ORIGIN® 2017
Graphing & Analysis
ORIGINPRO® 2017
Graphing & Analysis

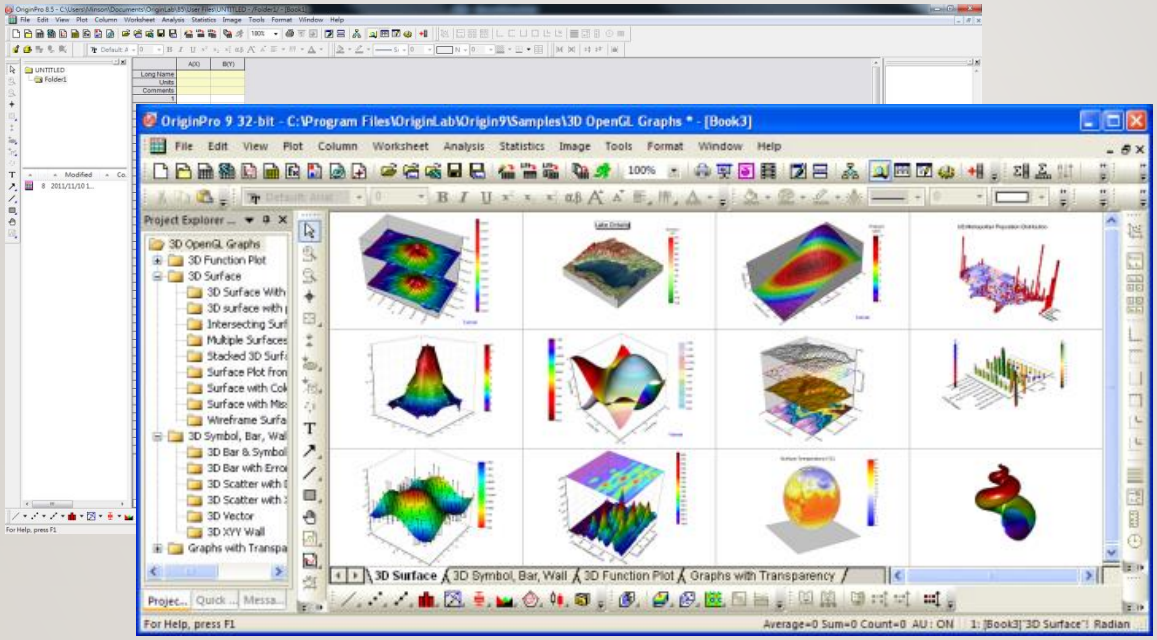
General introduction

ORIGINLab原廠合格認證
實密科技ORIGIN產品經理
張旭男 *sherman chang*

OUTLINE

- 簡介Origin/OriginPro
- Origin/OriginPro 的一般到進階繪圖功能
- Origin/OriginPro 的資料分析功能
- Origin/OriginPro2017新功能
- Origin/OriginPro的應用案例

ORIGIN/ORIGINPRO



資料數據導入/查詢/連結

可以直接導入**ASCII, CSV, Excel®**以及第三方格式的資料數據。可查詢資料庫， 從**LabVIEW™**、**MATLAB®**、 **Excel®**等發送程式和指令到**Origin**上進行後續任務

發表/展示/客製化報告

您可以透過多種方式快速地在**ORIGIN**創造出精美圖表與客製化報告；包含可以一指搞定圖表嵌入**Word®**和**PowerPoint**文件中。

導入新數據後，**ORIGIN**能自動更新分析與圖表並產生報告

OriginLab®

數據繪圖/瀏覽數據

輕鬆快速地產生高品質的圖表。可以保存能重複使用的繪圖模板與主題範本。您可以在圖表中直覺畫讀取數據資料，或是自由地旋轉、縮放或是滾動3D圖層查看局部區域。

消除/簡化資料與分析

使用帶有圖形化介面的**Gadget**工具在圖上直接產生互動式的分析結果；包含非線性擬合、積分等高階分析工具。

ORIGINLab原廠合格認證
實密科技**ORIGIN**產品經理
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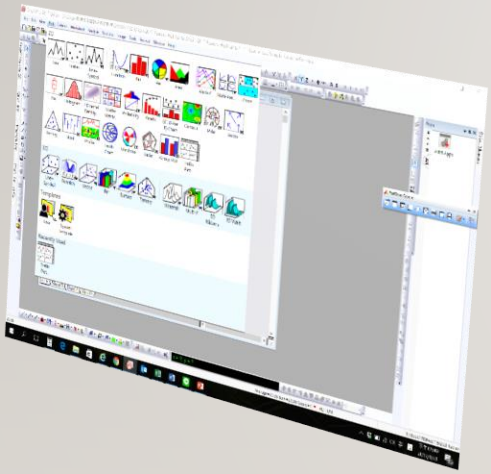
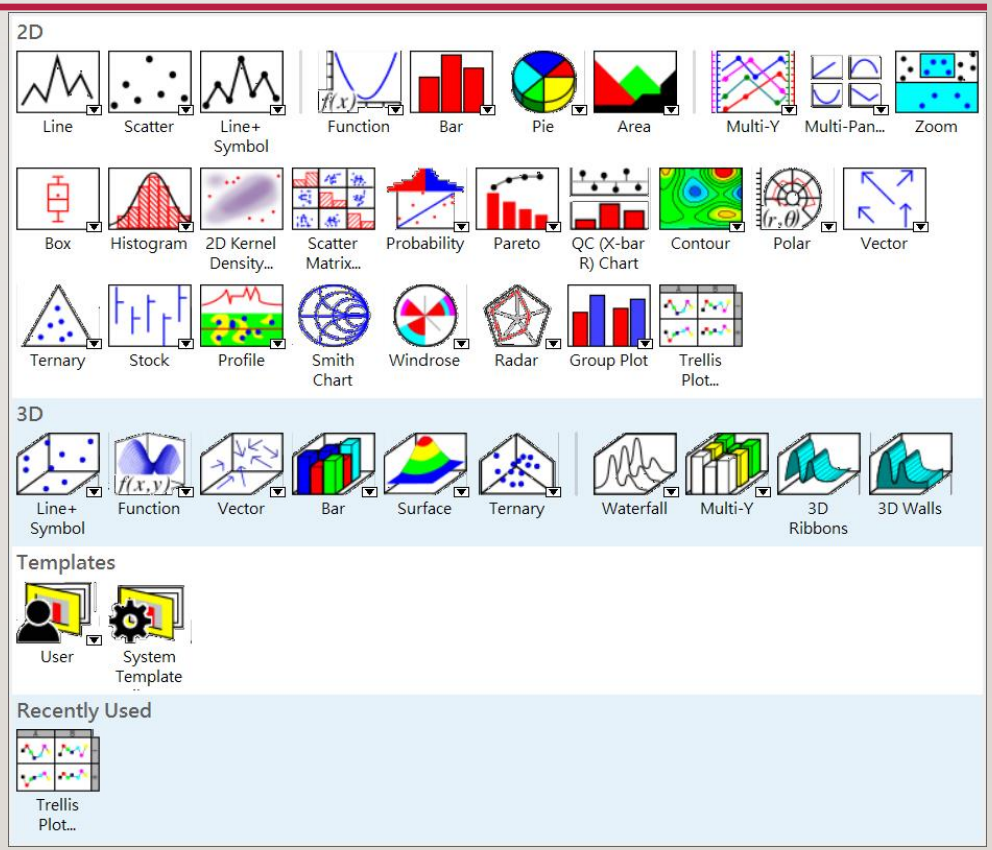
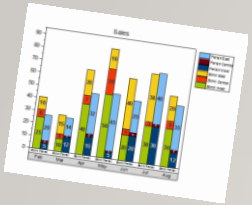
ORIGIN/ORIGINPRO 的繪圖功能

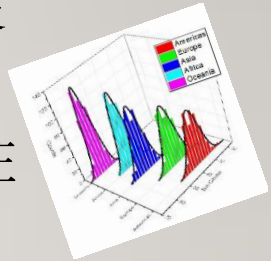


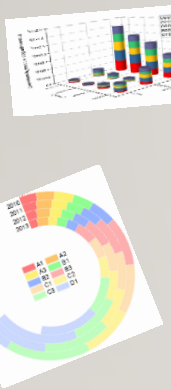


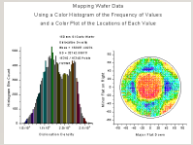
柱狀圖/直方圖、長條圖(BAR CHART)和圓餅圖

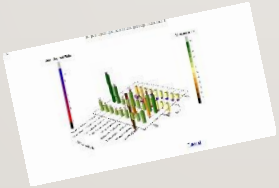


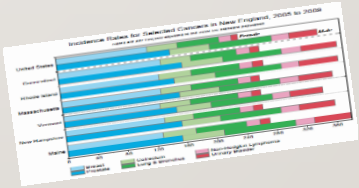
- 柱狀圖/直方圖、長條圖(Bar Chart)和圓餅圖是廣泛地使用在各領域的基本繪圖種類，Origin可以支援包含基本型、堆疊(Stacked))和群組(Grouped)以及浮動(Floating)柱狀圖/直方圖、長條圖之外，也支援3D柱狀圖以及2D圓餅圖。

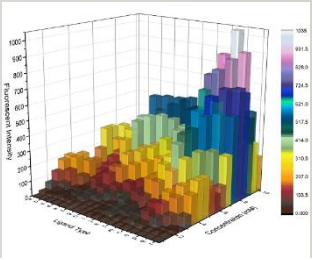


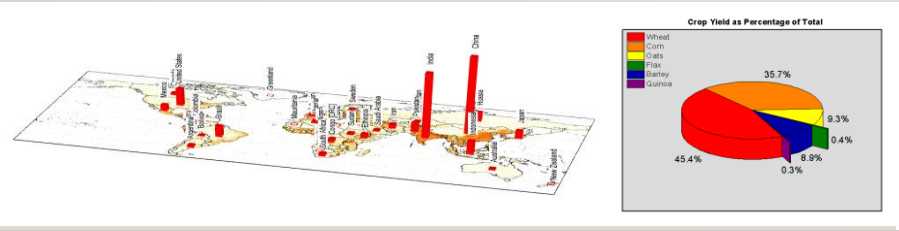


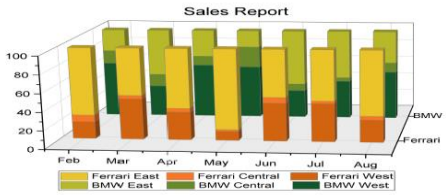


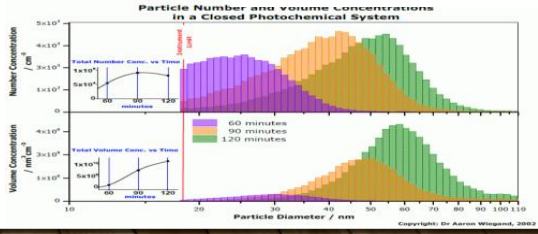




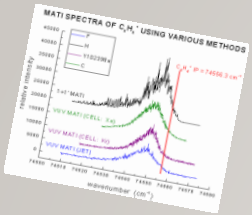


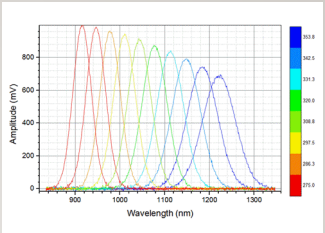


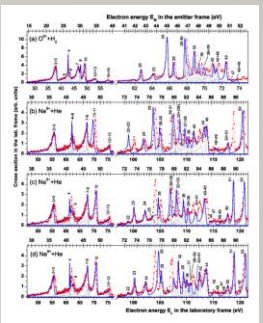


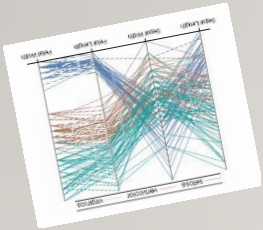


折線圖和符號圖
(LINE & SYMBOL GRAPH)

