



Amersham™ ImageQuant™ LAS 4000 CCD System

Technical Department
Specialist Melody Wu



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



ATED TO BIOMOLECULAR

Amersham™ ImageQuant™
系統的領導者

Healthcare前身)

已有長久的合作歷史致力
子(蛋白質及DNA)影像應用的
D成像系統

ImageQuant™ 800 為最新
能高階CCD影像系統，性能
提升

ImageQuant™ 系列是全
一擁有專業鏡頭、CCD生產
生產的成像系統

ImageQuant™ TL影像分析軟體，
攝到數據分析，給使用者完
功能

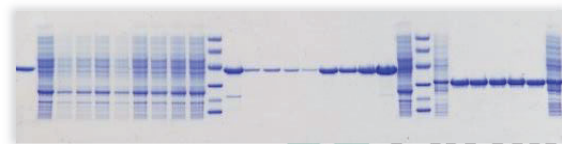
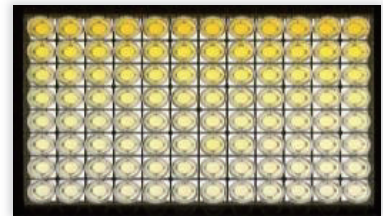
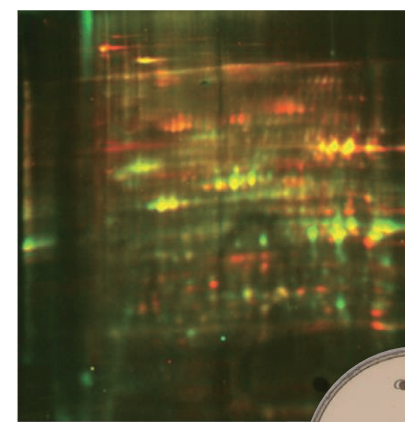
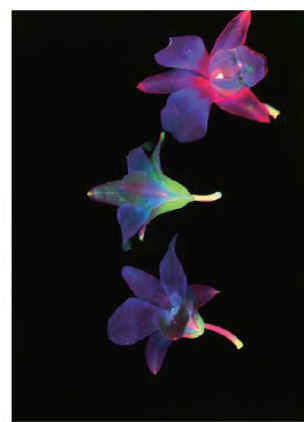
Amersham™ ImageQuant™ 照膠系統CCD成像家族



Amersham™ ImageQuant™ 800

多功能照膠/冷螢光影像系統

GET YOUR IMAGING RIGHT From The Smart
Multi function & User friendly



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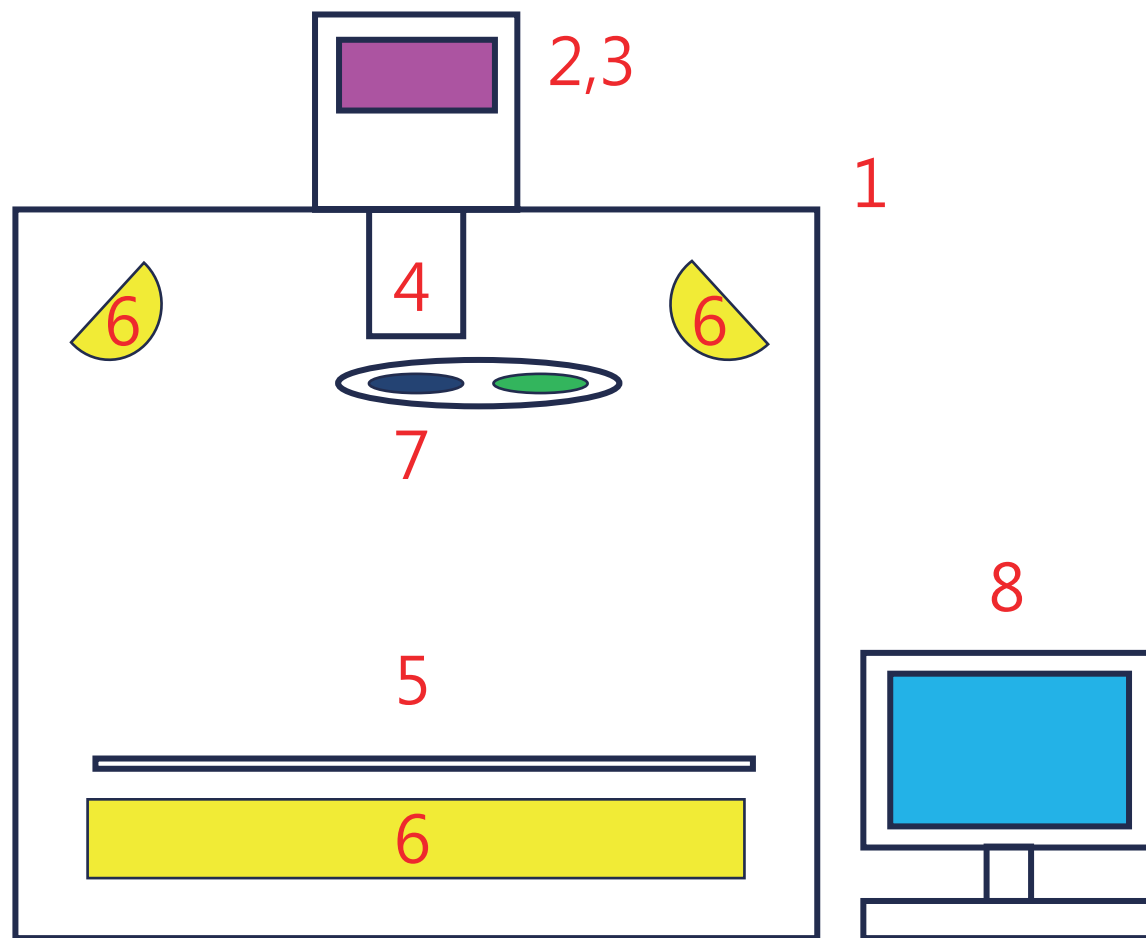


螢冷光照相系統基本原理



螢冷光照相系統裡有什麼？

- 1. 箱體
- 2. 感光元件
- 3. 冷卻系統
- 4. 鏡頭
- 5. 載台
- 6. 光源
- 7. 濾鏡轉輪
- 8. 分析系統

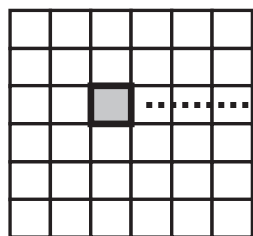




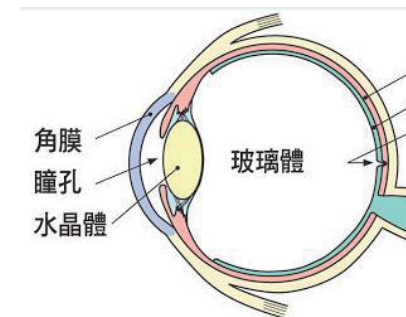
成像的關鍵元件-感光元件



- ✓ 數位相機紀錄影像的媒介為**感光元件**（CCD或是CMOS）
- ✓ 感光元件紀錄影像的單位就叫做**畫素 (pixel)**
- ✓ 一般相機上所謂「X百萬畫素」即為**解析度 (resolution)**
e.g. 192萬畫素，1600(L)×1200(W)

