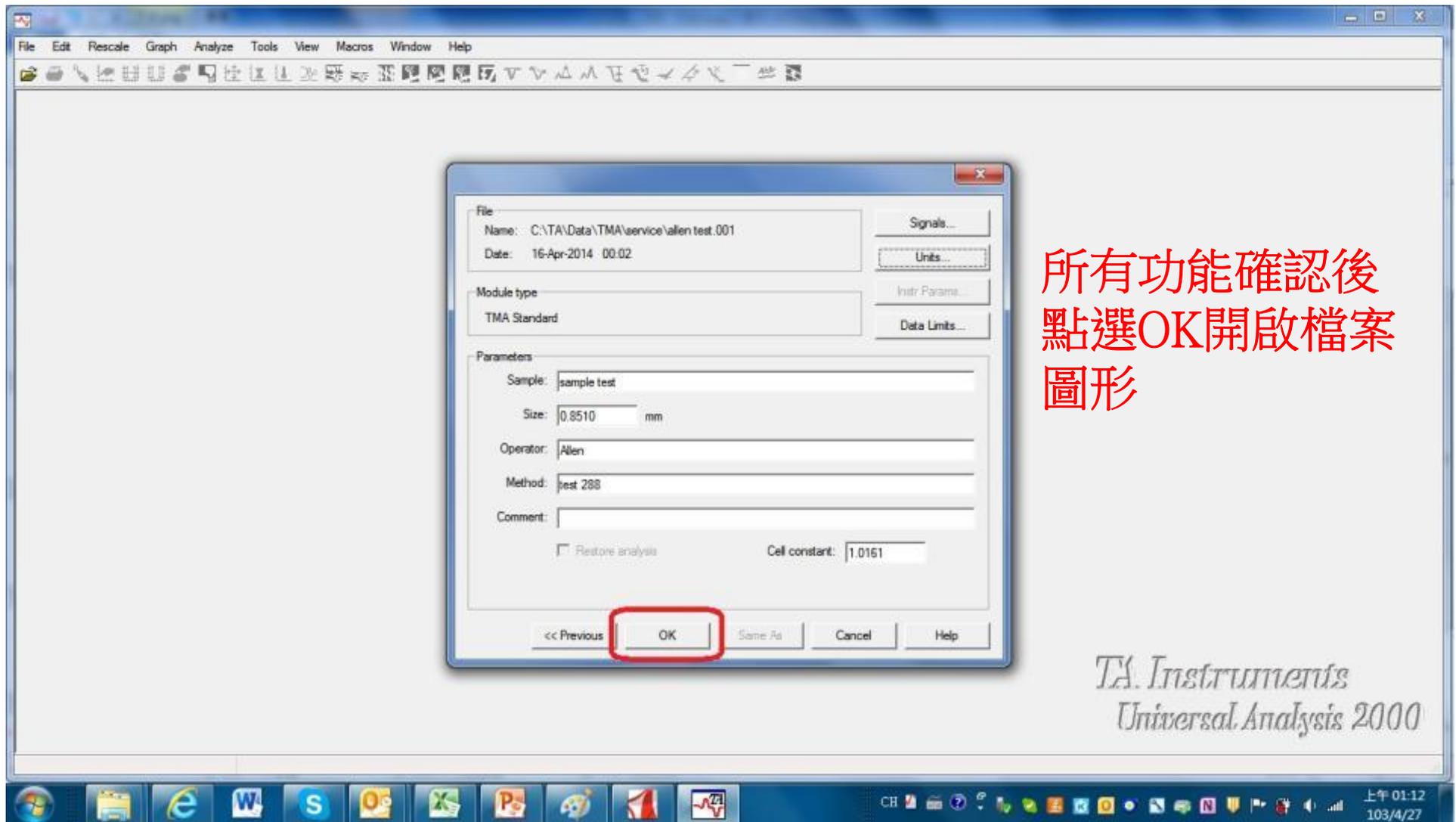
# 分析軟體(簡易示範)



確認後按OK

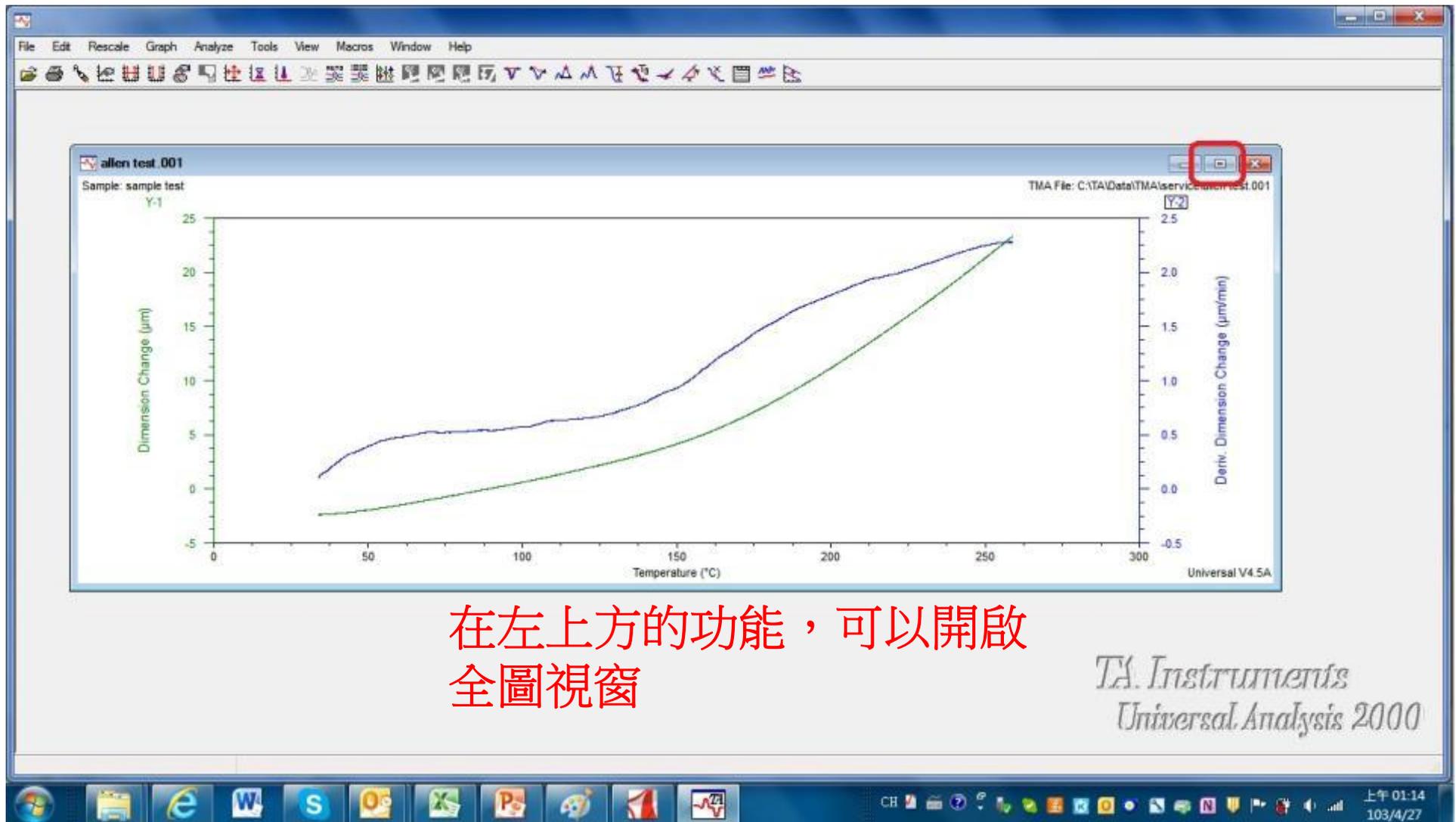
TA Instruments  
Universal Analysis 2000