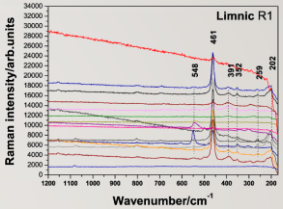


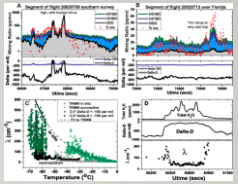




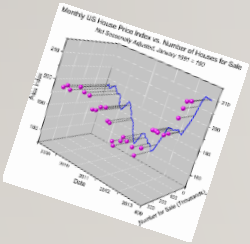


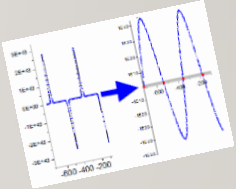
Origin支援包括:

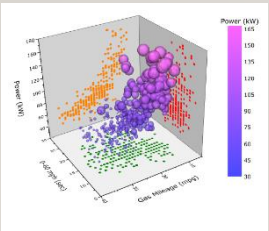


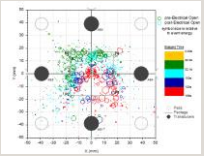


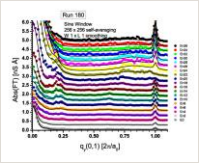
- 折線圖
- 散佈圖(Scatter plot):可以包含XY Error Bar，行散佈，水滴線(Drop line)，Color Map, Size Map。
- 折線圖和符號圖結合
- 區域圖(Area plot):單一區域，堆疊區域(Stacked Area)和填充區域(Fill Area)

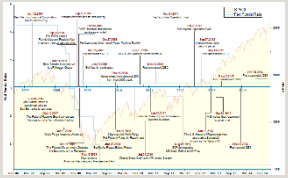


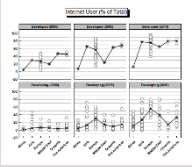


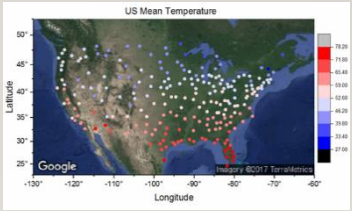




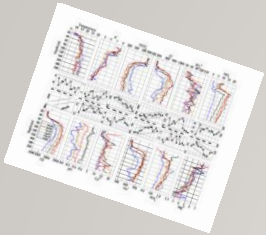


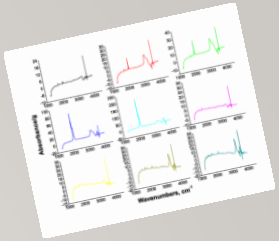






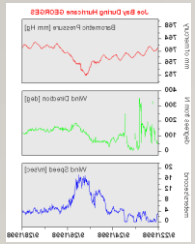
多軸(MULTI-AXIS)和多面板(MULTI-PANEL)圖型

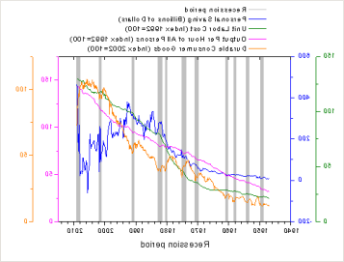


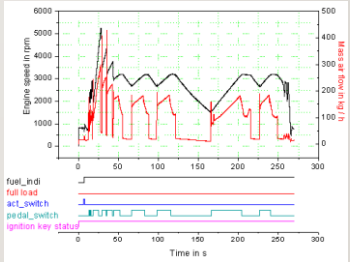


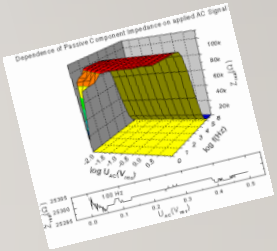
為了展現多重的數據資料在同一個圖型製作畫面，origin 提供底下兩種重要功能

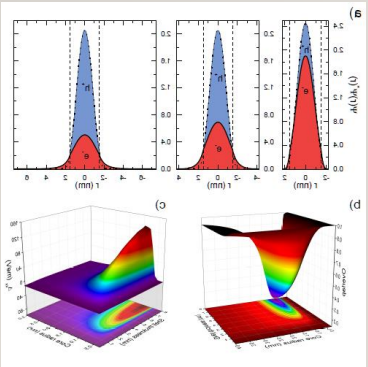
- 多軸圖型
- 多面板圖型

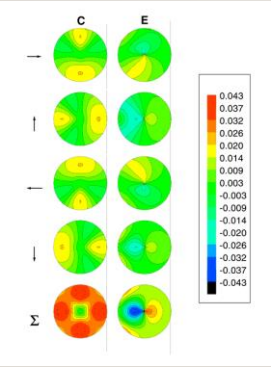


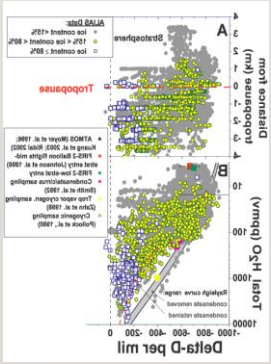


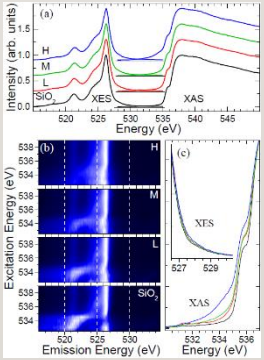


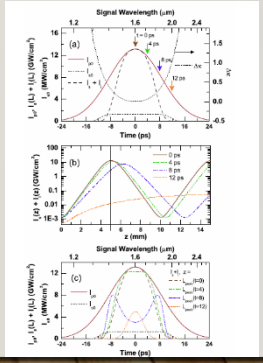


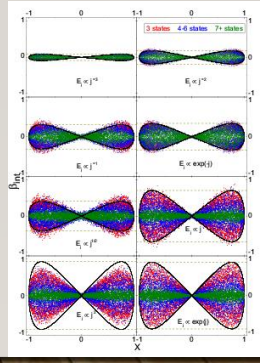




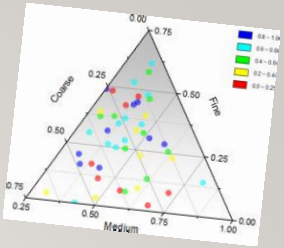


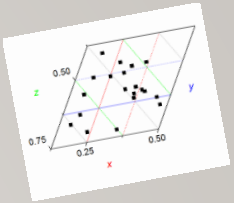




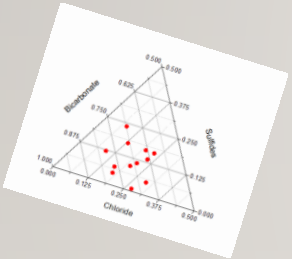


三元圖(TERNARY GRAPHS)和 PIPER GRAPHS

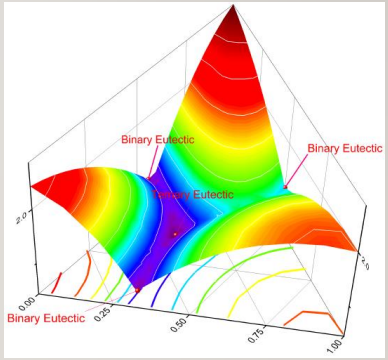


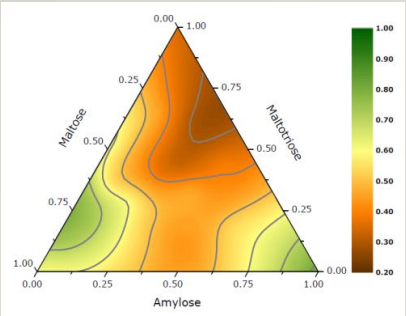


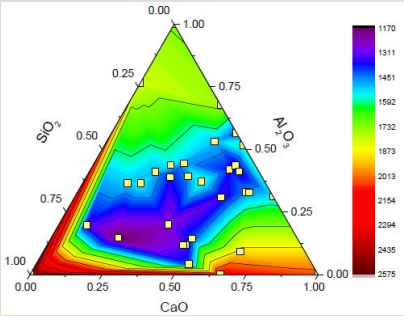
三元圖和Piper圖常常應用於特殊的地理科學和大眾工程領域上，如水化學分析等等。Origin支援包括:

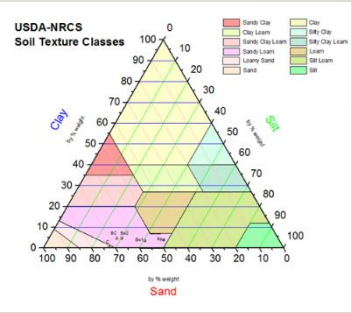


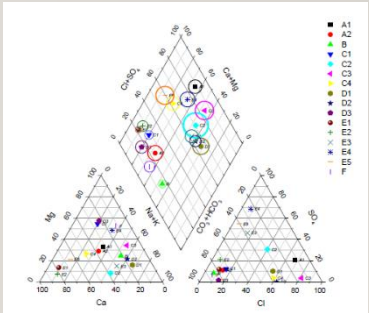
- 2D三元圖(包含散佈圖或是輪廓圖)
- 3D三元圖(包含散佈圖或是colormap surface)
- Piper chart(水質化學分析圖)

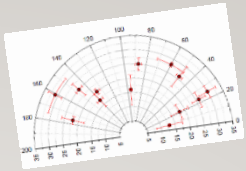


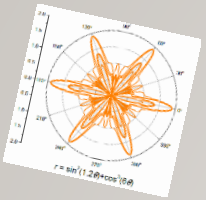




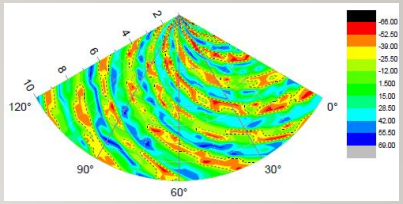


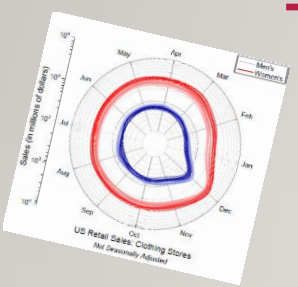




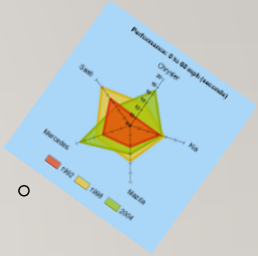


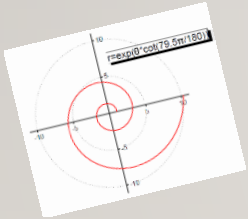
極座標圖(POLAR GRAPHS)