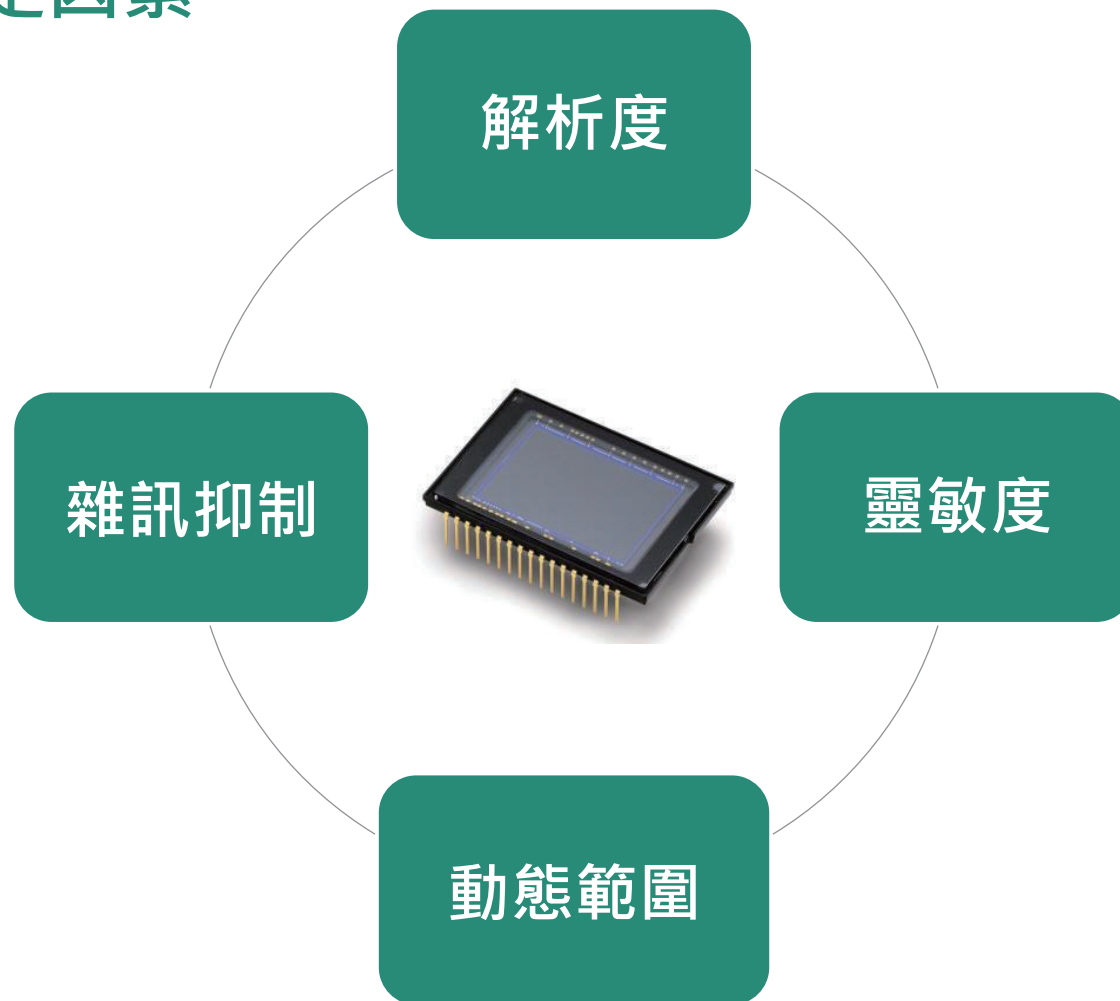


畫素 (pixel)