# 分析軟體(簡易示範)

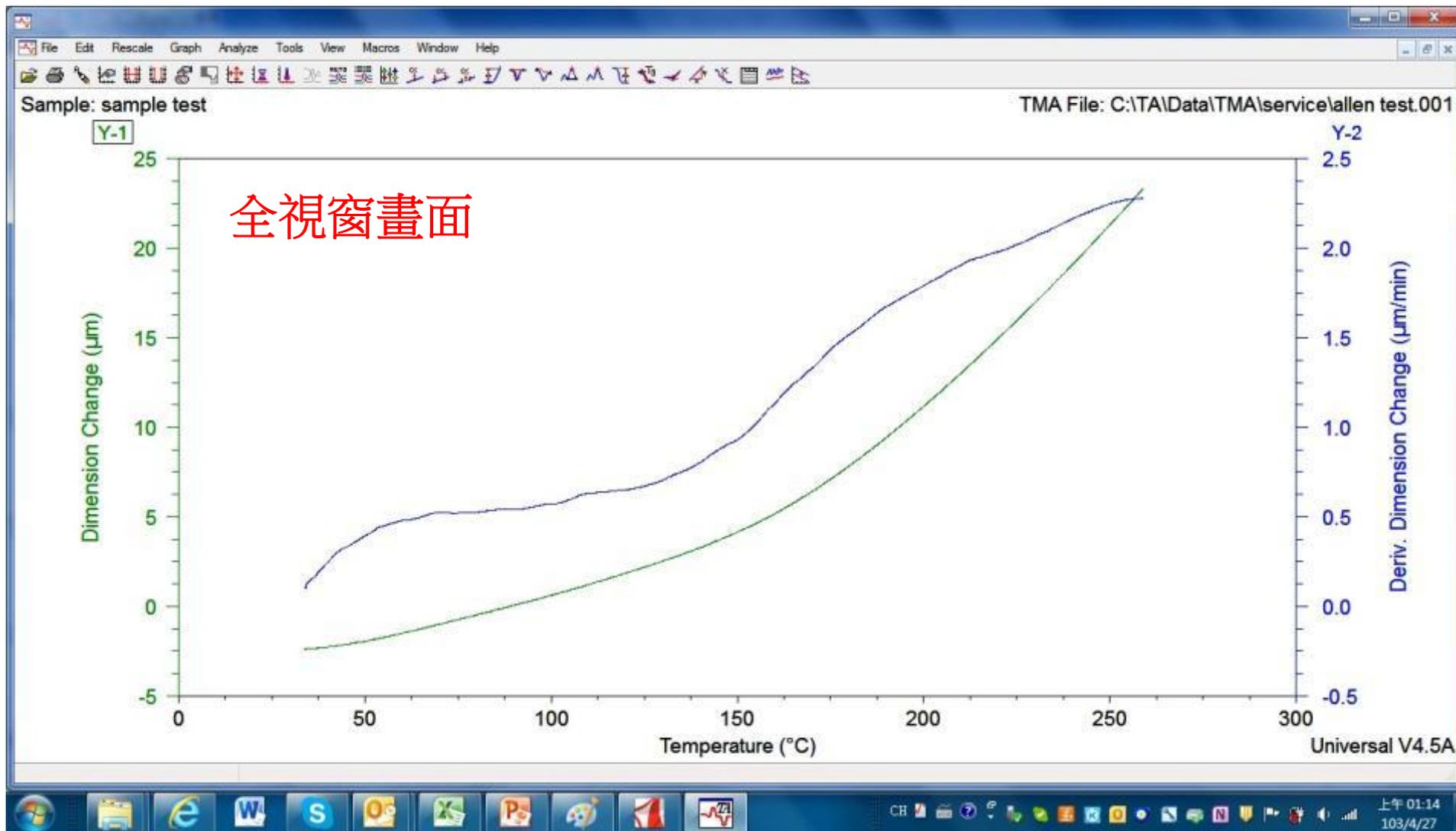


所有功能確認後  
點選OK開啟檔案  
圖形

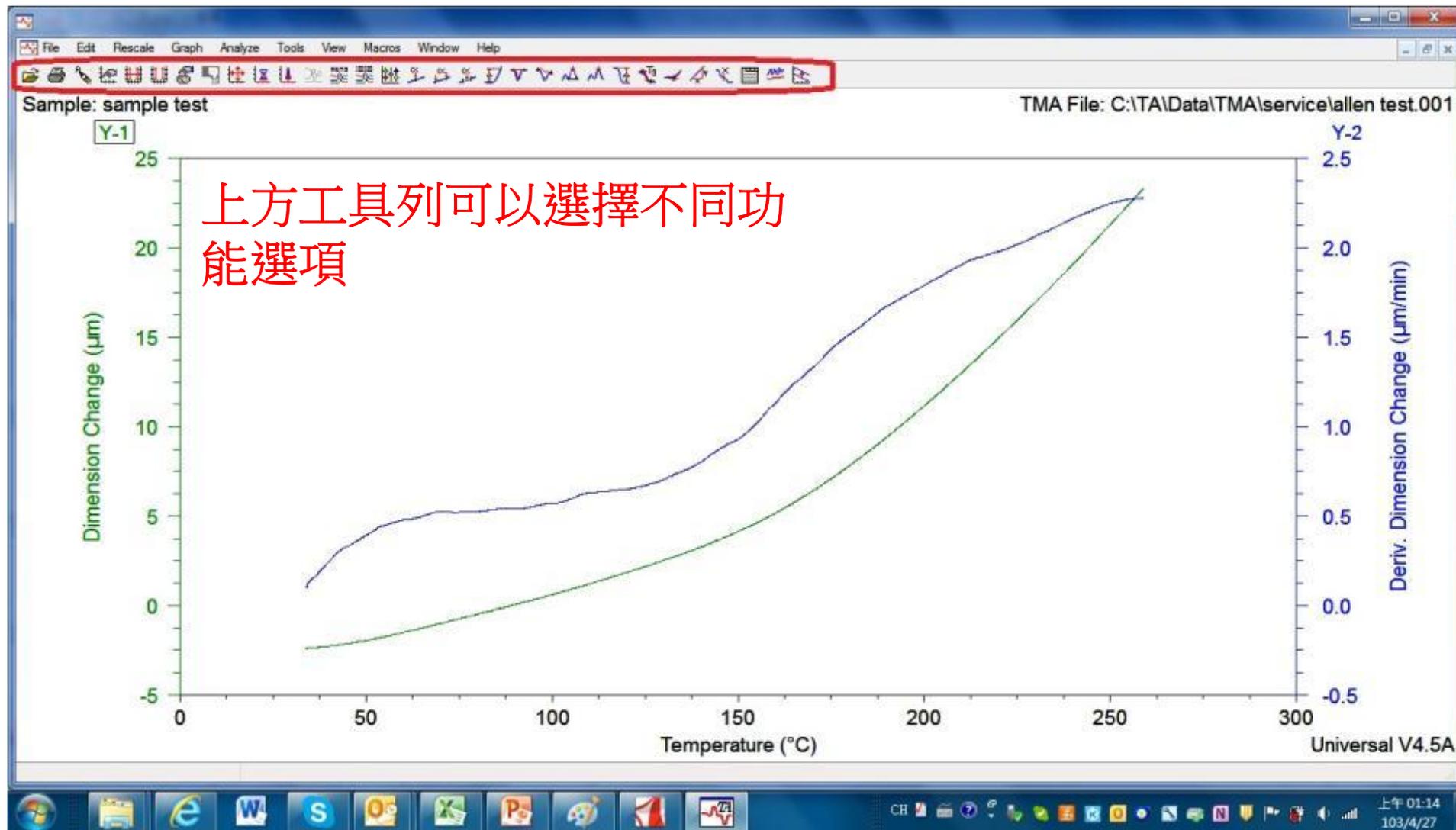
# 分析軟體(簡易示範)



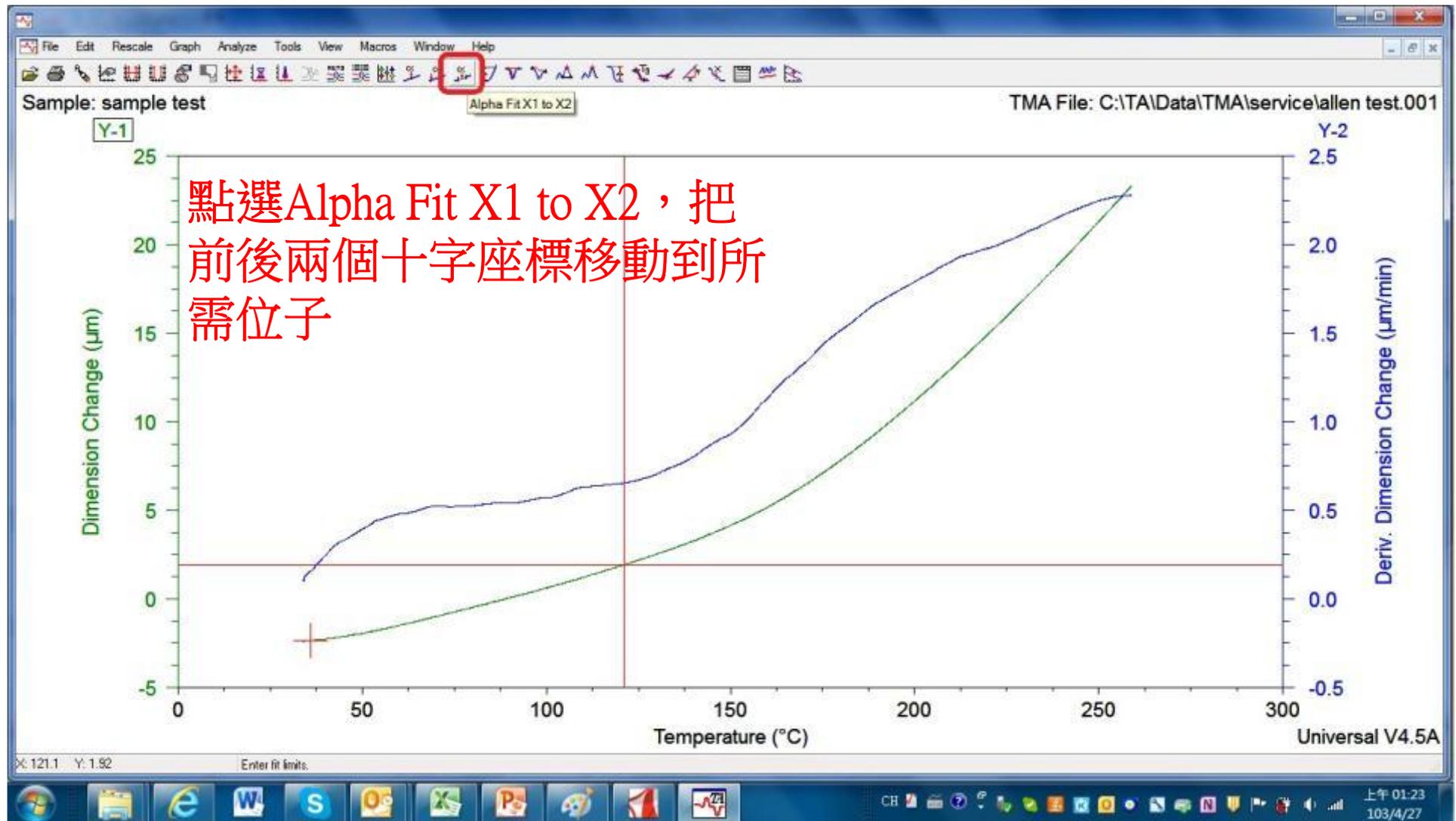
# 分析軟體(簡易示範)



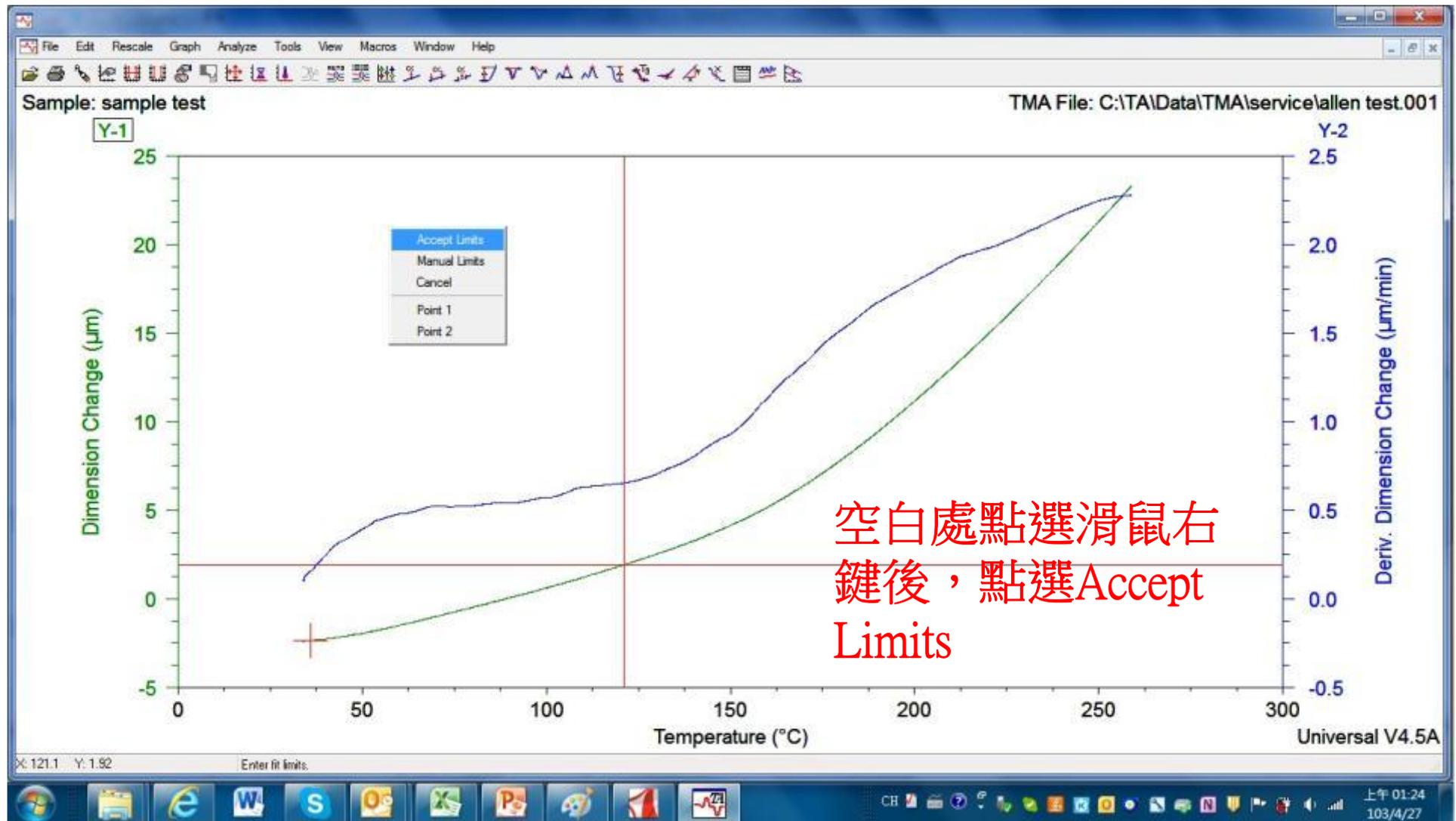
# 分析軟體(簡易示範)