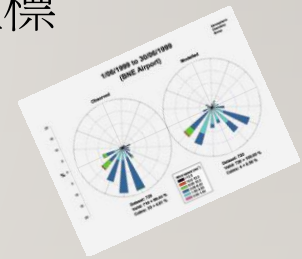


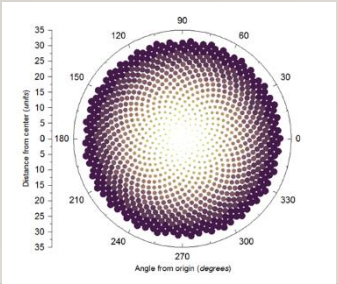
極座標可以藉由根據一個特定點的方向和距離來展現出某現象的特徵值，比如地球兩極地區下的溫度分佈圖。極座標同時也是面對處於多層次資料中能夠展現視覺化的方式。

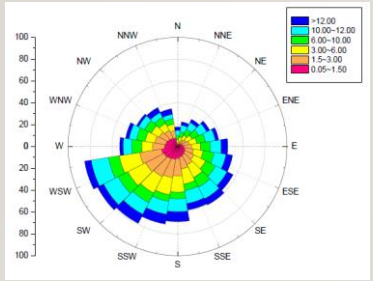


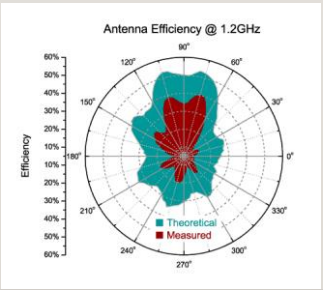


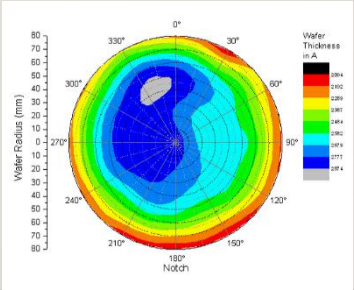
Origin提供簡單方便易用的模板可以展現資料和兩極座標函數，包括雷達圖和風花圖(Windrose diagrams)。

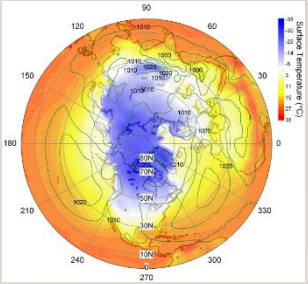




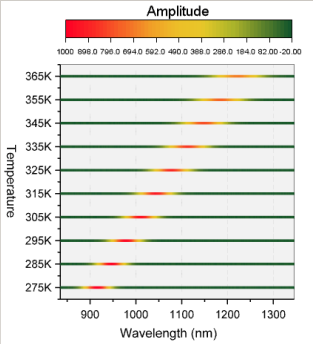


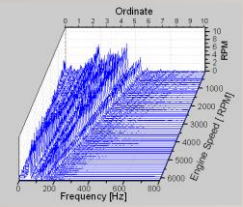




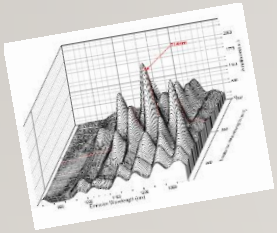


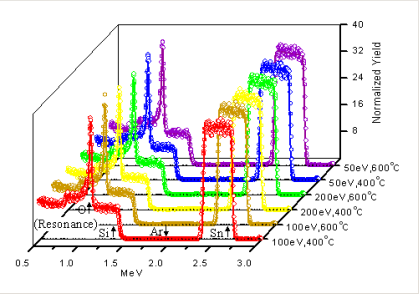
瀑布圖(WATERFALL GRAPHS)

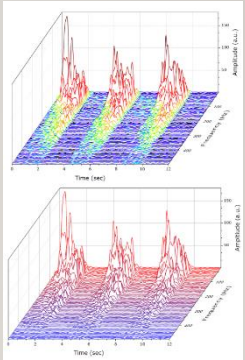


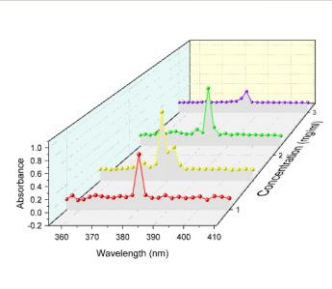


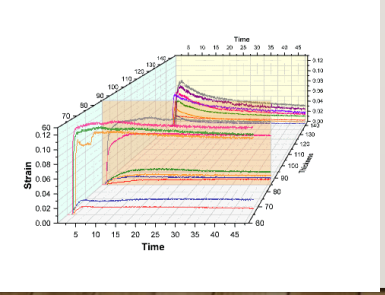
Origin的瀑布圖是最理想展現多重數據集在相同狀況下的變化比較圖。有三圍的變化效果，使您可以從Y或是Z的維度觀察變化趨勢。

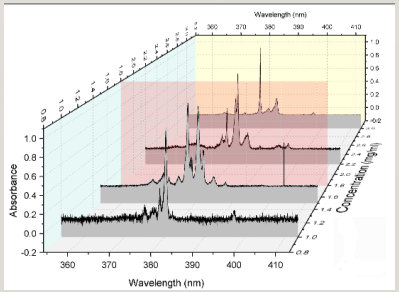


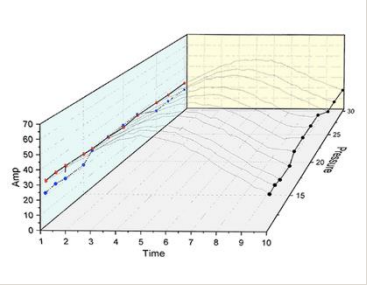




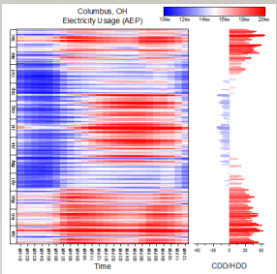


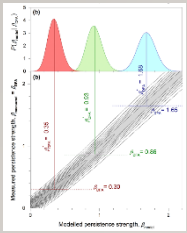




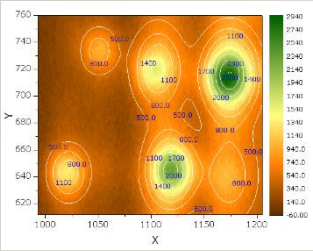


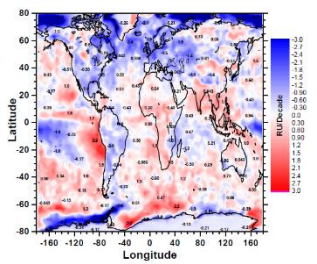
輪廓圖(CONTOUR)和熱區圖(HEAT MAP)

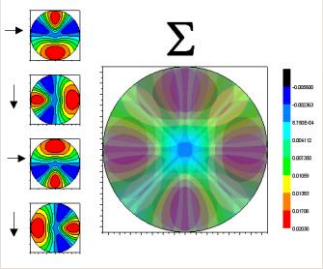


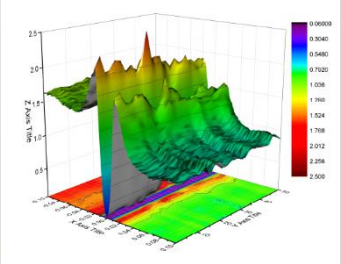


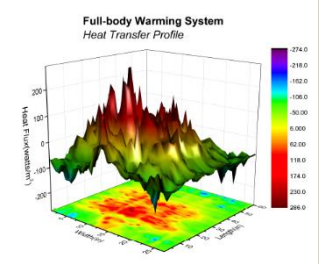
Origin的輪廓圖可以從XYZ資料表的數據資料或是從矩陣型態資料來創造出來，也能夠從輪廓線或是標籤來上色。包括註解的地方也可以同時上色，展現優異的視覺化效果。

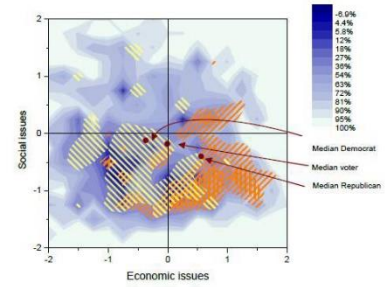


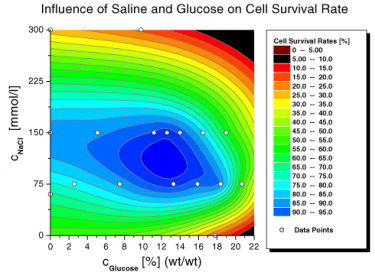


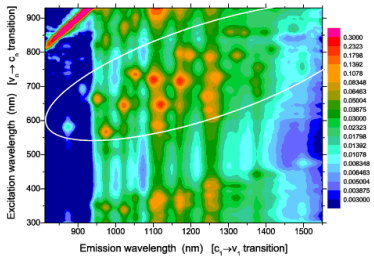


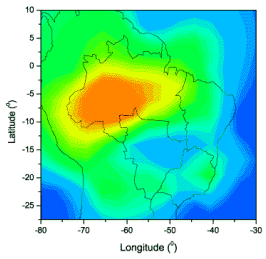


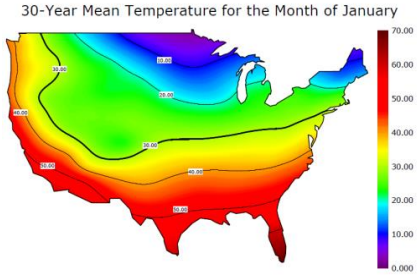




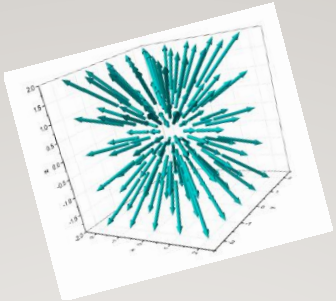


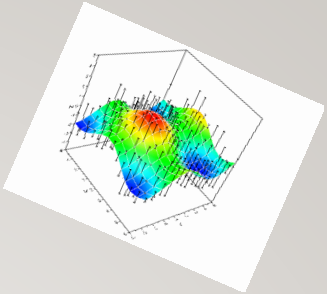


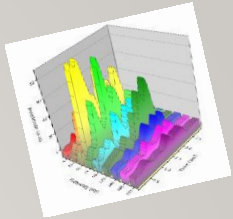


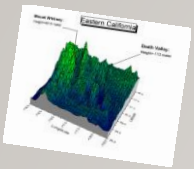


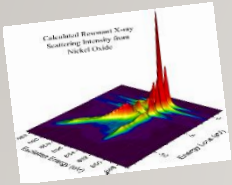
3D圖型





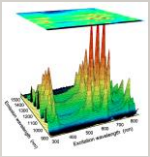


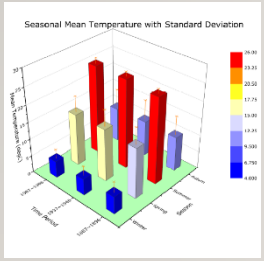


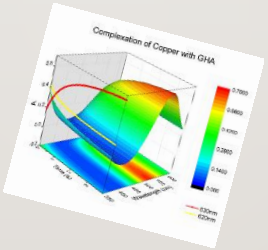


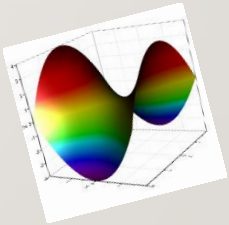
Origin支援3D圖型自由且即時的轉動，包括旋轉/延伸/扭旋。Origin提供:

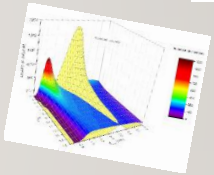
- 3D符號/向量/軌跡圖(Trajectory plot)
- 3D長條圖
- 3D曲面圖

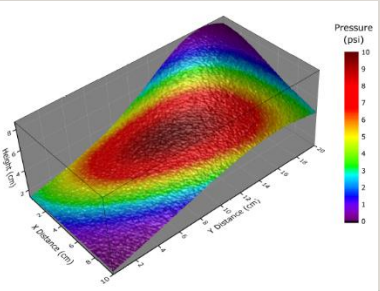


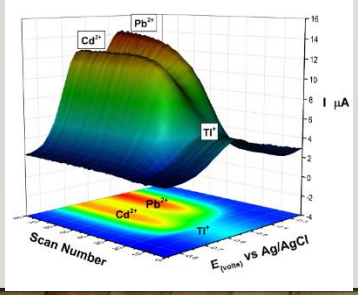


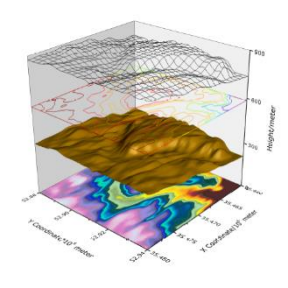


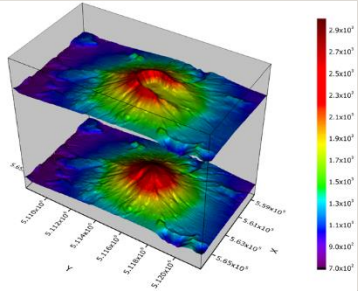


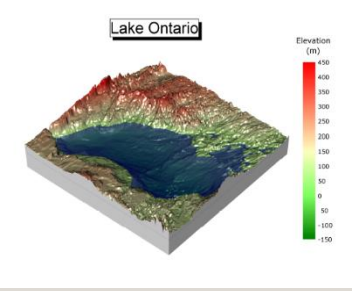




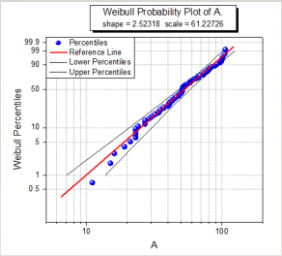


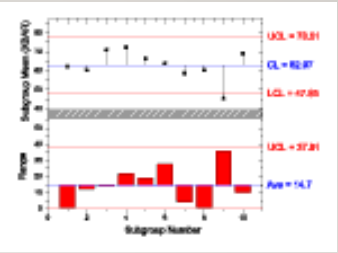


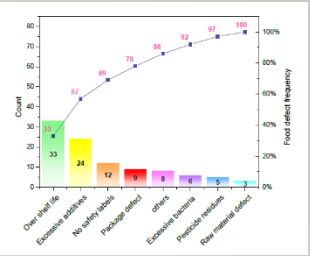




統計圖型

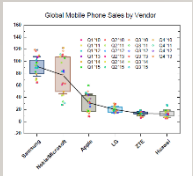


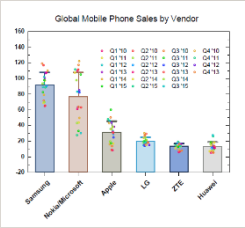


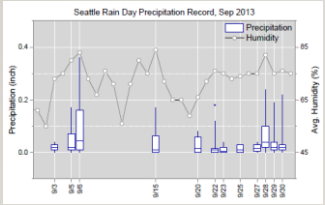


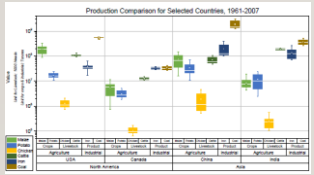
Origin支援許多種統計繪圖包括:

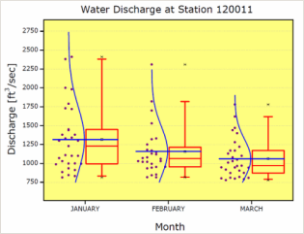
- 盒狀圖(Box Chart)，群組盒狀圖，直方圖，堆疊直方圖。
- 直方機率混合圖。散佈矩陣圖。機率分布以及常態分佈圖(Q-Q plots)。品管圖(x bar R -Chart)。柏拉圖(Pareto Chart)。

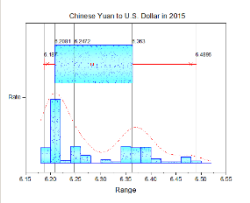


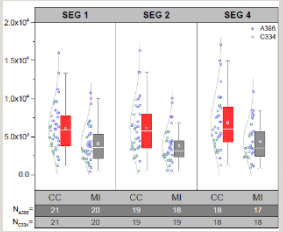


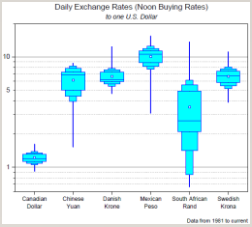








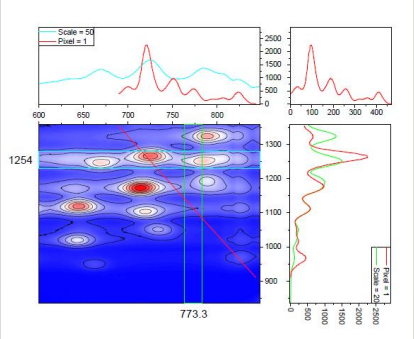


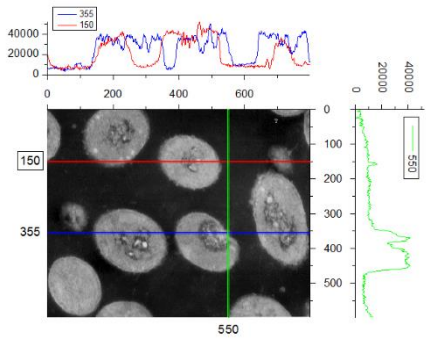


側面圖(PROFILE PLOTS)

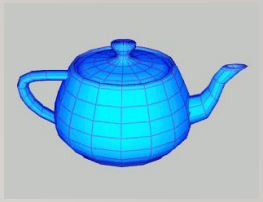
Origin可以讓您創造輪廓圖以及影像圖的側面圖，可以清楚檢視您的資料的水平與垂直的交叉構面角度。

- 側面圖可以自由選擇水平，垂直或是特定線。
- 可同時展現多重側面圖
- 可以計算包括最大值、最小值、平均值、總和與變異數。

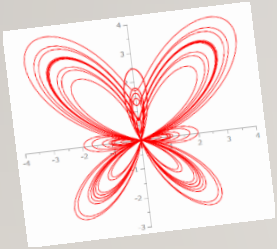


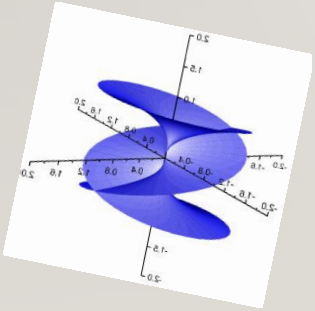


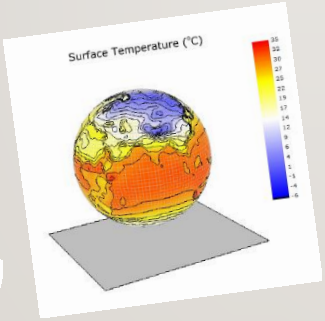
函數繪圖(FUNCTION PLOT)

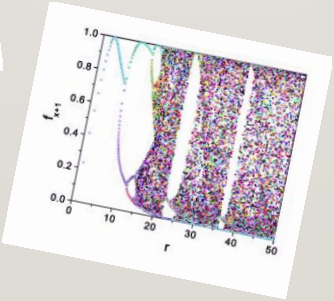


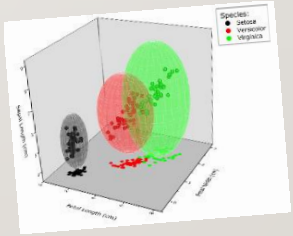
Origin支援2D和3D的參數繪圖方式，2D以及3D參數繪圖廣泛地被利用在描述圓形、拋物線圖和雙曲線圖。

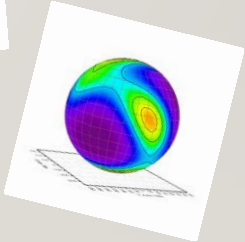


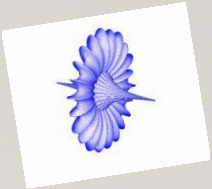




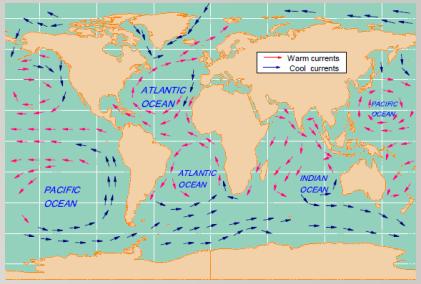




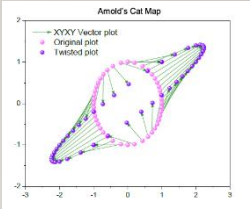




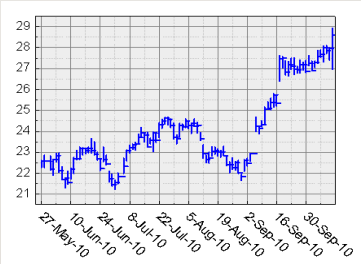
其他專業領域圖表

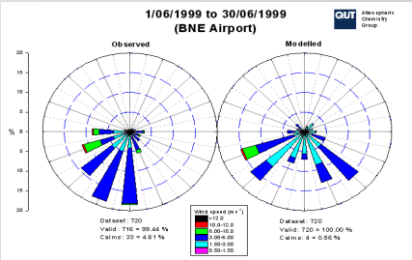


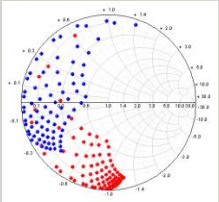
Origin 對各種專業領域提供了直接的支援，少數但專業的繪圖一樣可以直接從Origin 本身的圖表中直接選取無需做繁瑣的設定。

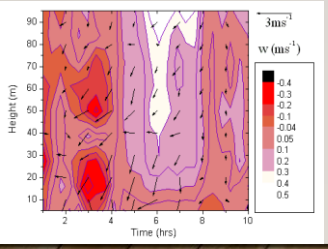


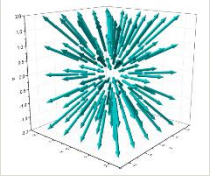
- Origin 支援
  - 向量圖/風瑰圖
  - 史密斯圖
  - 股票走勢圖
  - 其他專業圖表