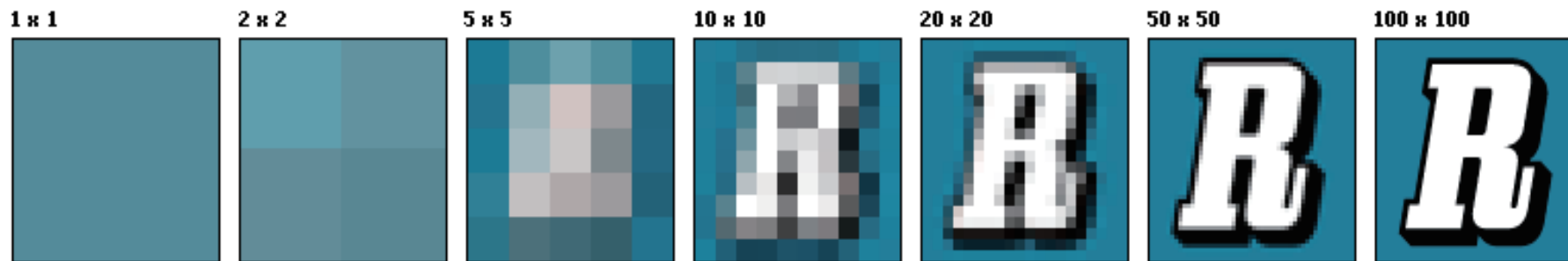


CCD的四大決定因素





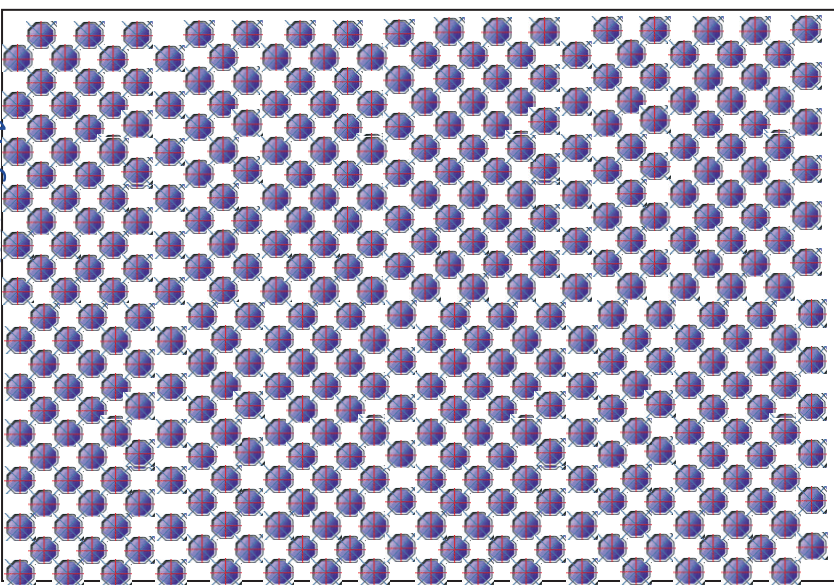
- 解析度(Resolution)：在同樣大小的晶片上,畫素越多,影像越清晰。



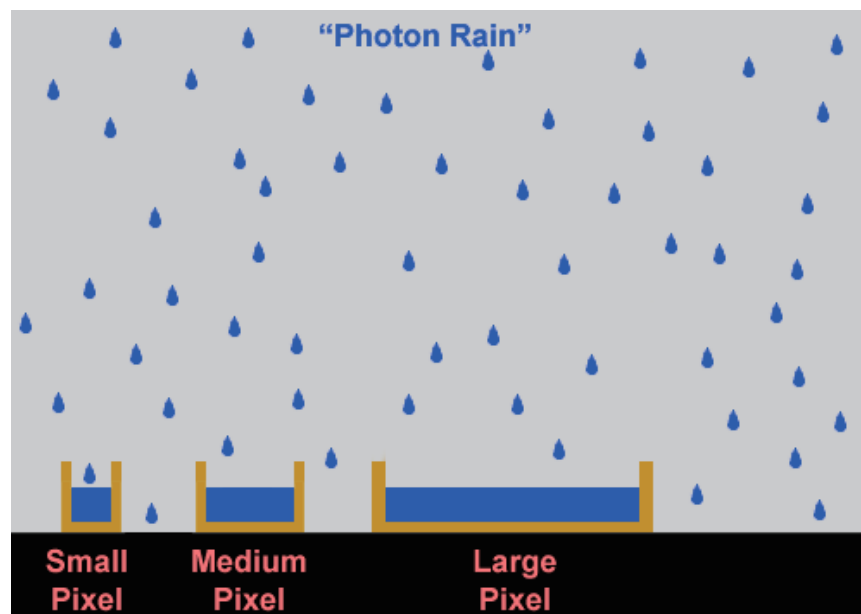


感光面積：關鍵因素為畫素尺寸(Pixel size)以及畫素排列緊密與否。
在相同的CCD尺寸下，解析度越高則畫素尺寸越小。

畫素尺寸(Pixel size)：同時影響靈敏度與動態範圍的關鍵因子。



23.4 mm

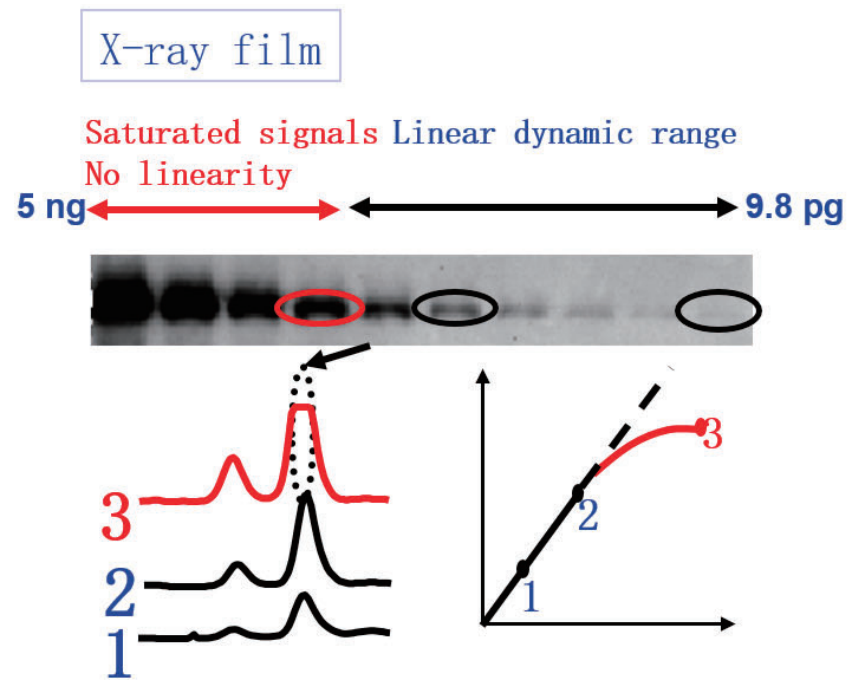
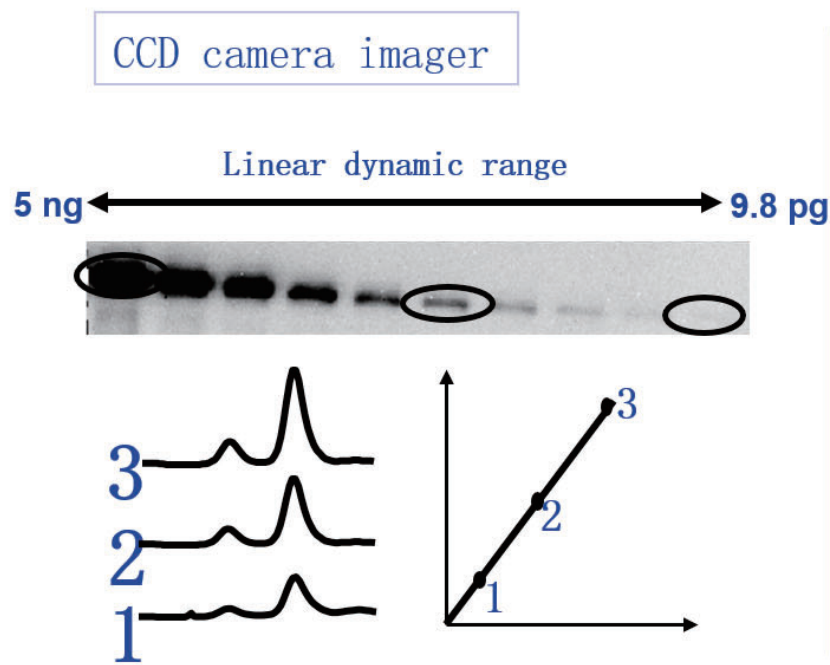


解析度與靈敏度無法兼得!