# 分析軟體(簡易示範)

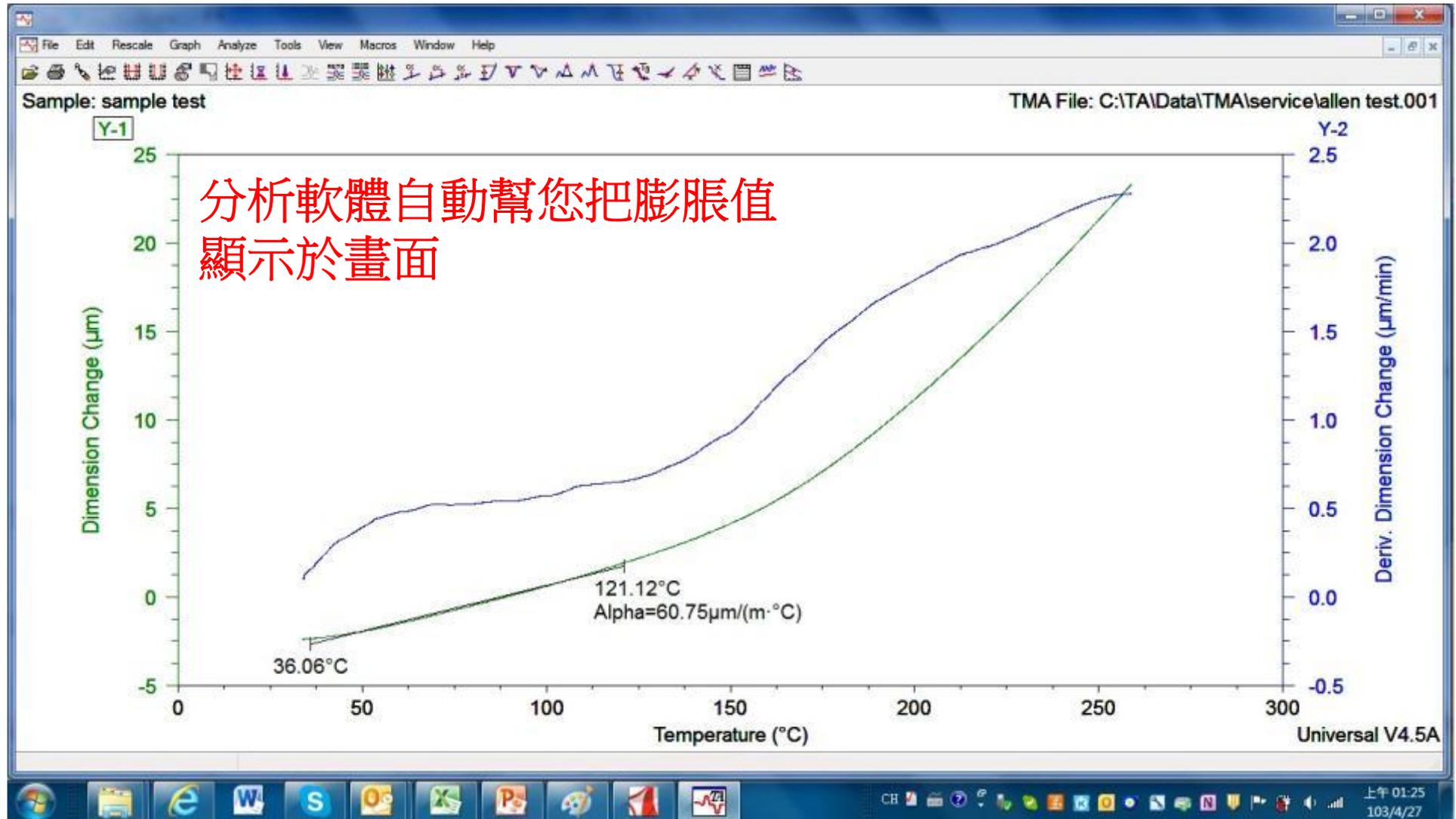


# 分析軟體(簡易示範)

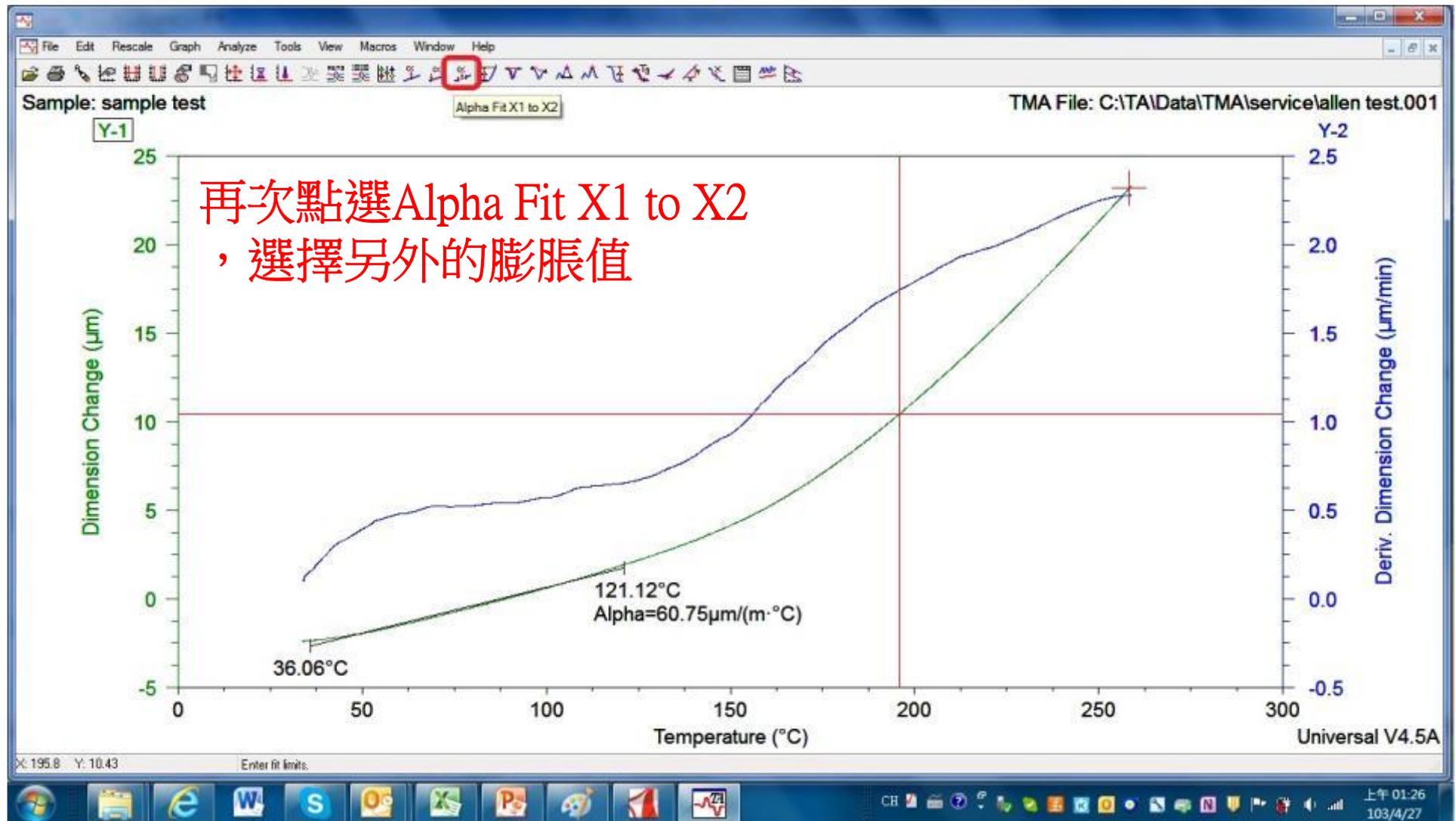


空白處點選滑鼠右  
鍵後，點選Accept  
Limits

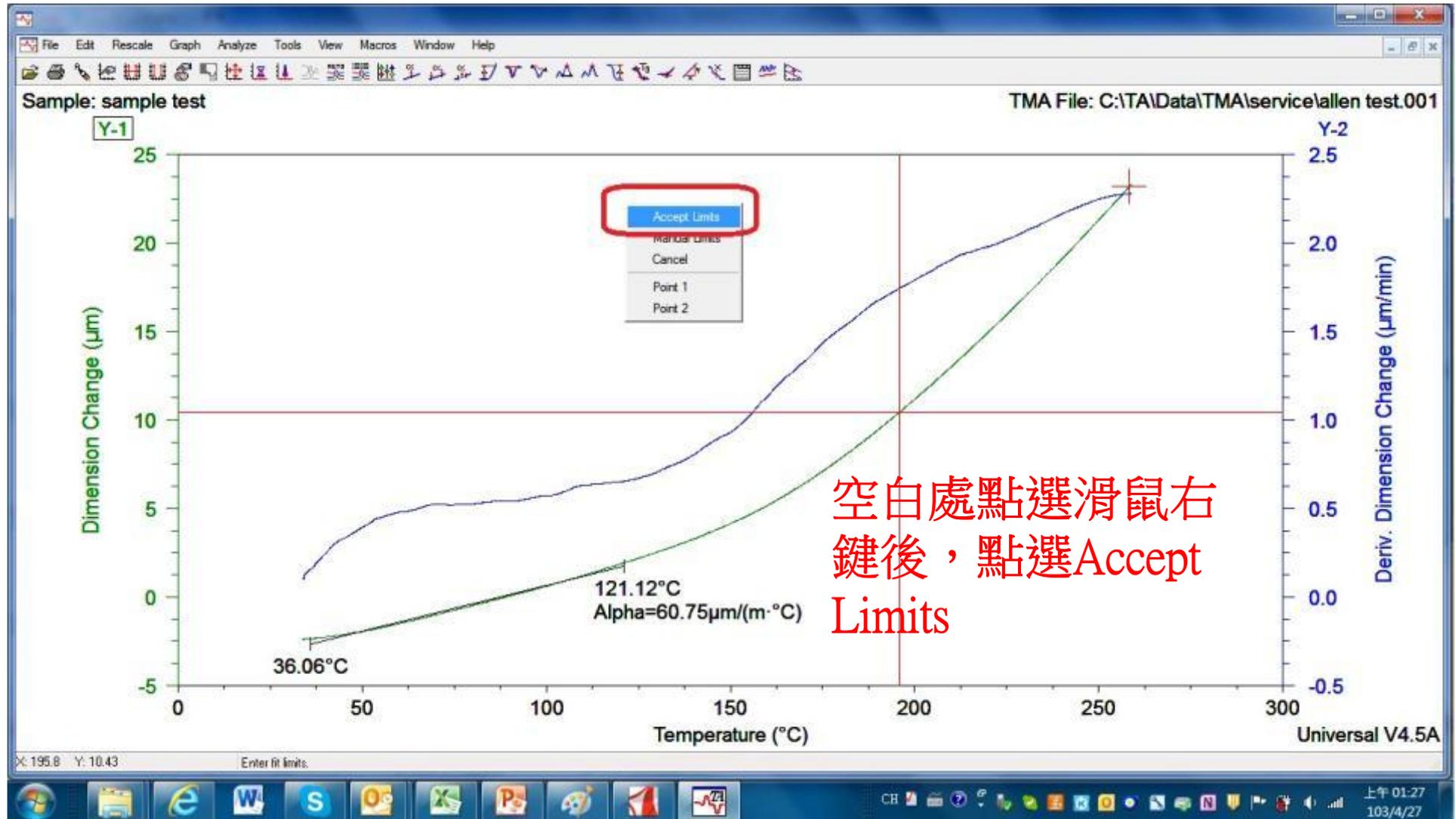
# 分析軟體(簡易示範)