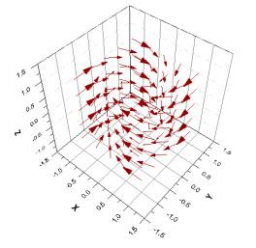


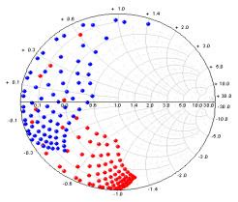


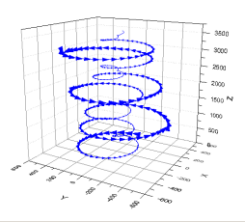




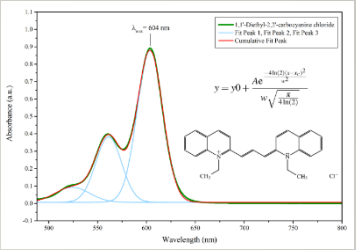




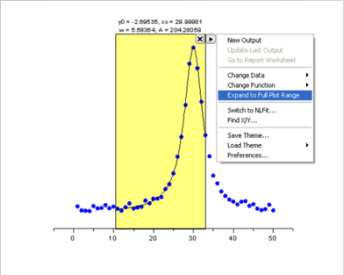


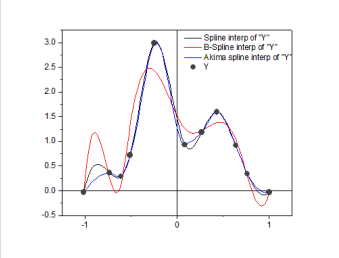


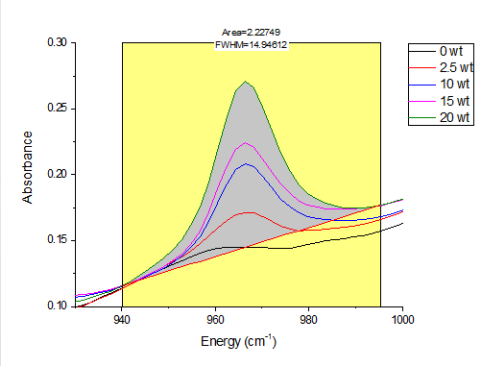
- ✓ 柱狀圖/直方圖、長條圖(Bar Chart)和圓餅圖
- ✓ 折線圖和符號圖(Line & Symbol Graph)
- ✓ 多軸(Multi-Axis)和多面板(Multi-Panel)圖型
- ✓ Ternary Chart (三元圖)
- ✓ 極座標圖(Polar Graphs)
- ✓ Waterfall Graphs (瀑布圖)
- ✓ 輪廓圖(Contour)和熱區圖(Heat Map)
- ✓ 3D圖型
- ✓ 統計圖型
- ✓ 側面圖(Profile Plots)
- ✓ 函數繪圖(Function Plot)
- ✓ 其他專業領域圖表

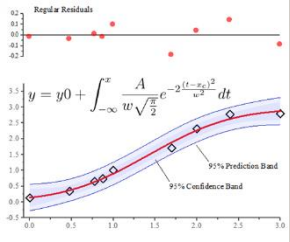


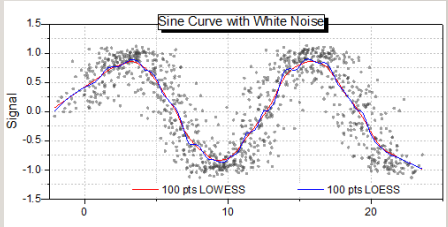
ORIGIN/ORIGINPRO 的資料分析功能

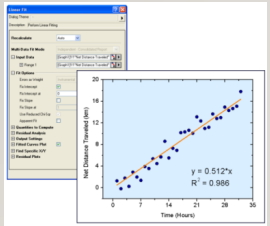


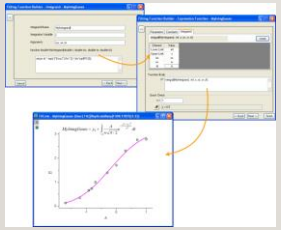


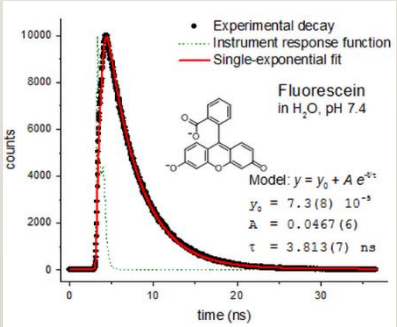


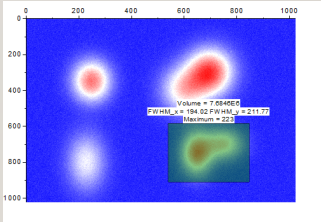










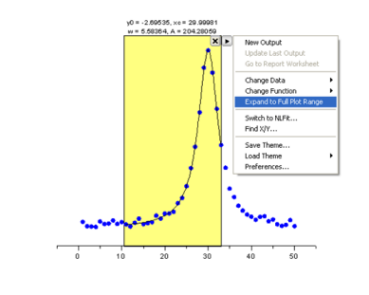


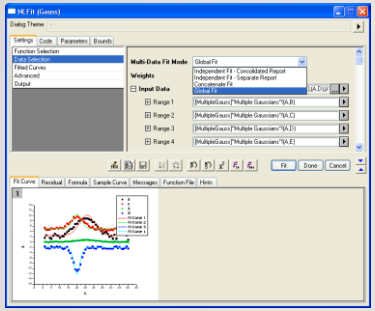
ORIGIN的資料分析功能

Origin支援的資料分析功能包括了

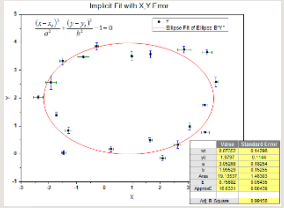
- Origin Gadgets (FFT，積分，或是Quick Fit等簡單的資料探索小工具)
- Statistic (統計相關功能):假設檢定/ANOVA/無母數統計分析/ROC/多變量分析等(多數功能**OriginPro**才有)
- ➢ Curve Fitting (曲線擬合) (部分功能**OriginPro**才有)
- Signal Processing (訊號處理)
- ➢ Peak Analysis (峰值分析) (**OriginPro可作multi-peak fitting和batch fitting**)
- Mathematics (相關數值分析或運算)
- Data Manipulation (資料的整理和調整)
- Analysis Templates Creation (建立分析作業樣板)
- Batch Processing (批次處理)

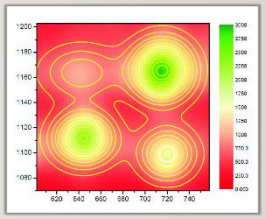
ORIGIN/ORIGINPRO 的曲線擬合功能

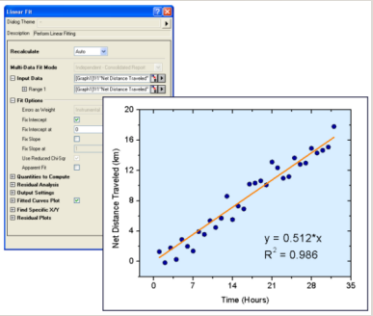


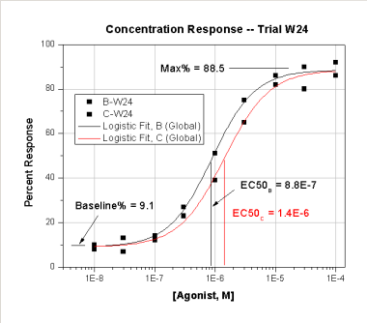


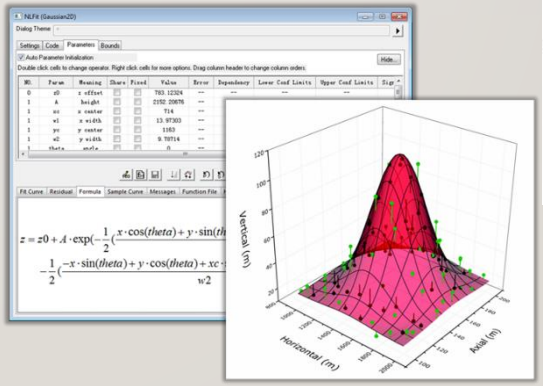
Only OriginPro

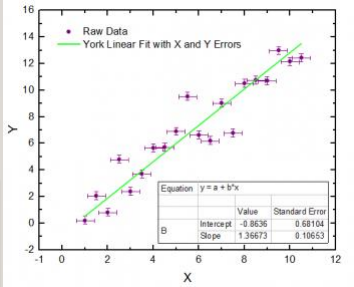






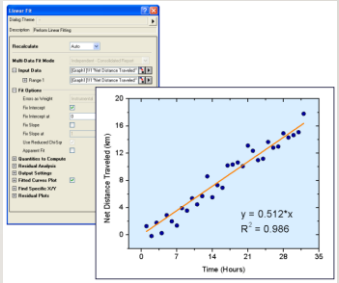


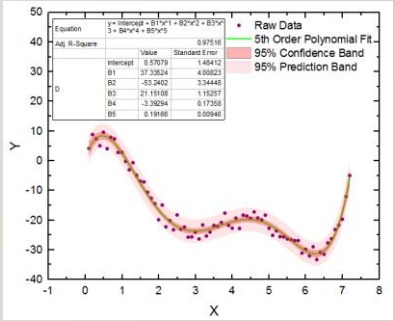




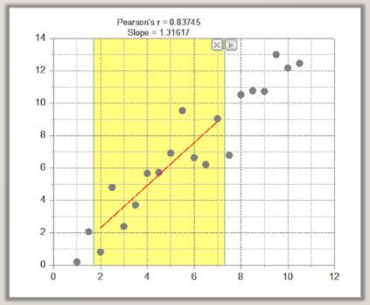
曲線擬合(CURVE FITTING)

- **線性與多項式擬合：** 使用者可以從工作表或圖面擷取資料，並求出一條最接近這些資料特性的函式繪製在圖面上，也可以對多組資料作分析比較。





- **Quick Fit Gadget**
  使用者可以在資料圖上定義一個子區間(Region-Of-Interest (ROI))並且針對這個區間做擬合和分析。



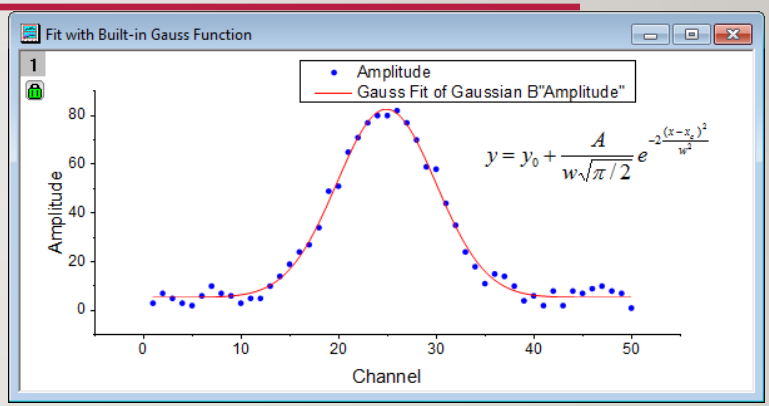
曲線擬合(CURVE FITTING)