多數科學用CCD僅有數百萬畫素。

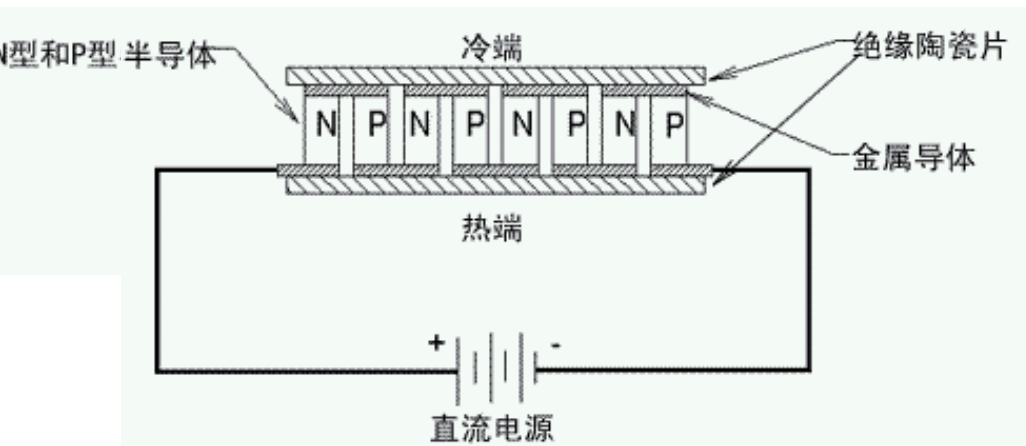


- 動態範圍(Dynamic range)：照相系統所能記錄的光度跨距。
受位元深度(bit depth)與畫素電子容量影響。





- ✓ CCD冷卻系統(Cooling)
- ✓ CCD每降溫 5°C ，可減少一半的雜訊；低雜訊能使微弱的訊號更容易被辨識到



Peltier cooler 熱電致冷晶片





鏡頭四要素

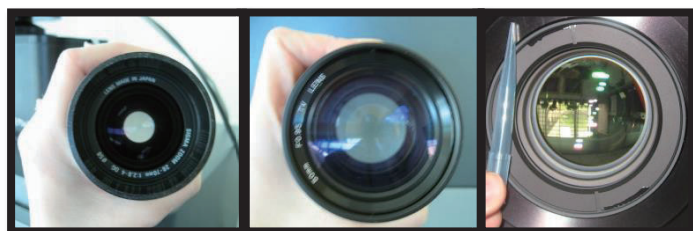
光圈、焦距(zoom)、對焦(focus)、快門

F1.2 / 8 – 48 mm 變焦鏡

F0.95 / 25 mm

F0.85 / 43 mm

定焦鏡進光量大

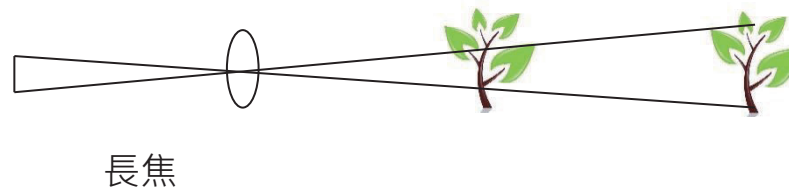
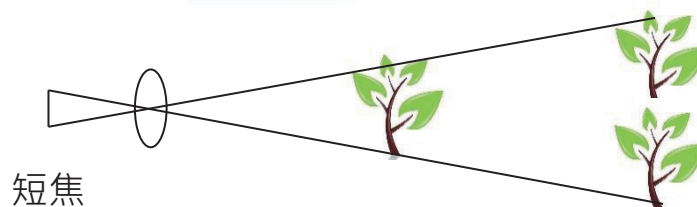


F2.8

F0.95

F0.85


F	1.2	0.95	0.85
進光量	0.6	1	1.2

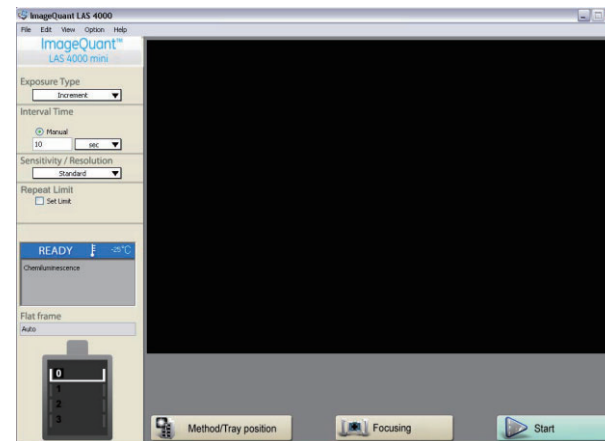
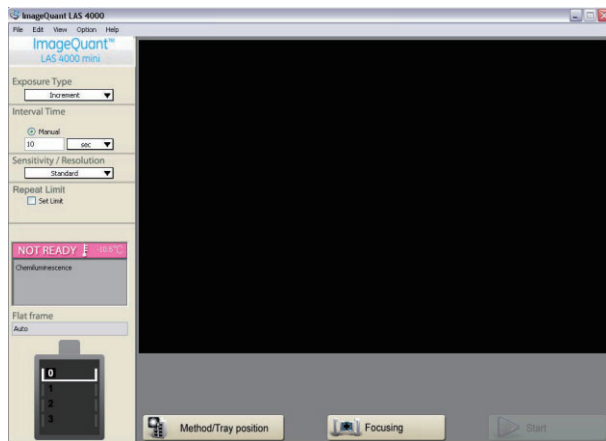




- ✓ 解析度 - 影響影像的細緻度
- ✓ 靈敏度 - 是否能擷取微弱訊號
- ✓ 動態範圍 - 影響影像分析的準確度
- ✓ 冷卻系統 - 抑制雜訊產生
- ✓ 鏡頭 - 影響影像訊號進入感光元件的量



- 開啟 ImageQuant LAS 4000 主機電源 & 電腦電源（任何順序皆可）
- 點選電腦桌面上 ImageQuant LAS 4000 快捷鍵  開啟影像擷取軟體
- 待 CCD 降溫至 -25°C (Ready) 藍色狀態





ImageQuant LAS 4000

File Edit View Option Help

ImageQuant™ LAS 4000

Exposure Type: Precision **3**

Exposure Time: Auto Manual

Sensitivity / Resolution: Standard

Add Digitization Image: ON

READY **35°C**

Chemiluminescence

Flat frame: Auto

1 2 3 4

ImageQuant™ LAS 4000

GE imagination at work

CONTROL SOFTWARE

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1 Method/Tray position

2 Focusing

4 Start



Method/ Tray position

性，選擇擷取方式(Method):

luminescence冷光

cence螢光

tion可見光

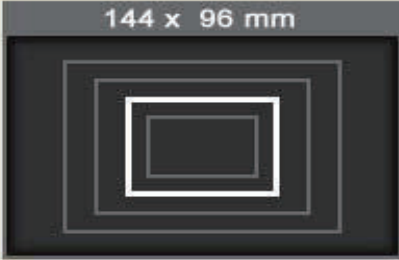

大小調整平台高度(Tray position)