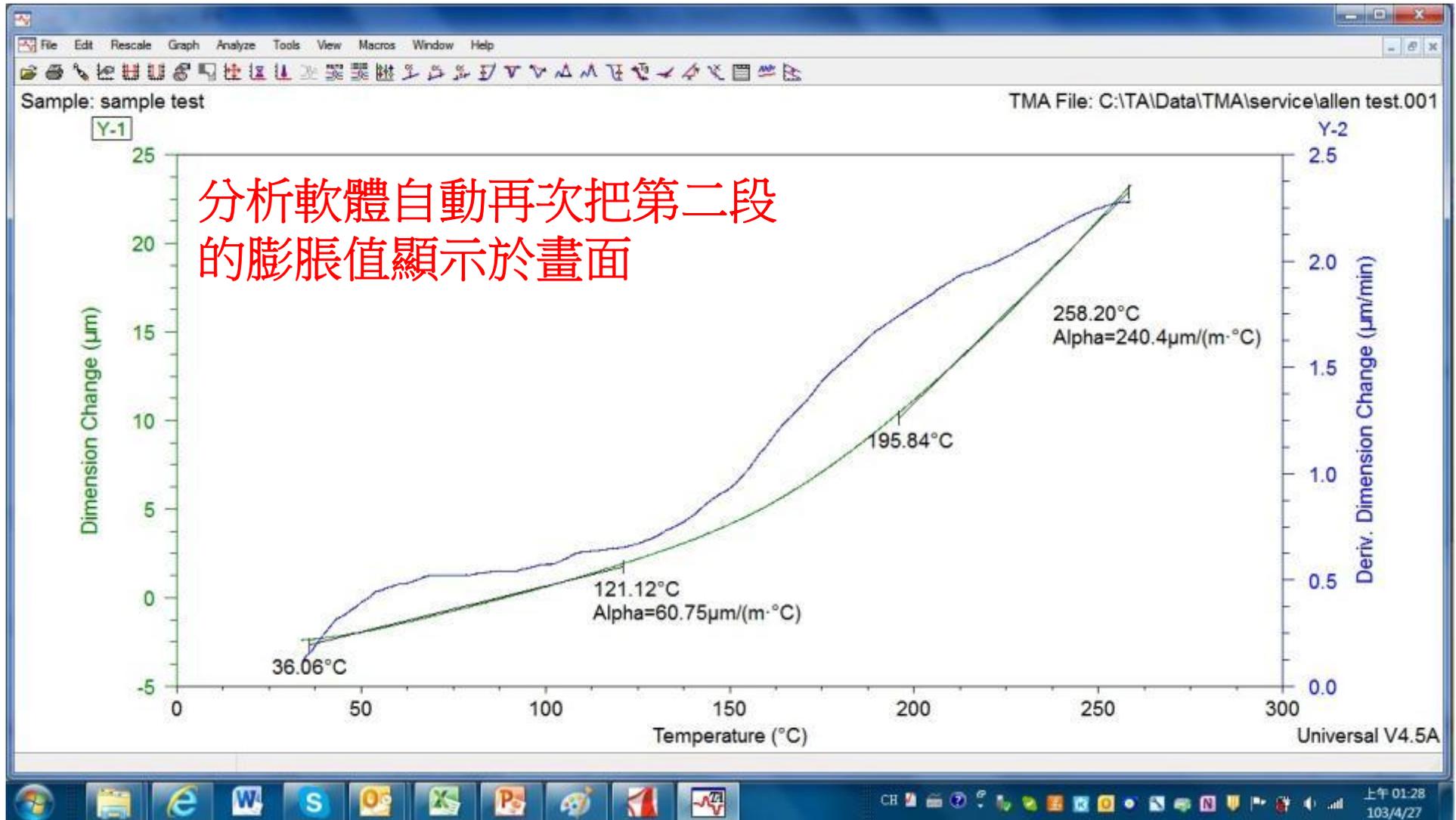
# 分析軟體(簡易示範)



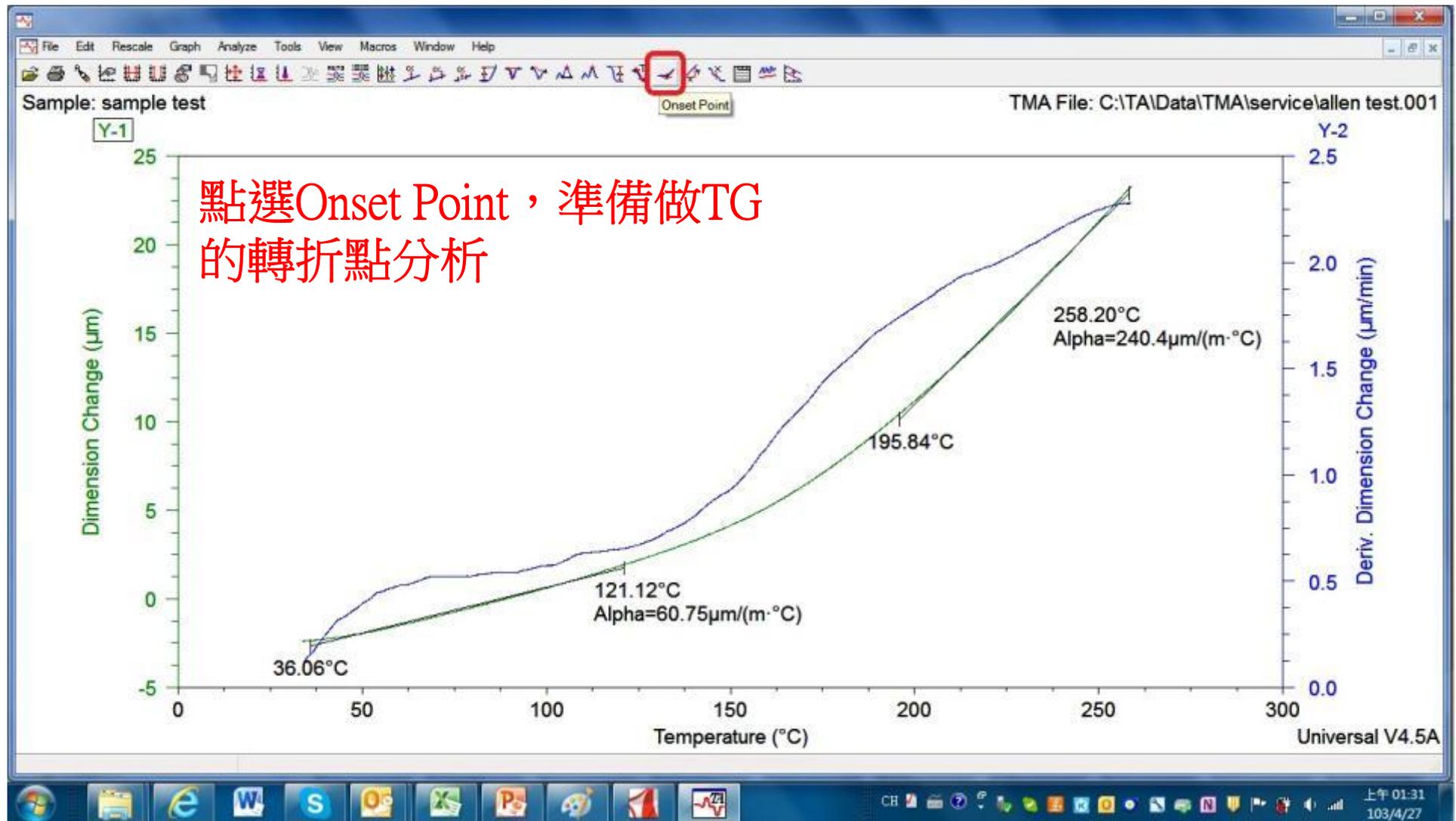
# 分析軟體(簡易示範)



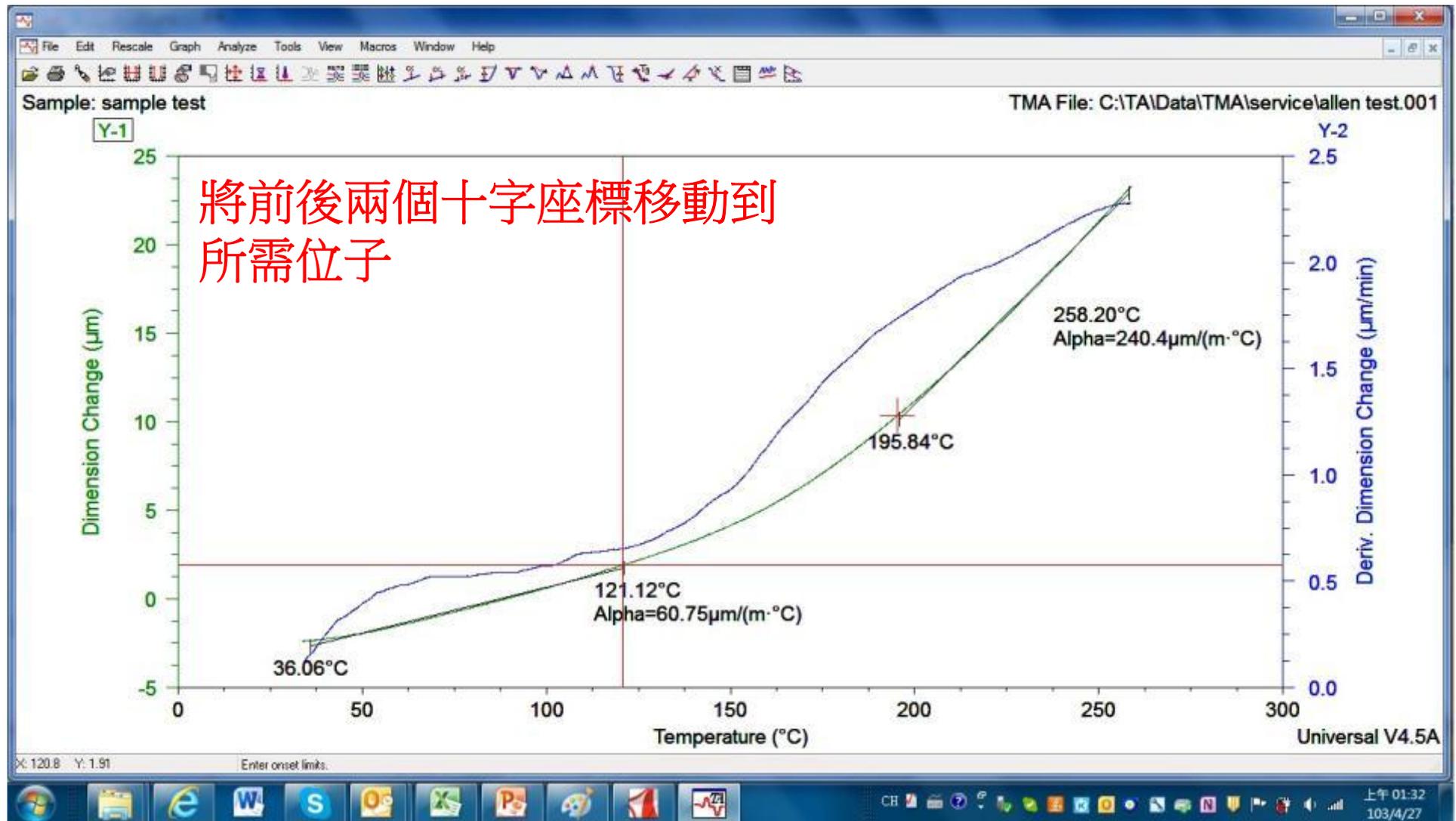
# 分析軟體(簡易示範)