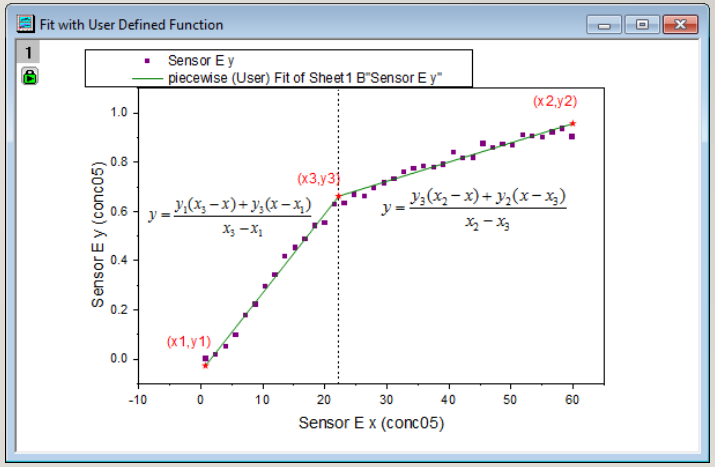
- **非線性擬合：**用Origin內建200多種函數作擬合之外，也可以用Origin的Fit Function Builder來建立自己的逼近函數。
- **自動化的擬合計算**
- **擬合模型和資料集合之比較(OriginPro)**

✓ **哪一種函數擬合最適合?**

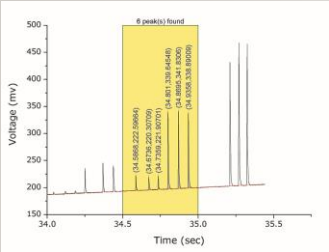
✓ **同一個函數哪個資料最適合?**

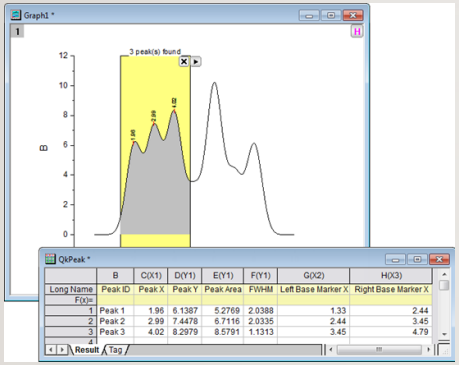
✓ **全部擬合函數排行榜**

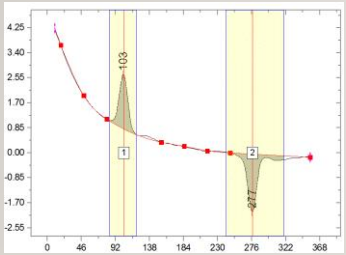


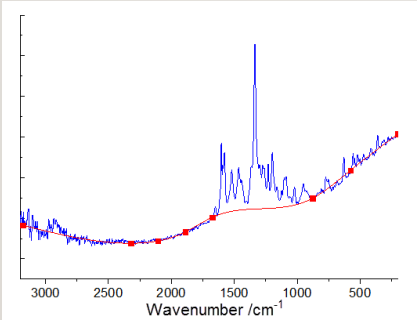


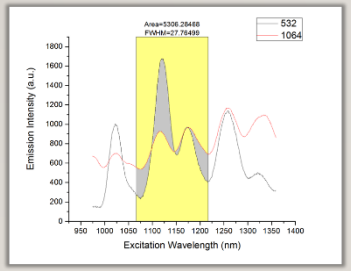
ORIGIN/ORIGINPRO 的峰值分析功能





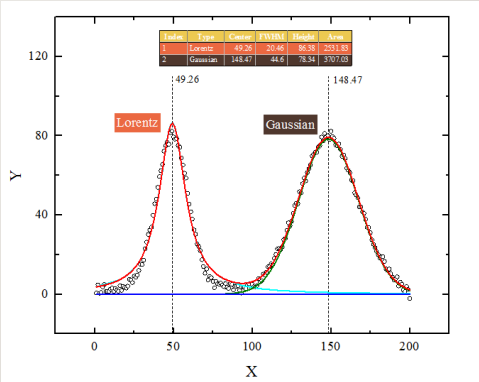


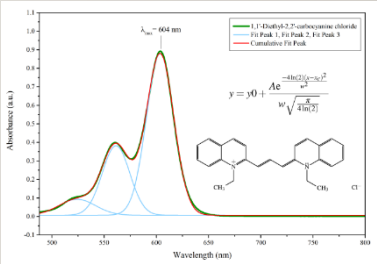


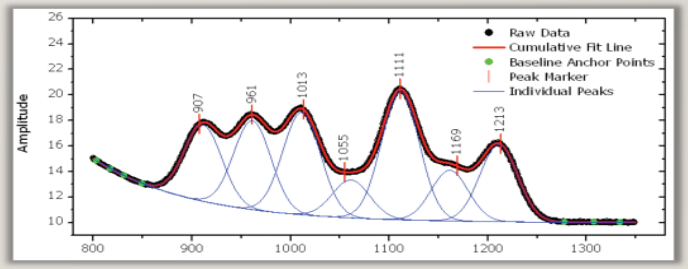


Only OriginPro

***峰值擬合(Peak Fitting；僅限於PRO版)**







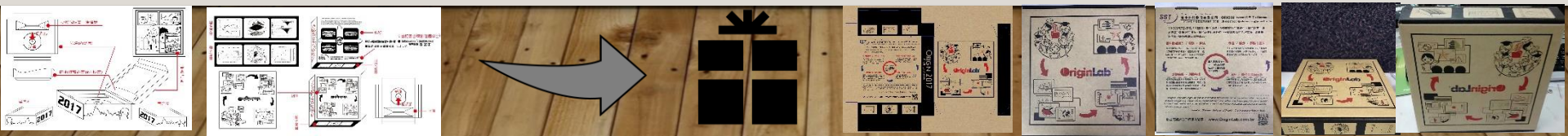
SST
For Better Life

ORIGIN® 2017
Graphing & Analysis

ORIGINPRO® 2017
Graphing & Analysis

ORIGIN軟體新功能

簡單易用/繪圖/分析/程式編輯/Apps



一、簡單易用
ORIGIN入門視窗
(ORIGIN CENTRAL STARTUP DIALOG)

- **開啟**

檢視和開啟圖檔和分析範本：引導使您可以了解您所想要的圖形與分析方法並連同原始資料教導您如何操作

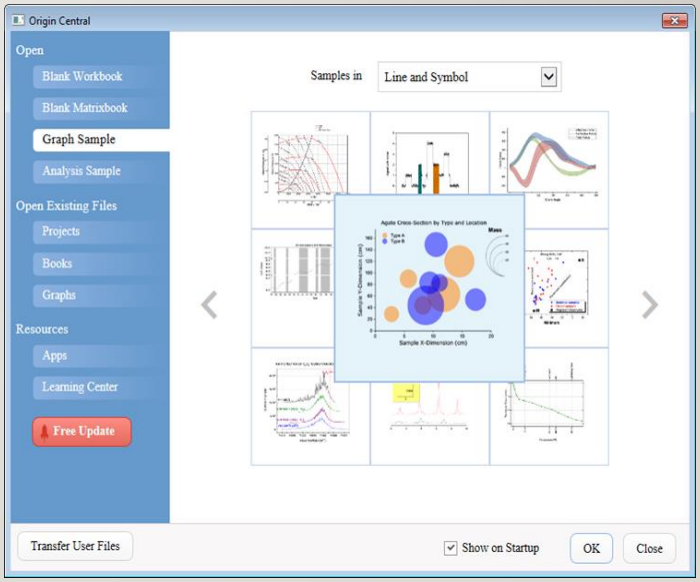
根據您的需求開啟工作表(workbook)或是矩陣表(matrix book)

- **檔案導入**

依據需要開啟目前所需的ORIGIN檔案，包含 opj / ogw / otw / ogg 等

- **相關資源**

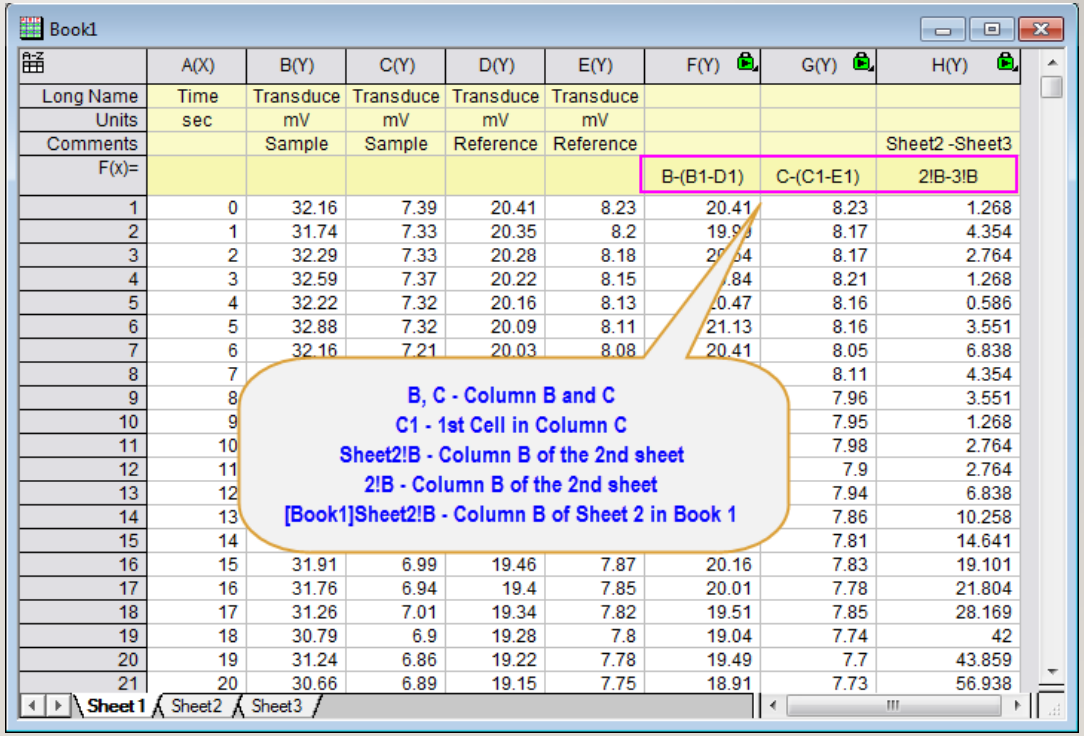
可以檢視相關的APPs ，教學影片和文件檔取得最新更新



一、簡單易用
更簡單之儲存格公式的輸入方法

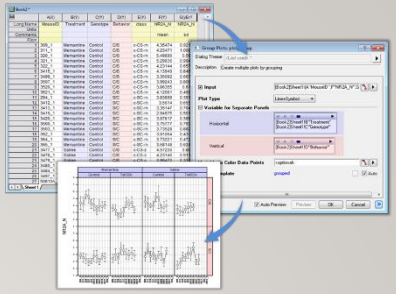
提供了類似Excel工作表的儲存格方式

- 相容ORIGIN舊的格式輸入方式
  - B, C - column B and C
  - B1 - 1st cell in column B
  - 2!B - column B of sheet 2