Method / Tray position

Method	Light	Filter	Iris
<input type="radio"/> Chemiluminescence	None	Through	F0.85
<input checked="" type="radio"/> Fluorescence [EtBr] ▼	UV (Trans-illumination) ▼	605DF40	F2.8
<input type="radio"/> Digitization			
<input checked="" type="radio"/> Epi-illumination	White (Epi-illumination)	Through	F2.8
<input type="radio"/> Trans-illumination	White (Trans-illumination)	Through	F2.8

Tray position

1 2 3 4 NP



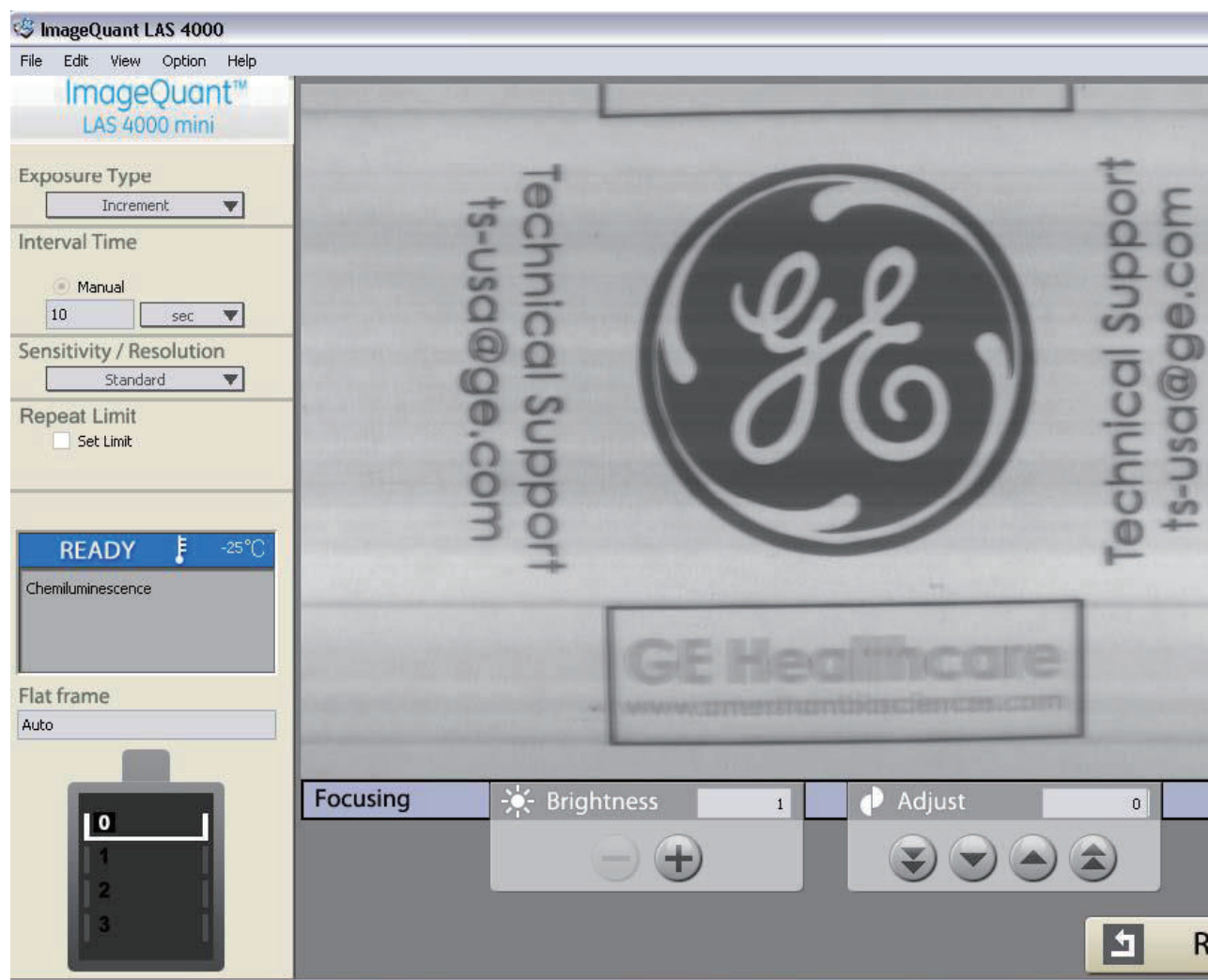
144 x 96 mm

OK Cancel





點選 Focusing:
調整明暗 (Brightness) 和焦距 (Adjust)
調整完後點選 Return





設定影像擷取參數:

曝光模式 (Exposure Type):

Precision (擷取特定時間下的單一影像)

Increment (連續拍且訊號累加)

Repetition (連續拍但訊號不累加)

Program (程式編輯)

Exposure Type

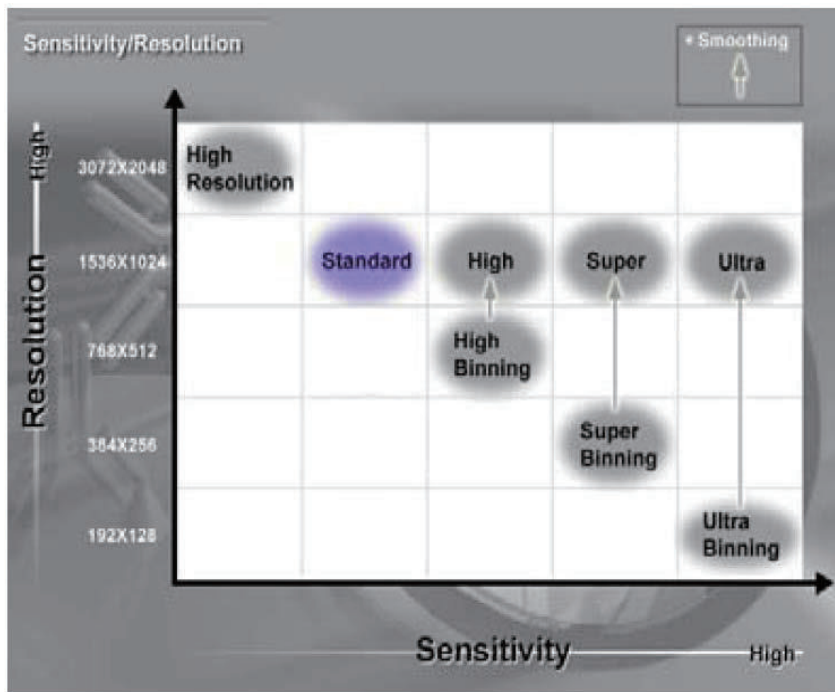
Exposure Type dropdown menu showing options: Precision (checked), Increment, Repetition, Program. Below are radio buttons for Exposure Time: Auto and Manual.



