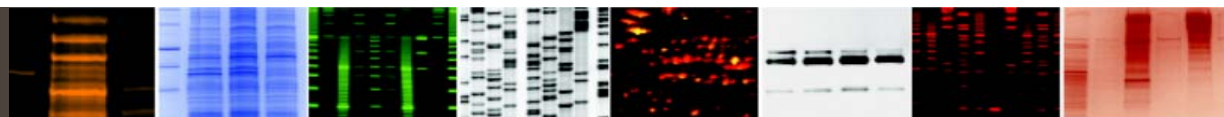
Bio-Rad's Camera Imaging Devices

Cathy Mainini/Ken Gresham
Sr. Prod Manager
NASD
March 2005



Understand Imaging

If you understand:

Sample properties – what is the sample, how abundant is it, how large are the features (spot, band, etc), what size is the gel or blot

Sensitivity

Resolution

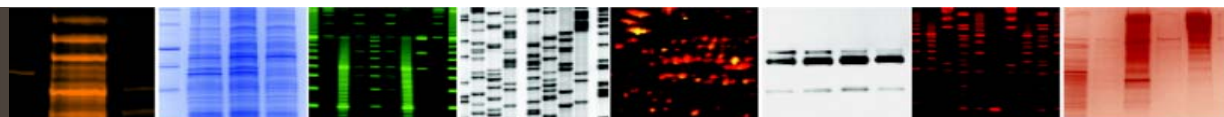
Imaging/Scan Area

Properties of the detection reagent – fluorescent, colorimetric (visible) or luminescent detection, multiplexing, multiple detection types, dynamic range

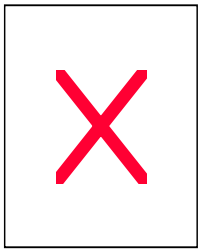
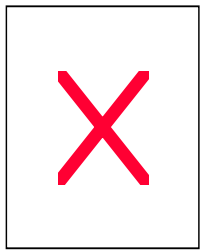
Illumination (laser, UV wavelength, white light)

Detector (camera, PMT)

Filters (excitation & emission)



Bio-Rad CCD Products

Gel Doc XR	ChemiDoc XRS	VersaDoc 4000	VersaDoc 5000
• Basic gel documentation 1-D DNA, RNA, & protein gels or blots), colony counting, X-ray film	• Basic gel documentation (1-D DNA, RNA, & protein gels or blots), colony counting, X-ray film • Chemi imaging of robust and "faint" chemi signal	• 2-D protein gel imaging • 1-D imaging • Flexible – SYPRO ruby, Coomassie, silver + chemi • Uniform data over large sample (2-D) area	• Highest limit of detection (sensitivity) • Imaging of very faint chemi signal • Excellent chemi detection
			
• High resolution imaging	• High resolution imaging	• Highest resolution imaging	• Low resolution imaging
$	$$$	$$$$	$$$$

Gel Documentation

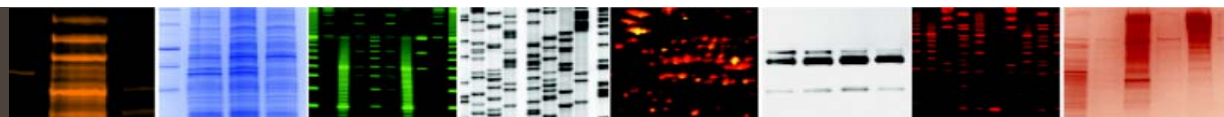
Gel Doc XR, ChemiDoc XRS

- Basic gel documentation & chemiluminescence
- Rarely use multi-fluorescent dyes
- Economical
- MZL
- Fast C-Mount optics