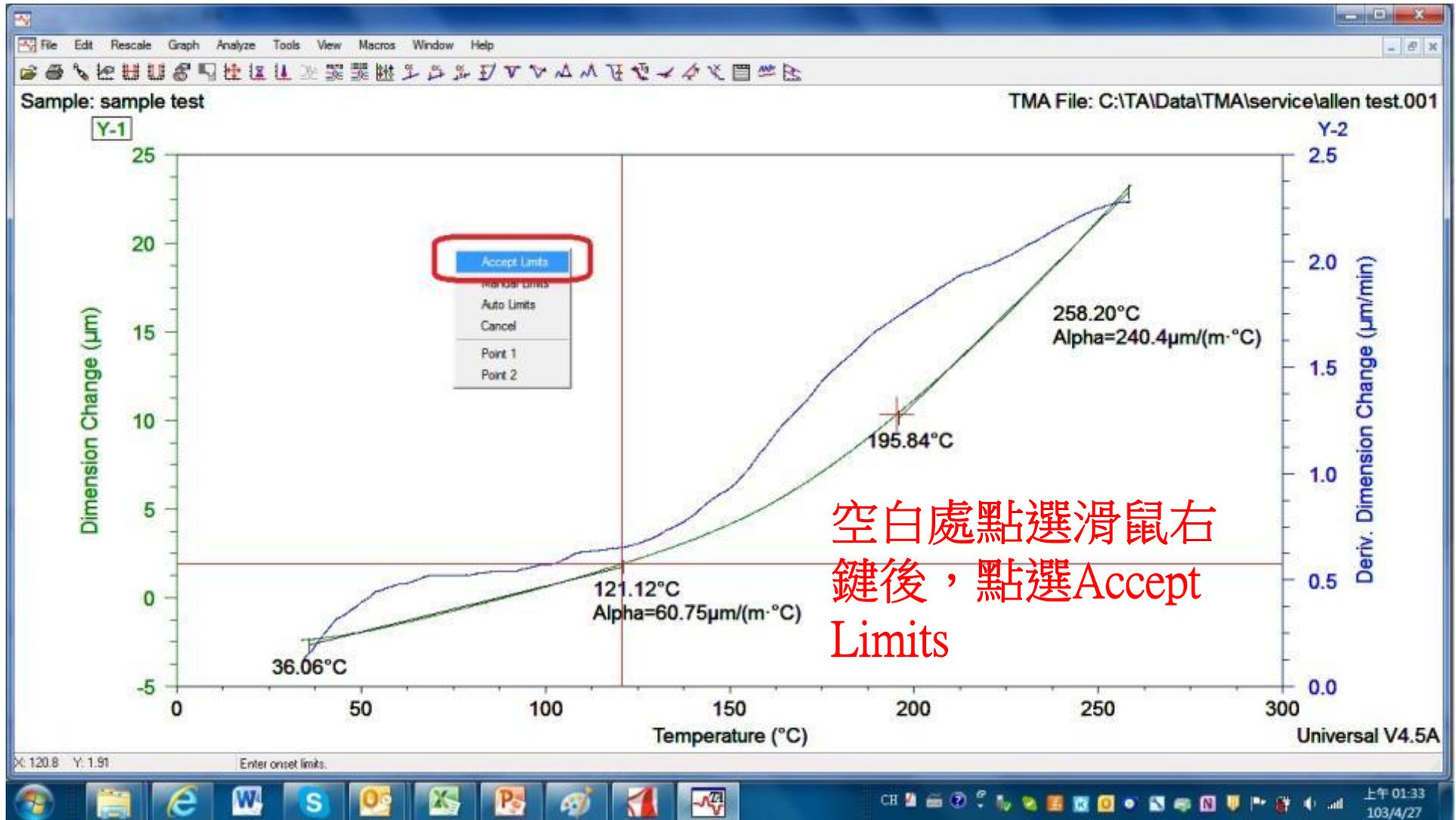
# 分析軟體(簡易示範)