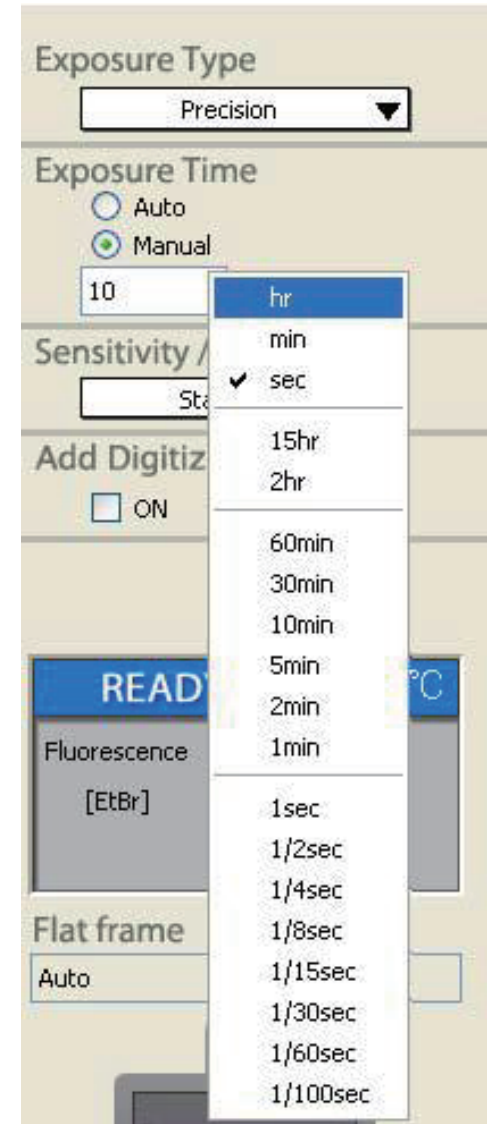
✓ 曝光時間 (Exposure Time): Auto/Manual:

✓ 靈敏度/ 解析度 (Sensitivity / Resolution):

Standard/ High/ Super/ Ultra/ High Binning/ Super Binning/
Ultra Binning/ High Resolution



Sensitivity	Image file size
High Resolution	12.6 MB
Standard	3.15 MB
High	3.15 MB
Super	3.15 MB
Ultra	3.15 MB
High Binning	786 KB
Super Binning	197 KB
Ultra Binning	49.2 KB

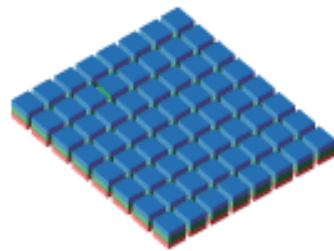




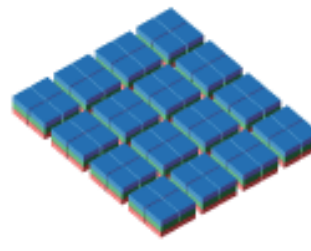
Binning：將相鄰的多個畫素當成是一個畫素的模式輸出。

e.g. 1300×1300 $\xrightarrow{\text{Binning: } 2 \times 2}$ 650×650

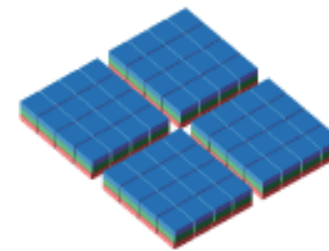
- 優點：每個pixel 的感光面積變大了，所以靈敏度變高、輸出速度變快。
- 缺點：解析度變差。
- 應用：光線弱時（例如螢光），可用Binning提高靈敏度，節省時間。