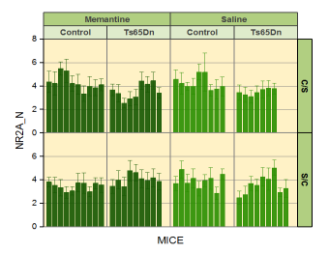


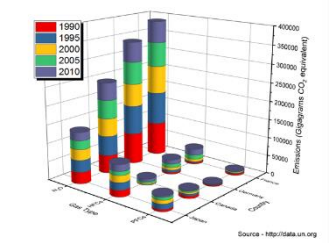
	A(X)	B(Y)	C(Y)	D(Y)	E(Y)	F(Y)	G(Y)	H(Y)
Long Name	Time	Transduce	Transduce	Transduce	Transduce			
Units	sec	mV	mV	mV	mV			
Comments		Sample	Sample	Reference	Reference			Sheet2 -Sheet3
F(x)=						B-(B1-D1)	C-(C1-E1)	2!B-3!B
1	0	32.16	7.39	20.41	8.23	20.41	8.23	1.268
2	1	31.74	7.33	20.35	8.2	19.9[illegible]	8.17	4.354
3	2	32.29	7.33	20.28	8.18	2[illegible]4	8.17	2.764
4	3	32.59	7.37	20.22	8.15	[illegible].84	8.21	1.268
5	4	32.22	7.32	20.16	8.13	[illegible]0.47	8.16	0.586
6	5	32.88	7.32	20.09	8.11	21.13	8.16	3.551
7	6	32.16	7.21	20.03	8.08	20.41	8.05	6.838
8	7						8.11	4.354
9	8						7.96	3.551
10	9						7.95	1.268
11	10						7.98	2.764
12	11						7.9	2.764
13	12						7.94	6.838
14	13						7.86	10.258
15	14						7.81	14.641
16	15	31.91	6.99	19.46	7.87	20.16	7.83	19.101
17	16	31.76	6.94	19.4	7.85	20.01	7.78	21.804
18	17	31.26	7.01	19.34	7.82	19.51	7.85	28.169
19	18	30.79	6.9	19.28	7.8	19.04	7.74	42
20	19	31.24	6.86	19.22	7.78	19.49	7.7	43.859
21	20	30.66	6.89	19.15	7.75	18.91	7.73	56.938

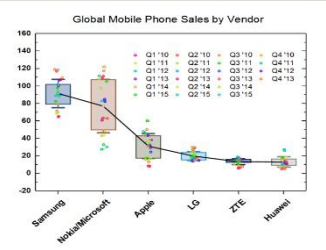
二、繪圖

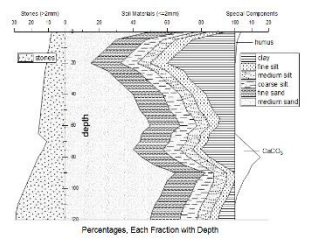


- ✓在origin2017下您使用帶有分組的資料可以用下列型態創造trellis plot(網格圖):散佈圖/折線圖與符號圖/直方圖/柱狀圖
- ✓3D堆疊直方圖以及100%堆疊柱狀圖的新圖型
- ✓盒子圖的改善:Origin2017的盒子圖增加了兩種變數-統計值的bar和line-彈性地客製化選擇
- ✓更多的填充圖樣









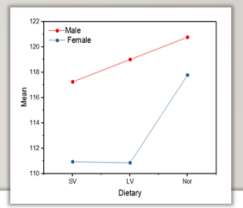
三、資料分析

✓ 曲線擬合/Curve Fitting :

- 初始化公式的參數選擇可以透過Fitting Function Builder下拉視窗
- 更多的內建函數可應用

✓ 統計/Statistics :二因子ANOVA的平均值繪圖

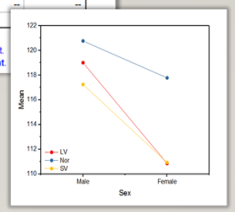
✓ 波峰分析/Peak Analysis :



Overall ANOVA

	DF	Sum of Squares	Mean Square	F Value	P Value
Sex	1	1594.39725	1594.39725	17.64529	4.05551E-5
Dietary	2	1137.86004	568.93002	6.29638	0.00224
Interaction	2	245.48621	122.7431	1.3584	0.2595
Model	5	2794.86329	558.97266	6.18618	2.40633E-5
Error	194	17529.50212	90.35826	--	--
Corrected Total	199	20324.36541	--		

At the 0.05 level, the population means of **Sex** are **significantly** different.
At the 0.05 level, the population means of **Dietary** are **significantly** different.
At the 0.05 level, the interaction between **Sex** and **Dietary** is **not significant**.

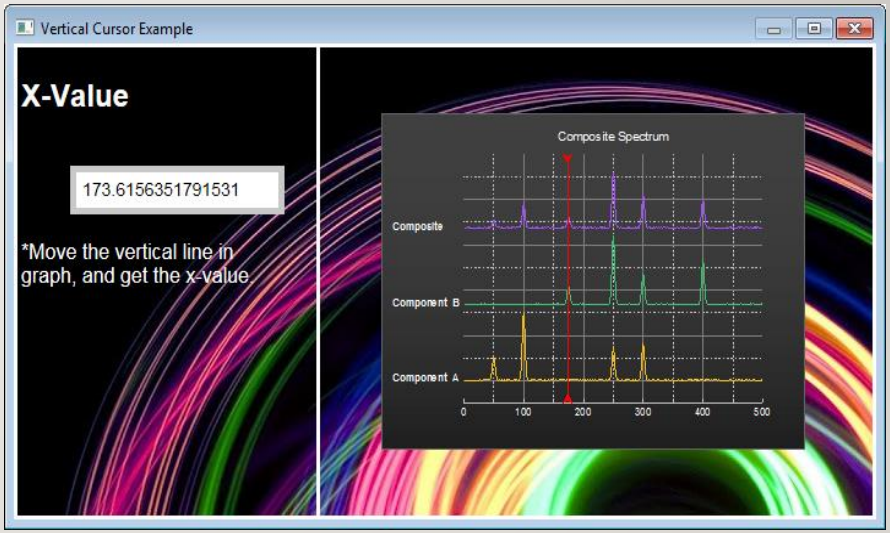


Origin02017的Peak Analysis工具可將前一個擬合結果做為下一步的擬合初始值，大幅提升擬合效率。

四、程式編輯

✓支援帶有JavaScript的HTML對話窗

Origin C現在已經可以支援HTML的對話窗來控制，可提供Origin使用上具備彈性與互動方式。Origin的任何表圖都可以透過HTML控制來設定位置。為了能夠連結與控制HTML的元素，Origin2017提供Origin C和JavaScript之間的呼叫方式。

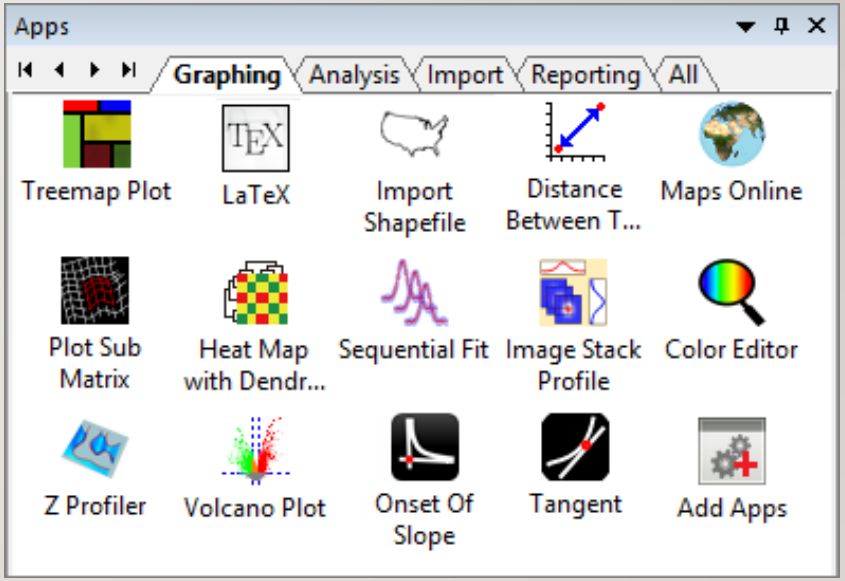


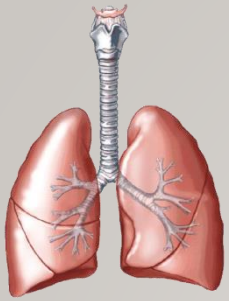
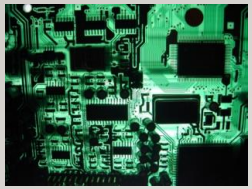
✓支援NAG Mark 25 Library全部函數

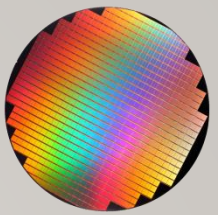
五、APPS
提升最佳化的操作可能

✓ APPs 一覽表的選項按鈕
您可以從網頁下載你喜歡的APPs且透過拖曳的方式拉到Origin工作表上就會自動安裝。

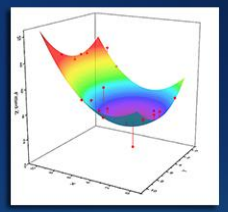
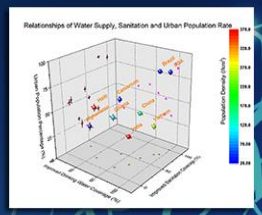
✓ **Apps Gallery** 可以提供您查閱與整理APPs，您可以增加/修改/排列/刪除。此外，您也可以在**Apps Gallery**透過滑鼠右鍵點選使用**Tab Views**查閱。