# 分析軟體(簡易示範)

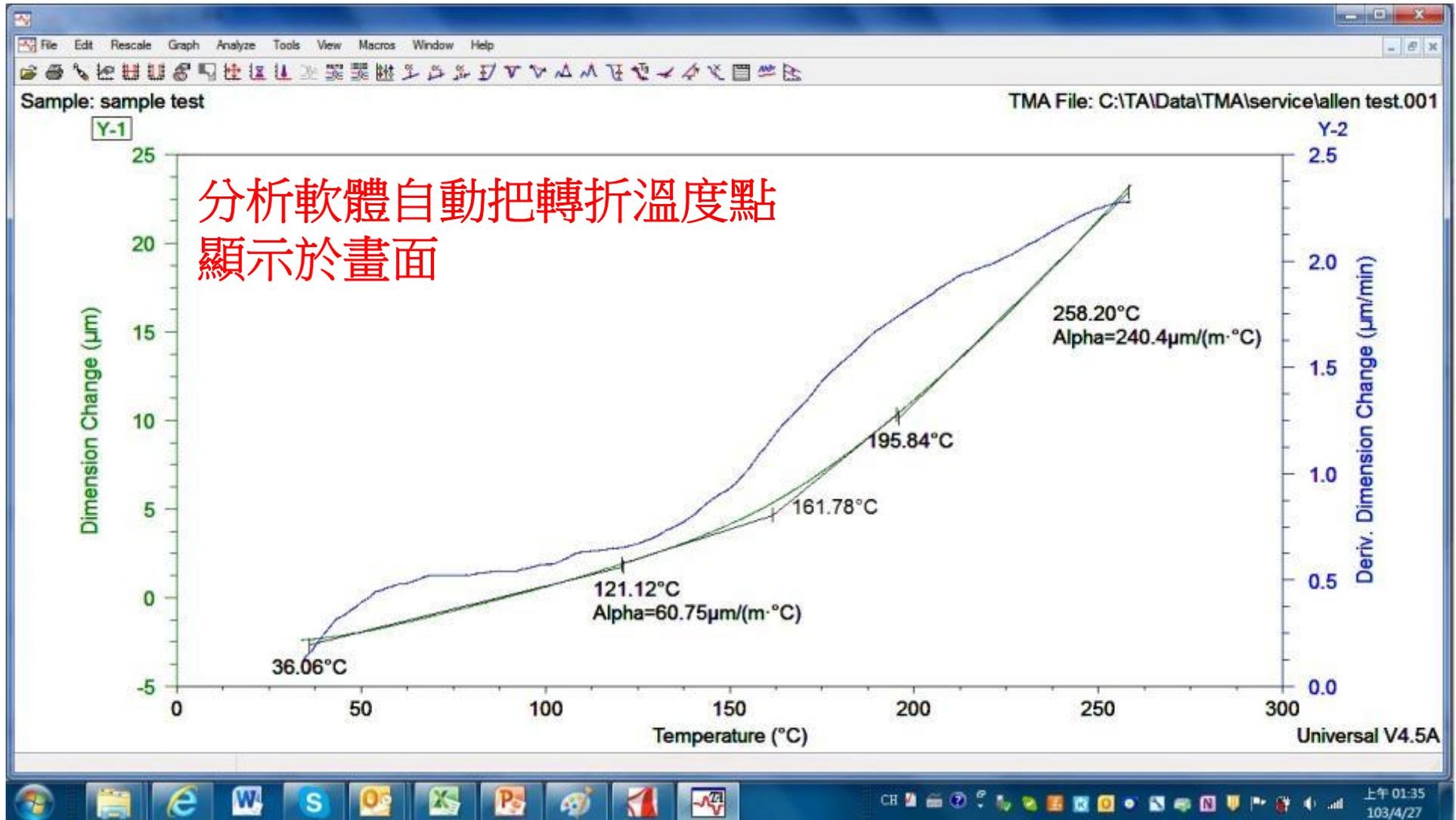


# 分析軟體(簡易示範)

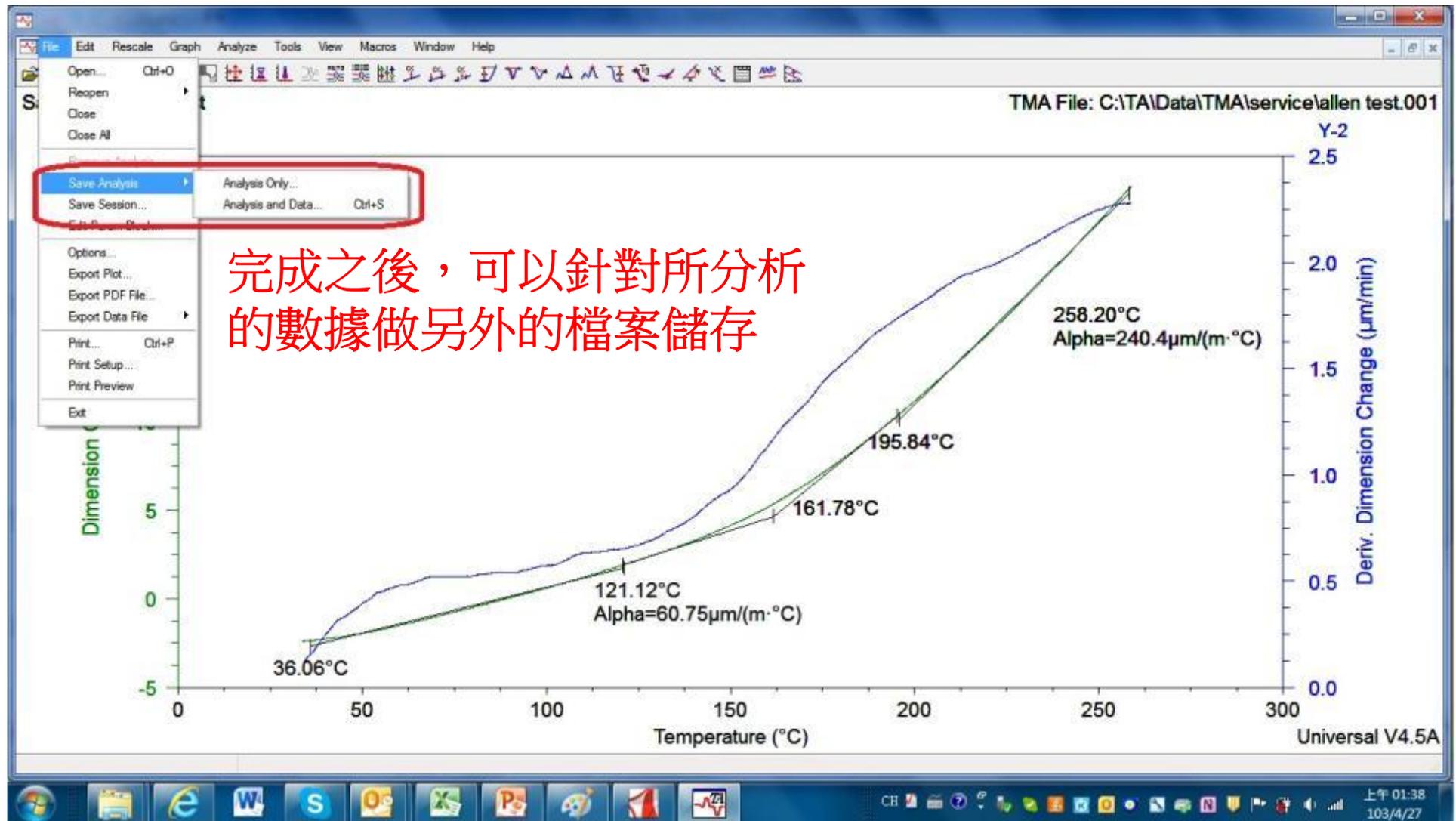


空白處點選滑鼠右  
鍵後，點選Accept  
Limits

# 分析軟體(簡易示範)

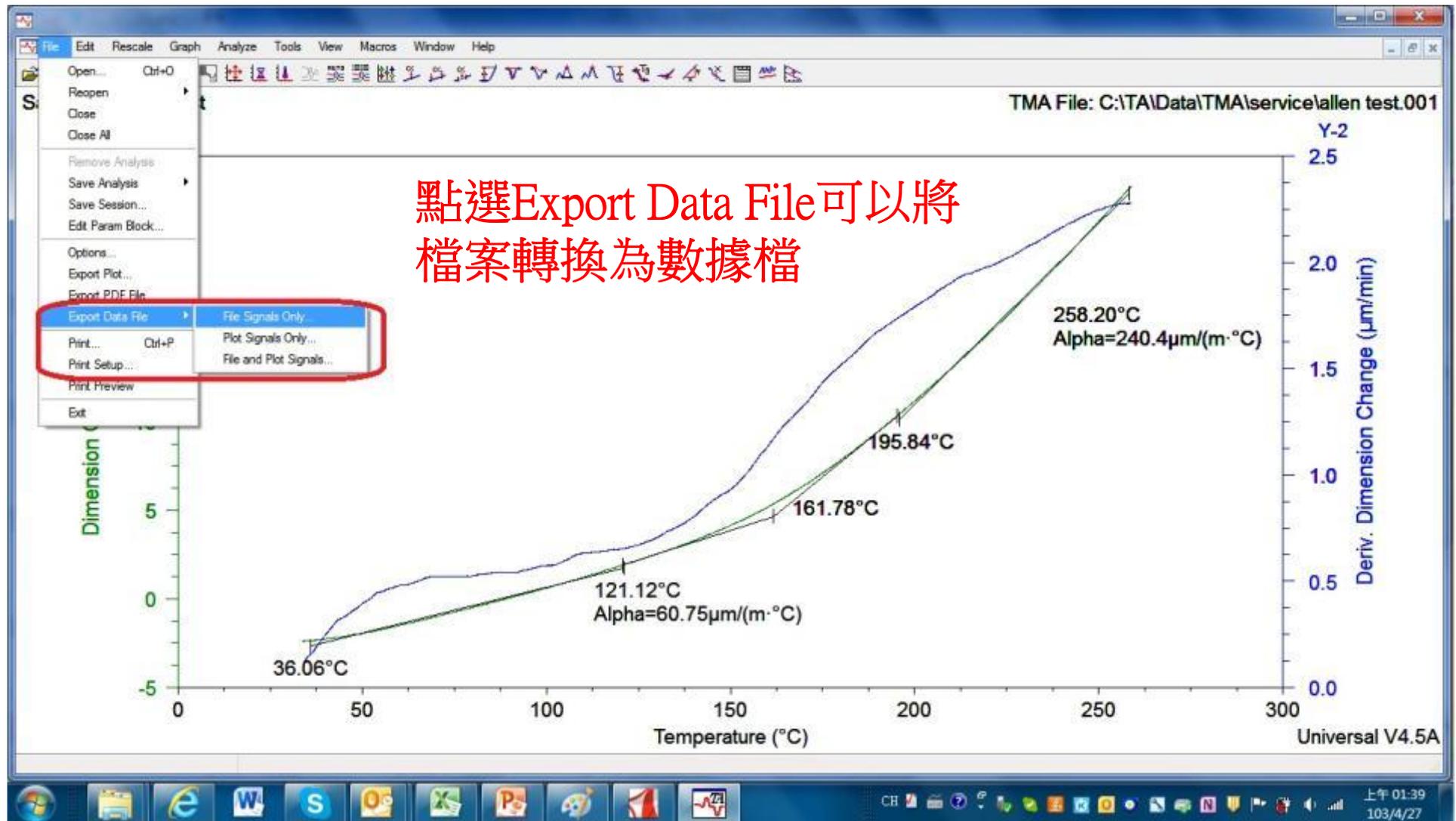


# 分析軟體(簡易示範)

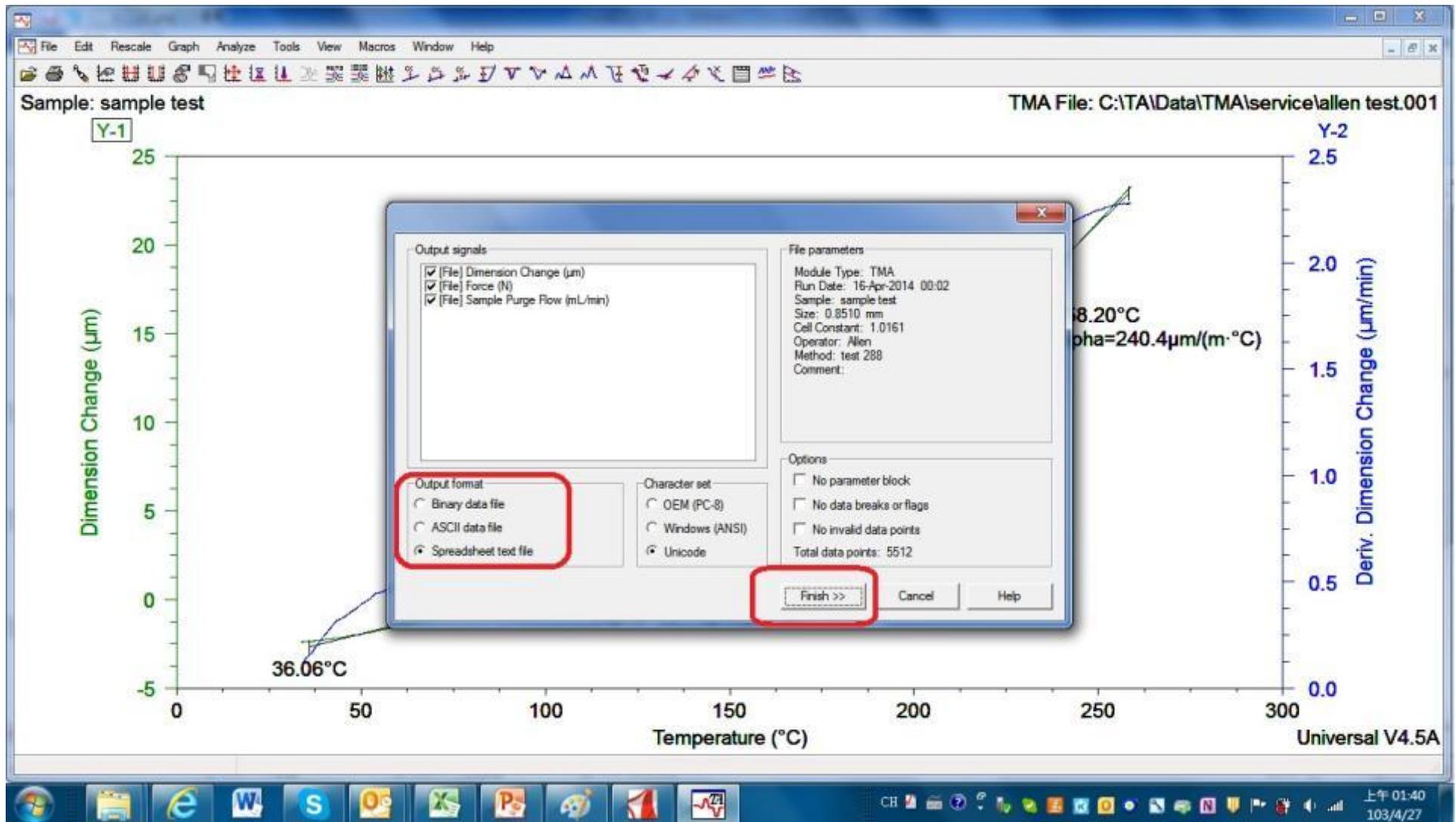


完成之後，可以針對所分析的數據做另外的檔案儲存

# 分析軟體(簡易示範)



# 分析軟體(簡易示範)



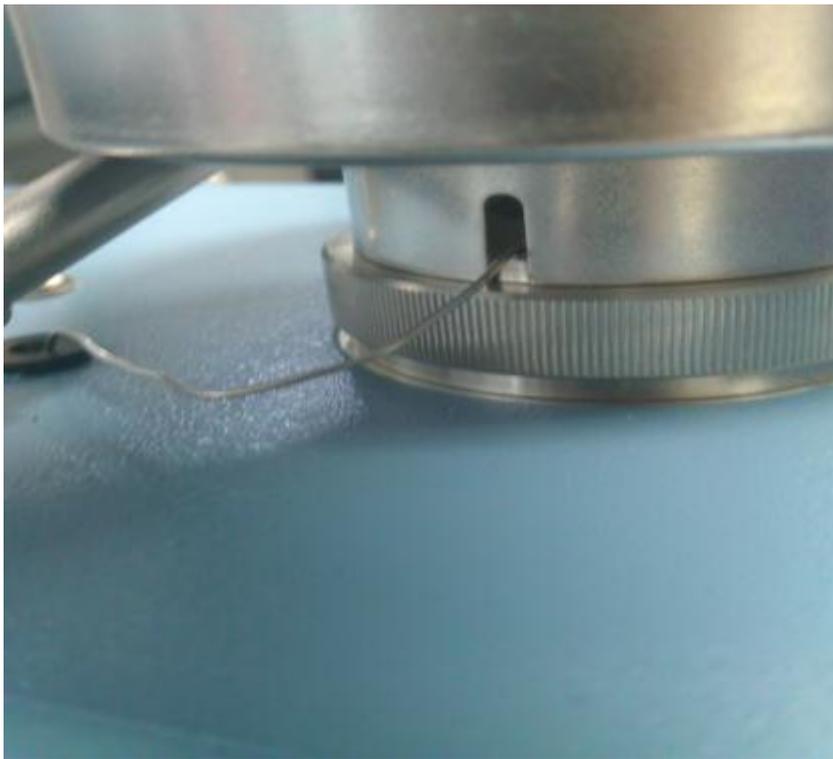
# 平時保養注意事項

- 注意氣體鋼瓶的是否有開啟或關閉
- 儀器關機後，後面的電源開關確認關閉



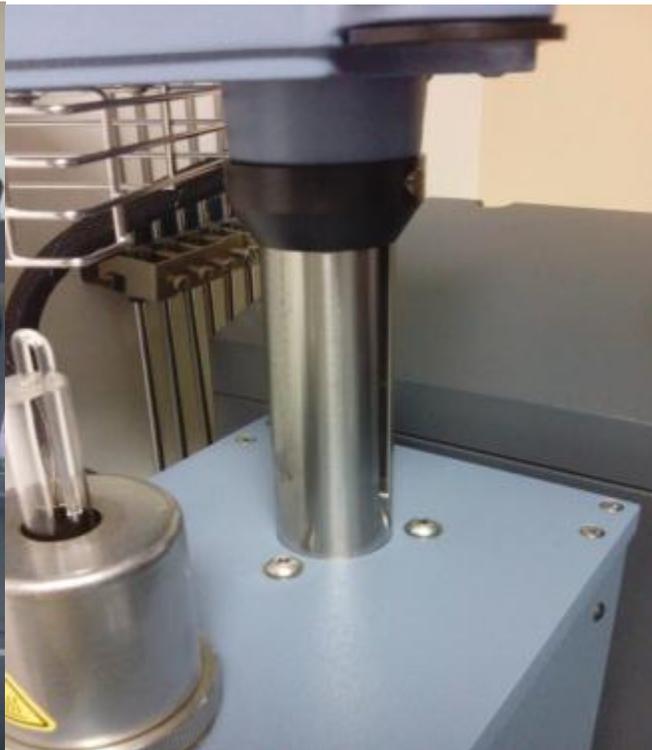
## 平時保養注意事項

- 每次更換探針後，一定要注意熱電偶必須穿過Stage保護蓋的預留孔，避免擠壓熱電偶。
- TMA長時間使用後，接頭容易鬆脫，須把接頭重新安裝妥善。



# 平時保養注意事項

- 爐子上面必須確認，把低溫保護鋁杯取出。
- 爐子上升下降軸桿須保持乾淨滑順。
- 熱電偶的頂端勿重複彎折。



## 平時保養注意事項

- 安裝探針右手抓探針時請勿施於太大力量。
- 取出探針後務必放回原本的盒內，避免不小心折斷。
- 熱電偶的頂端勿重複彎折。



# 維修工時合約與PLUS合約

## 維修工時合約

### 1.維護方式:

- a.全年度無限次數維修工時費與交通費用一律免費。
- b.所有維修零組件和耗材享有10%折扣。
- c.提供一次年度證書校正，或年度保養.
- d.設備服務時間:周一至周五，早上08:30~下午17:30
- e.回應時間:(以接到叫修時間為準)  
24小時內電話回應查尋問題所在.