Binning: none



Binning: 2x2



Binning: 4x4

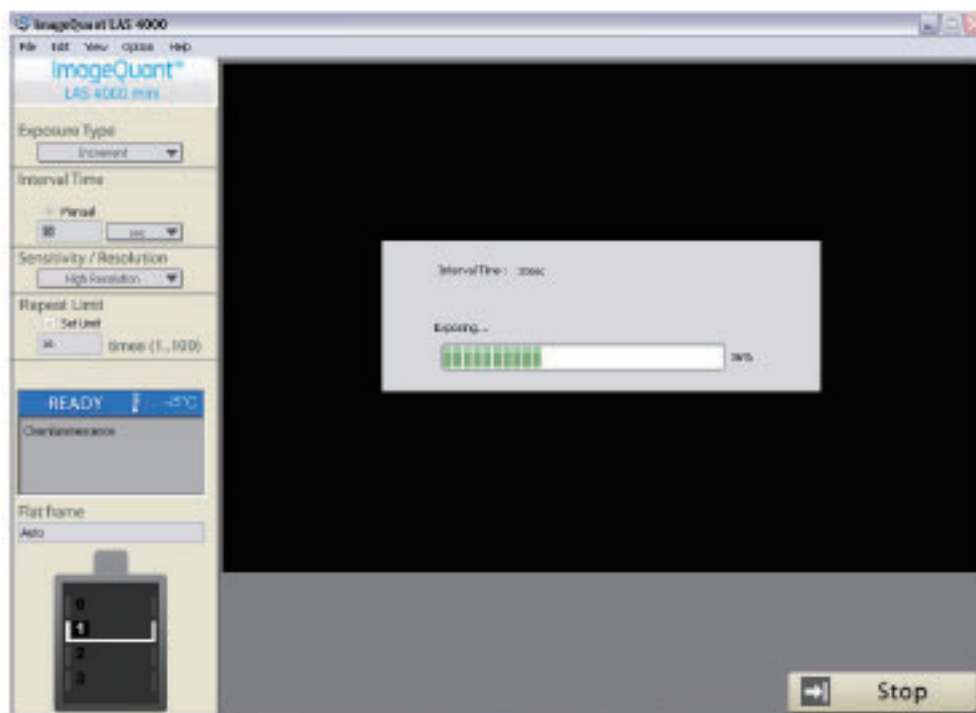


選Start進行拍照

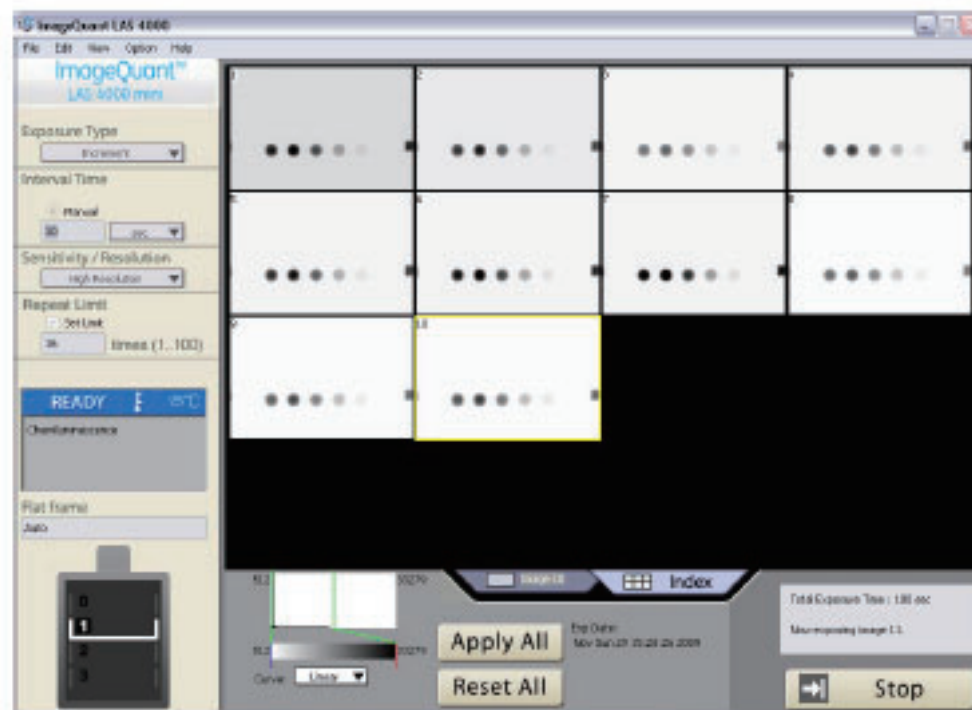




During exposure



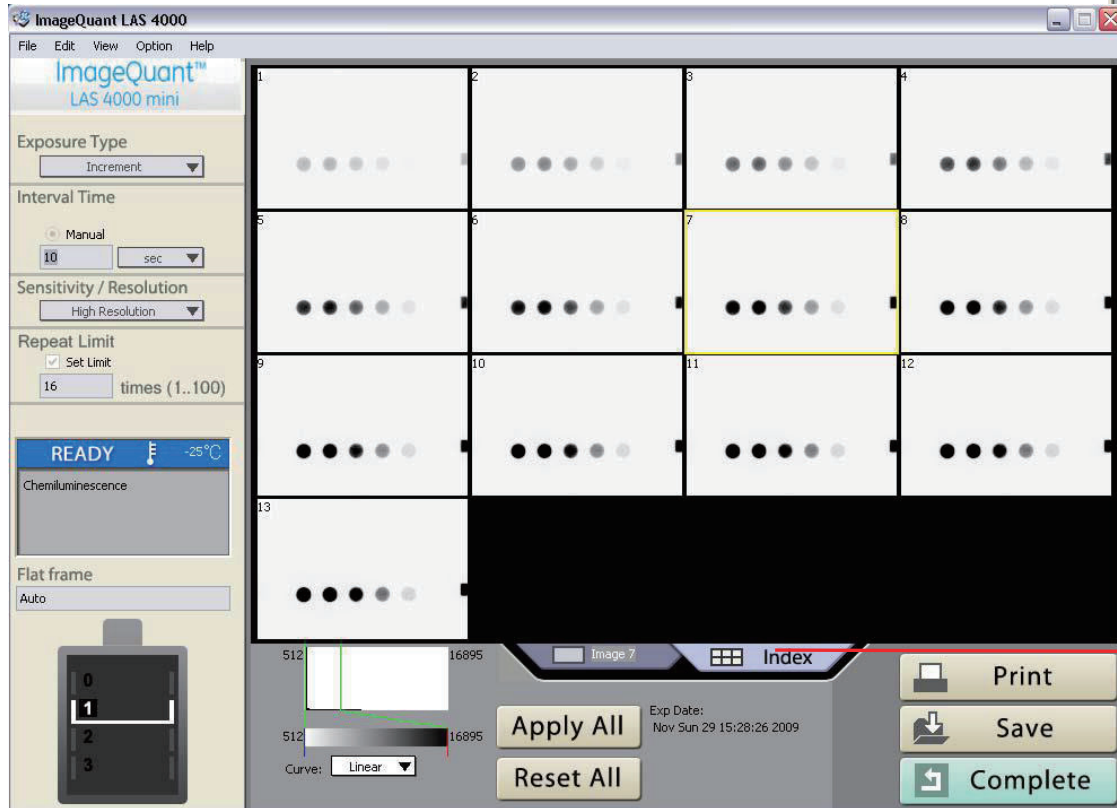
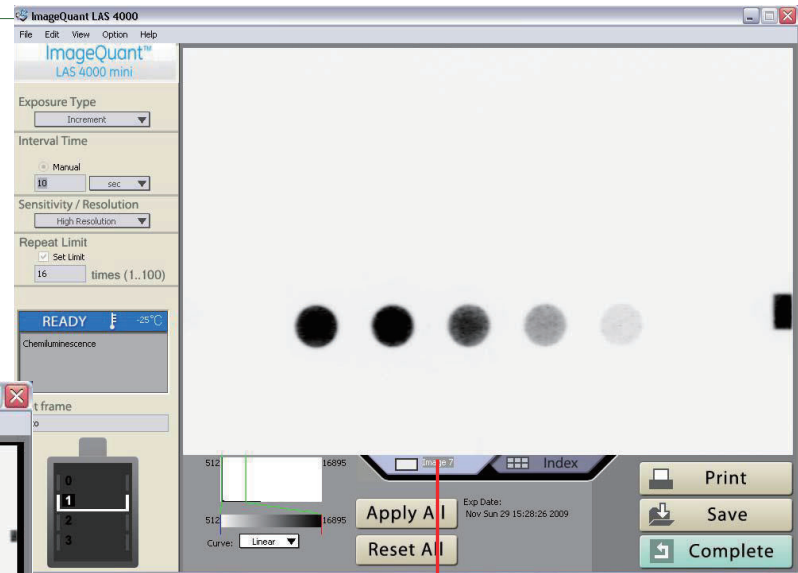
Precision type