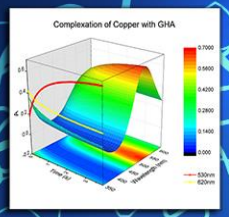


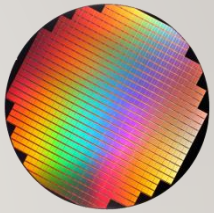


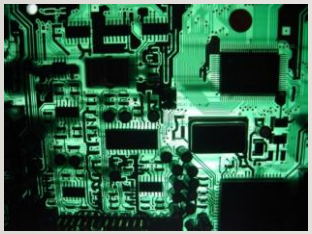
ORIGIN/ORIGINPRO

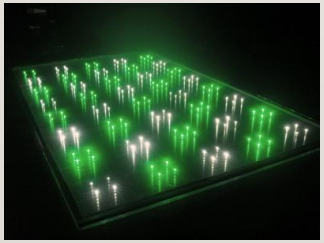



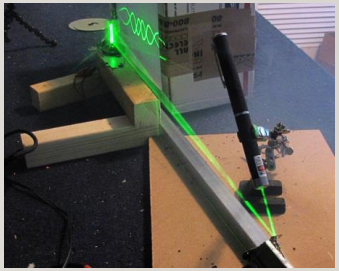


Origin/OriginPro
光電範疇

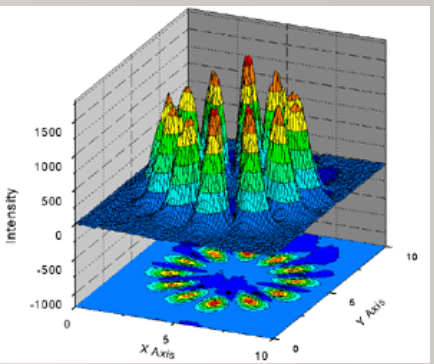








二氧化碳雷射不穩定性分析

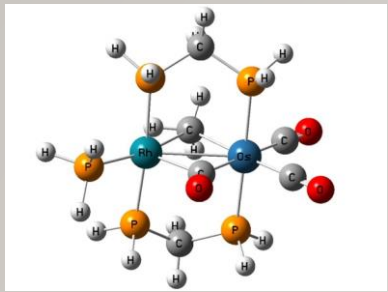


- 義大利的國家光學研究院(National Institute of Optics, NIO)對二氧化碳雷射的特性做研究設法提高設備的效率。

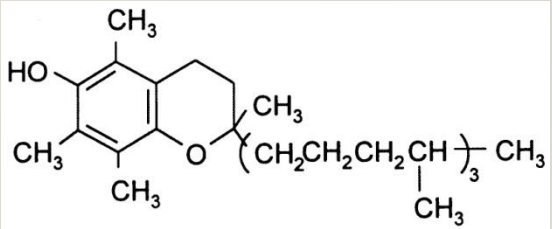
- 分析蒐集得來的資料發現雷射光束在切面上的強度隨時間和位置有預料之外的變化

- **NIO利用Origin重建了光束截面的強度等相關資料，繪製了3D以及輪廓圖。**

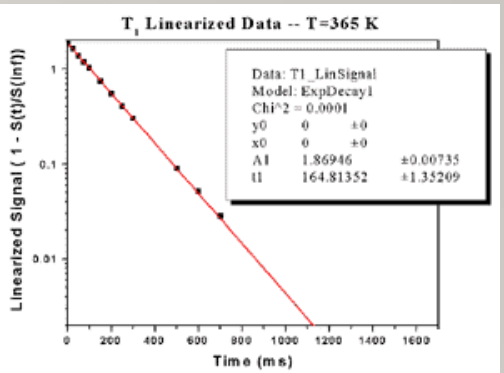
研究成果提供設計或運用二氧化碳雷射的專業人士極佳的參考資訊。



Origin/OriginPro
化工材料

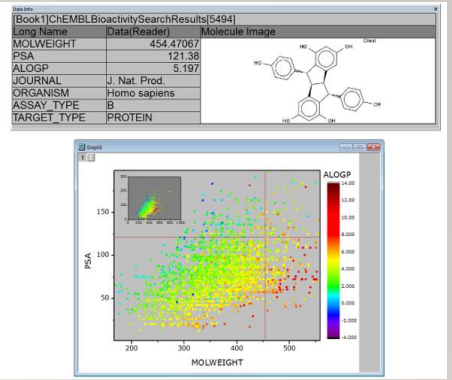


尖端電池技術研究

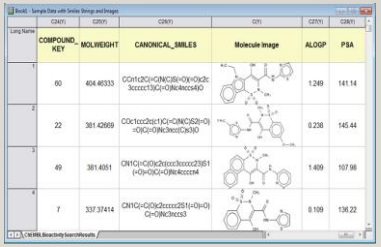


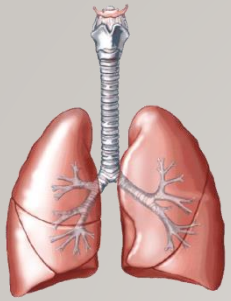
- 西北大學在研究更有效率的電池成分工作上必須分析大量的電解質材料的相關資料和數據。
- 由核磁共振儀以及其他實驗得來的不同材料和成分的大量數據的分析中可以找到更好的添加物配方以促進離子的運動讓電池更有效率。
- 分析數據的工作極為繁瑣枯燥，並且需要大量時間人力。
- **西北大學的研究人員在Origin的環境裡以巨集的方式開發了自動化的數據分析軟體套件，只要按一個按鈕，就可以自動分析量測所得的大量數據。**

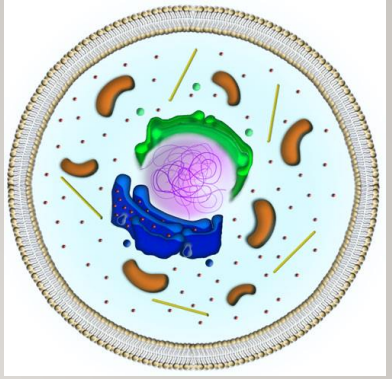
分子影像資料視覺化



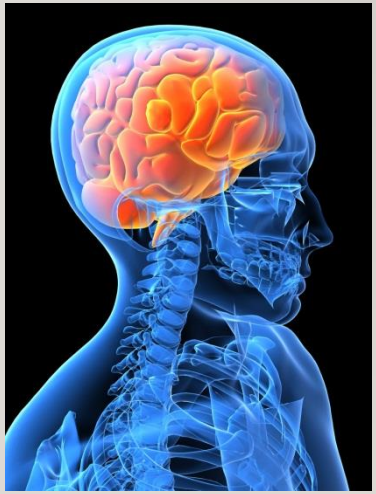
- 化工和生醫相關領域的客戶經常會需要參考圖形化的分子結構式資料以及各種成分的物理特性作為評估的依據。
- 一位在頂尖的製藥企業任職的客戶援用了第三方的DLL函式庫配合Origin C在Origin的環境裡撰寫了極為方便的工具程式。
- Origin的環境和彈性讓這位客戶建立了一個可以在Origin的環境裡讀取SMILES格式的資料重建圖形，並且同步的顯示各種成分的物理特性以供研發工作參考的便利功能。



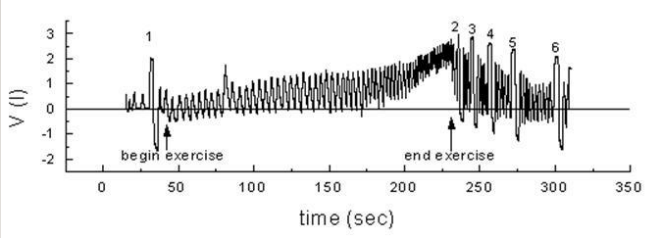




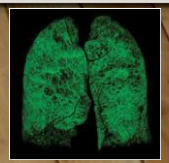
Origin/OriginPro
生醫科學



慢性阻塞性肺病的研究



- 位於加拿大蒙特婁的McGill大學希望對於慢性阻塞性肺病有進一步的研究，找出協助患者減輕不適感的方法。
- 患者呼氣時無法完全排出廢氣，導致吸氣困難並且產生不適感，並且也讓血液中二氧化碳濃度偏高。研究必須以健康的志願者配帶阻流器以模擬呼吸不順暢的狀況，並且在不同的環境下模擬不同的運動狀況蒐集資料。
- Origin可以安裝在筆記型電腦裡讓研究人員攜帶到非實驗室的環境，即時的收集資訊並且在同一個軟體平台下分析處理，大幅提高研究的便利性。
- 研究人員藉由Origin的協助了解了不適感的成因，進而發展出一套運動協助患者復健。



愛滋病疫苗研究

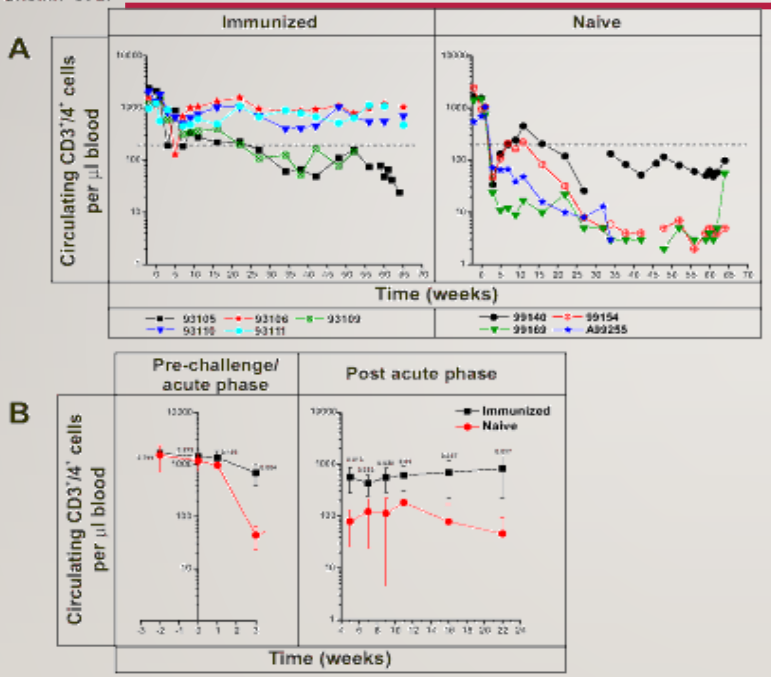
- Washington National Primate Research Center 的一群研發人員在愛滋疫苗的研究上運用了Origin軟體。
- 對於病毒感染的狀況作分析，亦即對於CD4+T細胞的損失狀況作研究可以作為愛滋發病的指標。
- 研究小組用血液分析量測血球細胞數量和血紅蛋白級數，以及用流式細胞儀鑑定白血球中的特殊成分來界定血液中T輔助細胞的數量。

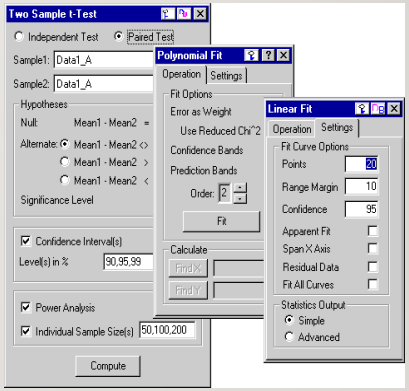
研究的過程中Origin的視覺化和資料分析功能提供了研發人員很大的幫助。

WANPRC

愛滋病疫苗研究(續)

Figure 1: Sheikh et al





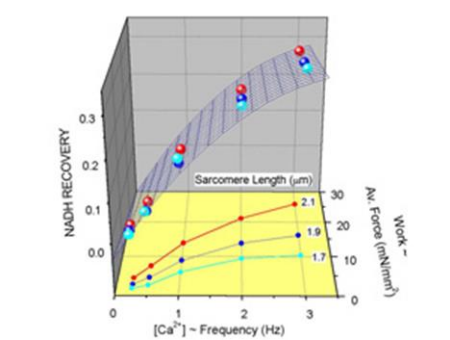
- Origin的雙面板圖提供了一個絕佳的環境比較分析資料。

- Origin的曲線擬合和數值分析功能對於歸納和解讀產出資料有很大的幫助

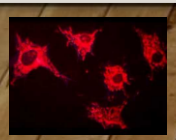
心臟產生能量的原理

- 任職於美國伊利諾州芝加哥的Loyola大學的Dr. Rolf Brandes領導的研發團隊，運用Origin在他們的研究工作上．Dr. Brandes的團隊試著找出心臟在負荷變重時如何管理和管制產生能量的機制以及這個機制和心臟疾病的關係
  - 細胞中的基礎能量是透過粒腺體進行氧化磷酸化的作用產生，而通常其效率是由二磷酸腺苷(ADP)所控制
  - 研發團隊想驗證粒腺體內的鈣離子濃度的變化和NADH的產生率是否有正面關係

心臟產生能量的原理(續)



- 研究團隊運用螢光光譜法收集組織中的資料，並且運用Origin做原始資料的前處理和分析以及擬和的工作
- 研究團隊必須先把影像資料加以處理比對,擷取資料並且數值化,再作進一步分析,人工處理資料耗費大量時間又容易出錯
- Origin讓很多工作變成自動化並且開放研究人員自己撰寫所需的功能，讓料分析又快又方便
- 這個實驗的結果確認了負荷增加時NADH的減少和鈣離子的濃度並無明確相關，但是反過來說NADH的恢復就和鈣離子的濃度有關係



問題與討論

Thank you for your patience

www.originlab.com.tw

Shermanchang@Schmidt.com.tw

0909-579-000