# 維修工時合約與PLUS合約

## PLUS合約

### 1.維護方式:

- a.全年度無限次數維修工時費與交通費用一律免費。
- b.非耗材之電子零組件部分損壞,一律免費更換。
- c.消費性零組件和耗材享有10%折扣。
- d.免費網路線上e-Training訓練課程。
- e.設備服務時間:周一至周五,早上08:30~下午17:30
- f.回應時間:(以接到叫修時間為準)
  - 24小時內電話回應查尋問題所在.
  - 三天內至現場查看及檢修.(以工作時間為主)

# 保固政策說明

- A. 從安裝當天起12月計算或是運送到客戶端起18個月計算，任何條件成立即開始計算保固時間。
- B. 下列物品為安裝時若有破損才可以免費保固更換：
  - 1. Glassware and Quartz Parts
  - 2. Thermocouples
  - 3. Gaskets/O-Rings
  - 4. CDs/DVDs
- C. 下列為90天保固期：
  - 1. 在全部保固政策之內沒有特別註明的維修替代品零件
  - 2. 維修人員修理配件
  - 3. 零件重新維修品
- D. 下列為限制性保固一年。(若因人為使用不當或腐蝕則不予與保固)
  - 1. Replacement TGA, SDT, DMA, TMA, ETC, and FCO furnaces and furnace cores

# 常見耗材備品



944122.901

標準探針



944126.901

穿透探針



944123.901

大頭探針



945051.901

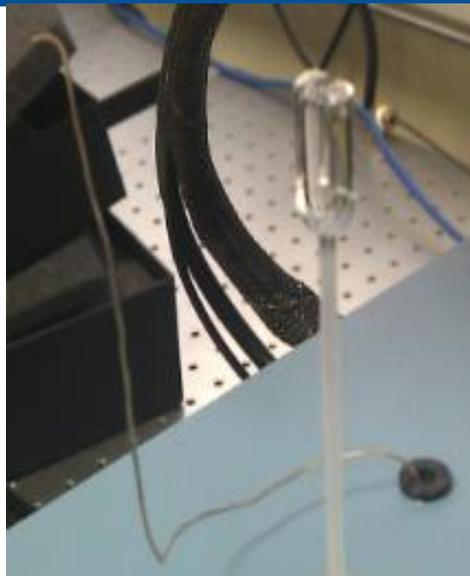
薄膜探針

# 常見耗材備品



944120.901

標準石英平台



944344.902

熱電偶



944121.901

薄膜石英平台



945025.901

加熱爐心

# 網路訓練及影片教學網址&FB

<http://www.tainstruments.com.tw/>

TA儀器台灣分公司網頁

The image shows a screenshot of a web browser displaying the TA Instruments website. The browser's address bar shows the URL <http://www.tainstruments.com.tw/>. The website features the TA Instruments logo at the top left. A navigation menu includes links for "TA儀器公司", "產品", "資源", "訓練" (highlighted with a red box), "新聞發布", and "聯繫我們". Below the navigation menu is a large banner image of laboratory equipment with the text "Controlled Stress and Controlled Strain Rheometers". To the right of the banner is a "TA Worldwide" section with a red box around the "訓練" link. The bottom of the page contains several promotional banners: "Buy One, Trade One!", "TA儀器成功收購LaserComp公", "Lifetime Testing by TGA WEBINAR LIVE & INTERACTIVE April 29, 2014 - 11 AM", and "Rubber Testing". The browser's taskbar at the bottom shows various application icons and the system clock indicating the time is 01:02 on 103/4/28.

# 網路訓練及影片教學網址&FB

The screenshot displays the TA Instruments website in a web browser. The browser's address bar shows the URL <http://www.tainstruments.com.tw/page.aspx>. The website features a navigation menu with links for 'TA儀器公司', '產品', '資源', '訓練', '新聞發布', and '聯繫我們'. A large banner image shows a man presenting to a group of people, with the word '訓練' (Training) overlaid. Below the banner, there is a section titled '課程安排' (Course Schedule) with a sub-link '網路訓練課程' (Online Training Course) highlighted by a red rectangle. To the right, there are sections for '安裝及訓練' (Installation and Training), '客製現場培訓' (Customized On-site Training), and '理論和應用課程' (Theory and Application Courses). The browser's taskbar at the bottom shows various application icons and the system clock indicating 01:09 on 103/4/28.

# 網路訓練及影片教學網址&FB

The screenshot shows a web browser window displaying the TA Instruments website. The browser's address bar shows the URL <http://www.tainstruments.com.tw/main.aspx?>. The page title is "短期技術訓練課程". The browser's address bar also shows several tabs, including "短期技術訓練課程". The browser's toolbar includes icons for home, star, and settings. The browser's status bar shows "Taiwan" and a flag icon.

The website content includes a navigation menu on the left with the following items:

- Microsoft 網站
- Windows Live
- 我的最愛列
- TA-INSTRUMENTS
- Home - TA Instrumen...
- SAP NetWeaver Portal
- TA Instruments Techn...
- Microsoft Exchange ...
- Thermal Analysis & A...
- 第一銀行個人網路銀行
- 筆記型電腦，桌上型...
- WS\_FTP Server Web ...
- 杜商股份有限公司
- TA儀器-熱分析 流變儀...
- Cryofab - dewars for ...
- Reset TA password
- MQ1 Elements v.2.0
- TA Instruments Intran...
- Home
- TA Instruments SkillP...
- ETC查詢
- 國內外Travel

The main content area of the website is titled "短期技術訓練課程". It includes a list of training opportunities:

- 結構訓練
- 理論與應用課程
- 實驗操作訓練課程
- 線上學習課程
- 短期技術訓練課程

The text on the page states: "TA Instruments offers a variety of training opportunities via the Internet. e-Training opportunities include the following:"

**QUICKSTART e-TRAINING COURSES**

QuickStart e-Training courses are designed to teach a new user how to set up and run samples on their thermal analyzer or rheometer. These 60-90 minute courses are available pre-recorded and can be taken 24/7 (24 hours a day, 7 days a week). These pre-recorded courses are available to all users at no charge. Typically these courses should be attended shortly after installation.

The following list of courses is highlighted in a red box:

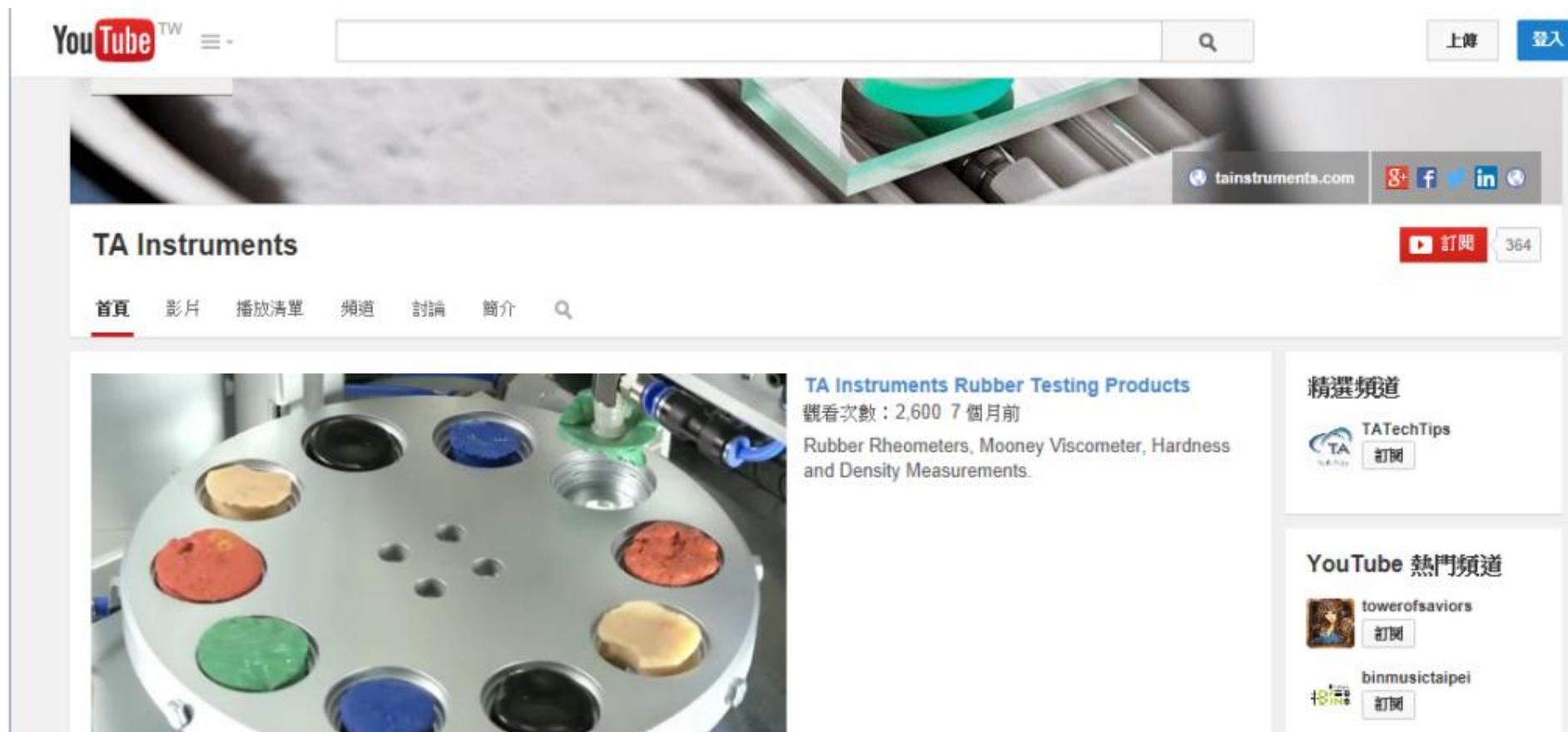
- Discovery DSC – TRIOS Data Analysis
- DSC QuickStart
- MDSC Quickstart
- TGA Quickstart
- Q600 SDT Quickstart
- DMA Quickstart
- TMA Quickstart
- Universal Analysis (UA) Quickstart
- Advanced Universal Analysis (UA) Quickstart
- AR Rheometer Quickstart

The browser's taskbar at the bottom shows the Windows Start button and several application icons, including Internet Explorer, Word, and PowerPoint. The system tray shows the date and time: "上午 01:12 103/4/28". The TA Instruments logo is visible in the bottom right corner of the browser window.