Increment type

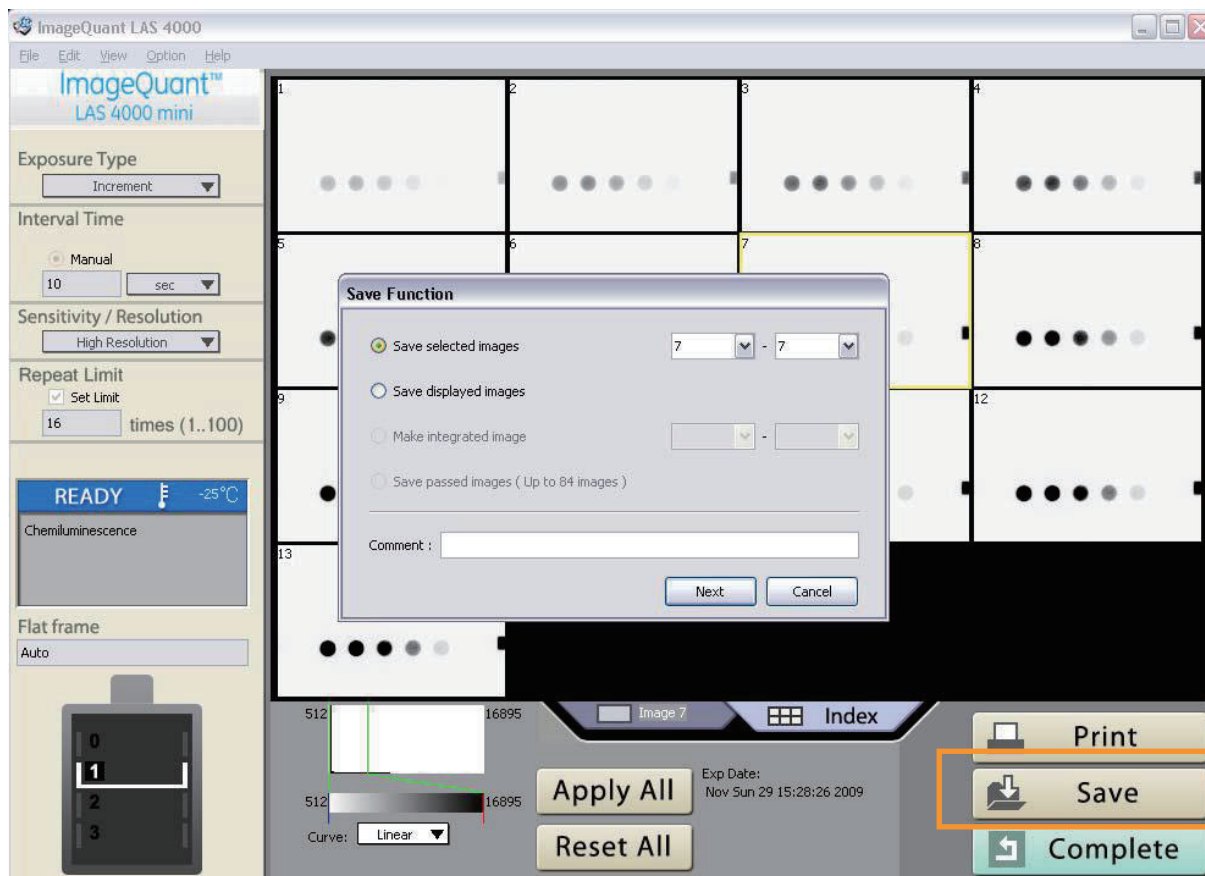


After exposure



單張影像

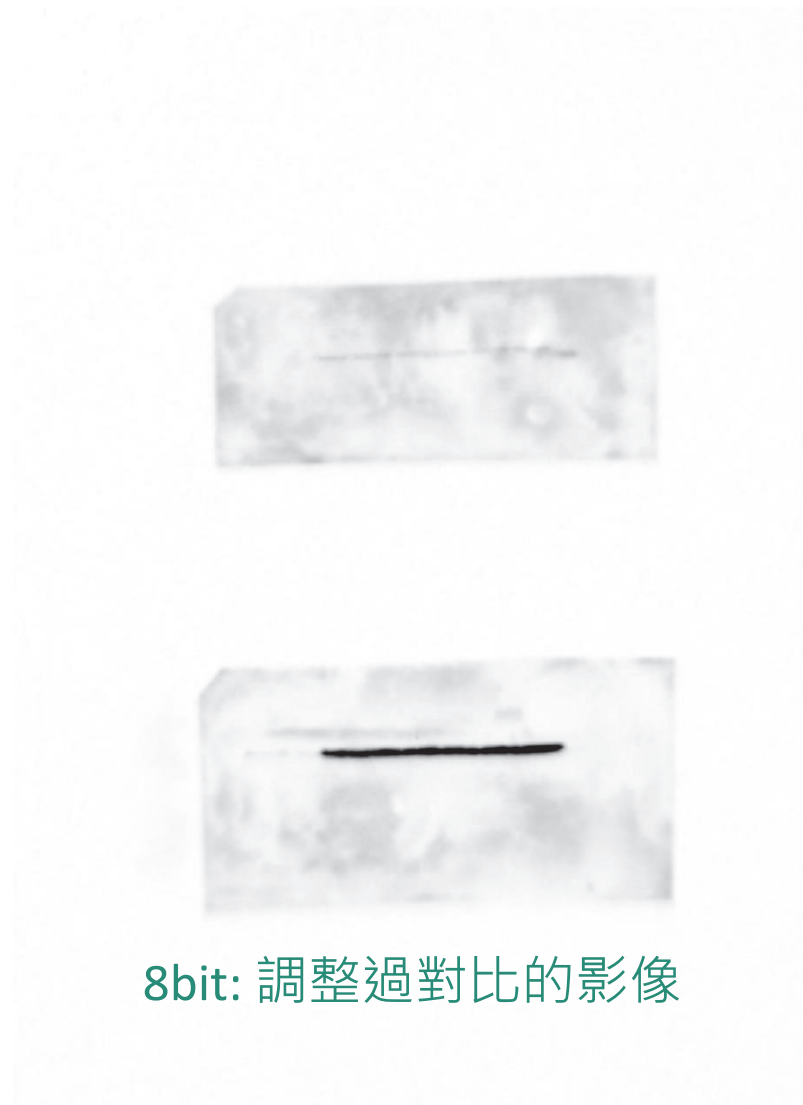
多張影像



.gel

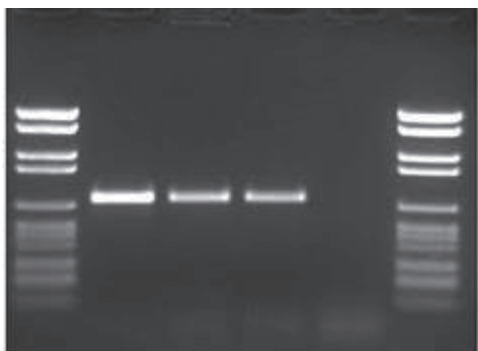
.16 bit TIFF

.8 bit TIFF

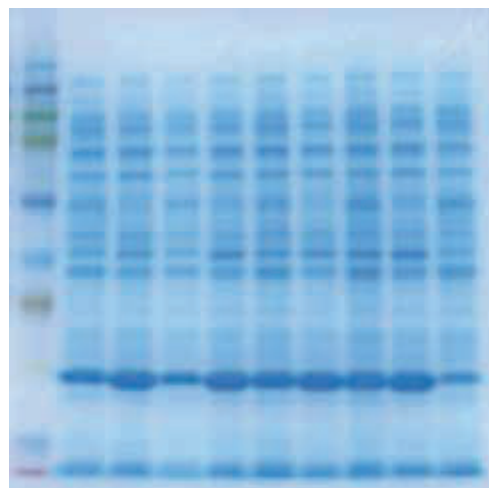




化學冷光呈色



UV透射成像



白光透射成像



Thank you for listening !