# 網路訓練及影片教學網址&FB

<http://www.youtube.com/user/TAInstruments>

TA 儀器介紹頻道



YouTube <sup>TW</sup> 登入

tainstruments.com

## TA Instruments

訂閱 364

首頁 影片 播放清單 頻道 討論 簡介

**TA Instruments Rubber Testing Products**  
觀看次數：2,600 7 個月前  
Rubber Rheometers, Mooney Viscometer, Hardness and Density Measurements.

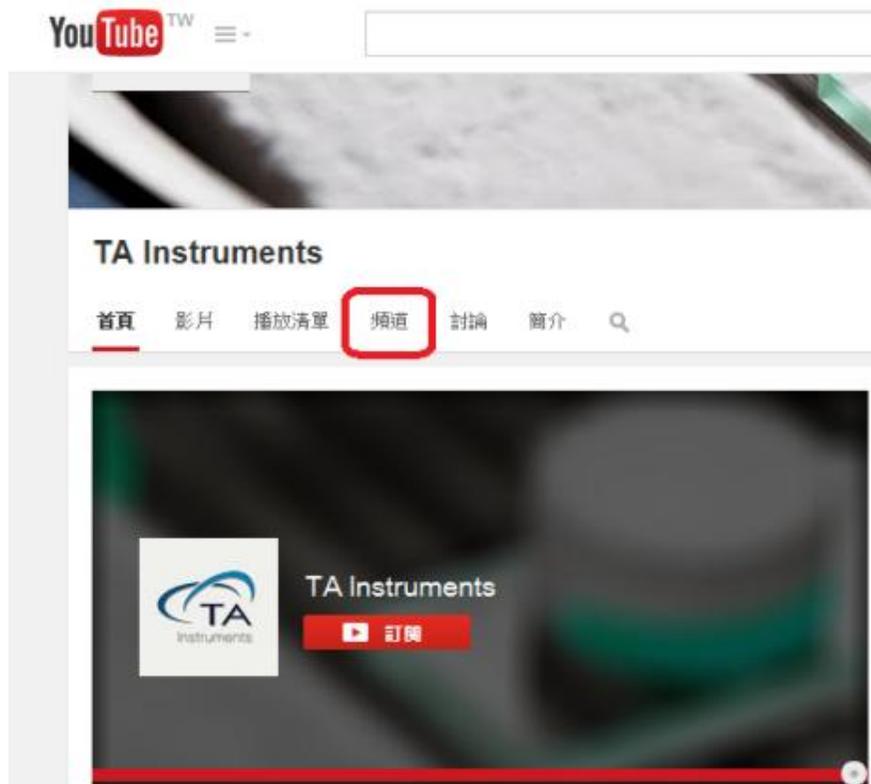
**精選頻道**  
TATechTips 訂閱

**YouTube 熱門頻道**  
towerofsaviors 訂閱  
binmusicitaipei 訂閱

# 網路訓練及影片教學網址&FB

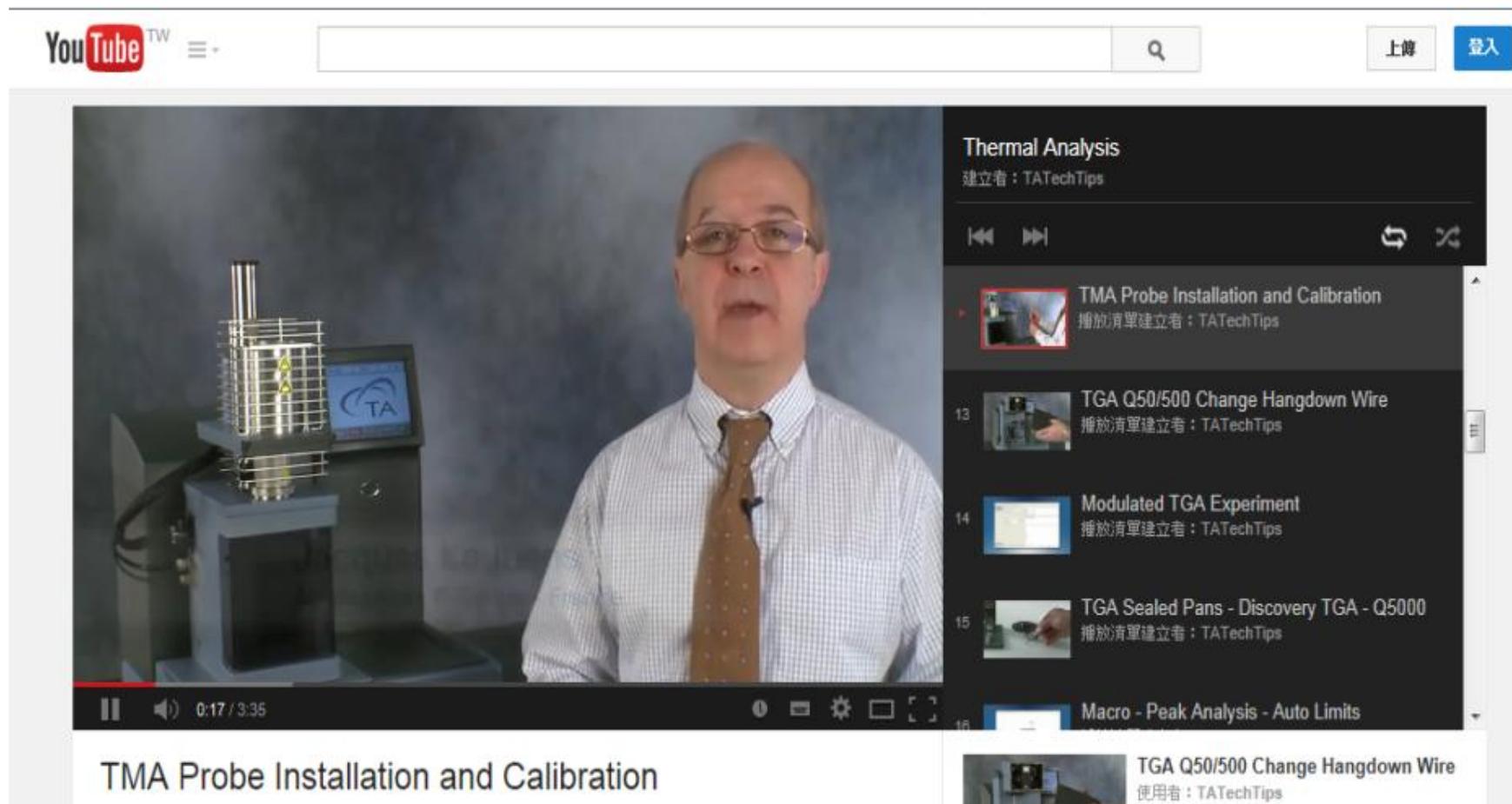
<http://www.youtube.com/user/TATechTips>

TA 儀器教學頻道



# 網路訓練及影片教學網址&FB

- 此網頁內有各項針對TA儀器的軟體及儀器校正操作教學



The image shows a screenshot of a YouTube video player. The video is titled "TMA Probe Installation and Calibration" and is from the channel "Thermal Analysis". The video content shows a man in a white shirt and tie speaking, with a thermal analysis instrument (TMA) visible in the background. The video player interface includes a search bar, a play button, and a progress bar showing 0:17 / 3:35. To the right of the video player, there is a list of related videos, including "TMA Probe Installation and Calibration", "TGA Q50/500 Change Hangdown Wire", "Modulated TGA Experiment", "TGA Sealed Pans - Discovery TGA - Q5000", and "Macro - Peak Analysis - Auto Limits".

# 網路訓練及影片教學網址&FB

<https://www.facebook.com/tainstruments>

TA儀器 Facebook網頁

The image shows a screenshot of a web browser displaying the Facebook page for TA Instruments. The browser's address bar shows the URL <https://www.facebook.com/tainstruments>. The page features a header with the TA Instruments logo and a navigation menu. The main content area displays a row of various laboratory instruments, including thermal analyzers and rheometers. Below the instruments, the TA Instruments logo is prominently displayed, followed by the company name "TA Instruments" and a 4.6-star rating based on 7 reviews. The page also shows 1,201 likes and 32 people talking about the page. A red box highlights the "讚" (Like) button. The right sidebar contains promotional posts, including one for a "大買家量販網路店" (Big Buyer Wholesale Online Store) offering a 500元 cash bonus. The bottom of the page shows the Windows taskbar with various application icons and the system tray displaying the time as 10:46 AM on 103/4/28.

# TMA Q400故障排除

## Message 81

Bad temperature reading. Hardware error. Run terminated.

---

### **Problem:**

The difference between the heater temperature thermocouple and the sample temperature thermocouple is too large.

### **Solution:**

Try one of the following procedures to solve the problem, depending on the instrument currently displaying the error. Then restart the experiment.

1. Check the sample thermocouple and replace if necessary. (DSC, TGA, TMA, SDT)
2. Check the reference thermocouple continuity, it should be about 2 ohms. (SDT)
3. Check the heater thermocouple and replace if necessary (DSC, TGA)
4. Clean the furnace housing. (TGA standard furnace, TMA, SDT)
5. Call TA Instruments for service.

## Message 120

Zero length, measure length, or close probe failed. Check probe.

---

### **Problem:**

The Dimension Change signal will not stabilize within a specified amount of time or no dimension change was detected.

### **Solution:**

Check your probe to make sure that it is seated properly, clear the stage, then repeat the operation. If the problem persists, call TA Instruments Service.

# TMA Q400故障排除

## Message 124

Probe or force calibration time-out.

---

**Problem:**

The Dimension Change signal will not stabilize within a specified amount of time because an applied force value could not be determined to balance the system.

**Solution:**

Check the probe to make sure that it is mounted properly, then repeat the operation. The probe should move freely with low (or no) force applied. If the problem persists, contact TA Instruments Service.

## Message 714

Run not ready to start.

---

**Problem:**

You have attempted to start a completed run which has not been reset yet. For example, the check mark is still displayed next to the run number.

**Solution:**

Make sure that you have completed all of the required fields to provide the information that instrument needs to perform the run, then retry the operation. Reset the run by clicking on the check mark next to the run number in the sequence list or right click on the run and select **Reset Run** from the pop-up menu.

# TMA 關機順序

- 關機步驟：
  - 等待TMA的空氣冷卻自動停止或是爐溫回到室溫
  - 完成後,執行Control \ Shutdown Instrument
  - 出現Shutdown視窗,按Start
  - 此時視窗自動關閉,TMA進行關機前參數回存動作
  - 等待TMA的LCD螢幕提示可以關機後,便可關閉TMA電源
  - 關電腦
  - 關氮氣/空氣

TMA Q&A

# 現場TMA操作問題 Q & A

# TA Taiwan 維修人員

- 北區維修:

張永威

- 手機 0972-633337
- E-mail [AChang@tainstruments.com](mailto:AChang@tainstruments.com)

- 中區維修:

張瑞銓

- 手機 0972-633336
- E-mail [RChang@tainstruments.com](mailto:RChang@tainstruments.com)

- 南區維修:

- 程鈴雄

- 手機 0972-633338
- E-mail [SCheng@tainstruments.com](mailto:SCheng@tainstruments.com)

# Thank You

## TA Instruments

The World Leader in  
Thermal Analysis, Rheology,  
and Microcalorimetry

[www.tainstruments.com](http://www.tainstruments.com)