Multi Imager

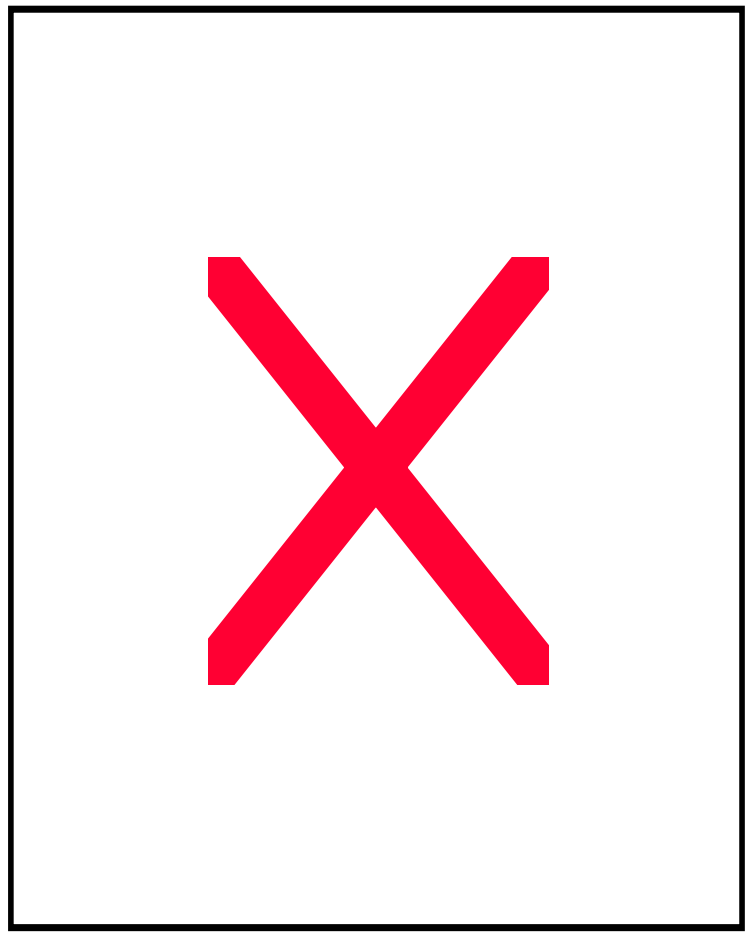
VersaDoc 4000, 5000

- Automated application selection
- Frequently use different dyes
- Imaging of fluorescently labeled blots
- Highly uniform F-Mount optics
- Excellent multi image registration



Gel Doc XR – *eXtra Resolution*

- Mega-pixel gel documentation
- 1.4M pixels
- 12-bit, 3 orders dynamic range
- FireWire interface
- PC and Mac (OS X) compatible
- $9995



Key Applications – Gel Doc XR

Nucleic Acid Detection

Ethidum bromide
SYBR green
SYBR gold

Texas red
Rhodamine
Coumarin
Hoechst

1D & 2D Protein Gels/ Colorimetric Blots

SYPRO ruby
SYPRO red
SYPRO orange

Copper Stain
Silver Stain
Zinc stain
Coomassie
DAB
NBT-BCIP

Densitometry

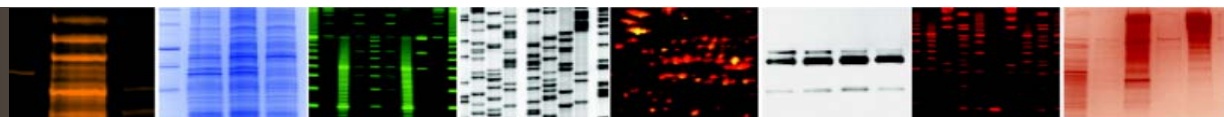
Negative
X-ray film

Colony counting

Betagalactocidase
GFP

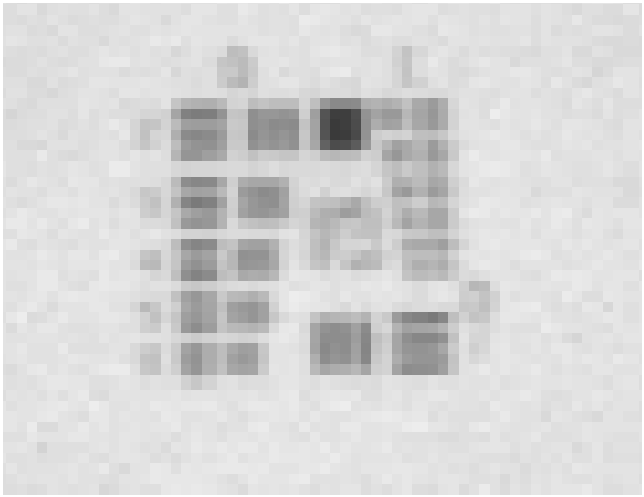
Carbohydrate Analysis

ANTs

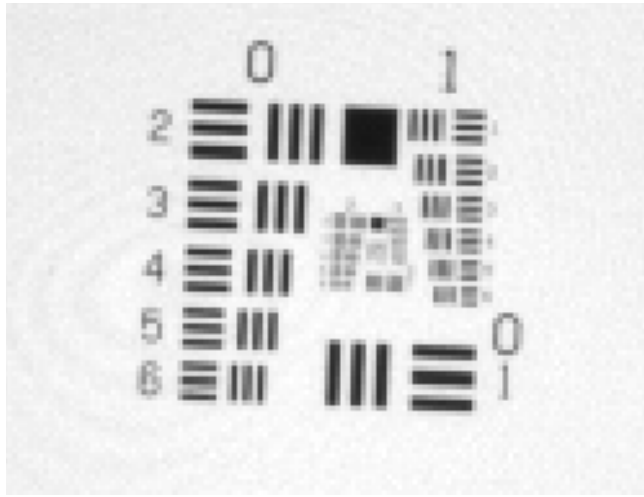


Gel Doc XR - e**X**tra **R**esolution

The benefits are obvious……..Greater Resolution….



Gel Doc EQ
0.4M pixels

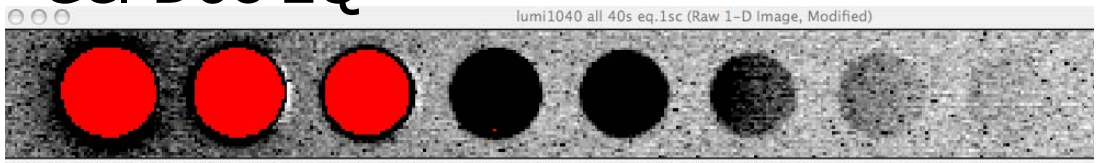


Gel Doc XR
1.4M pixels

Gel Doc XR - e**X**tra **R**esolution

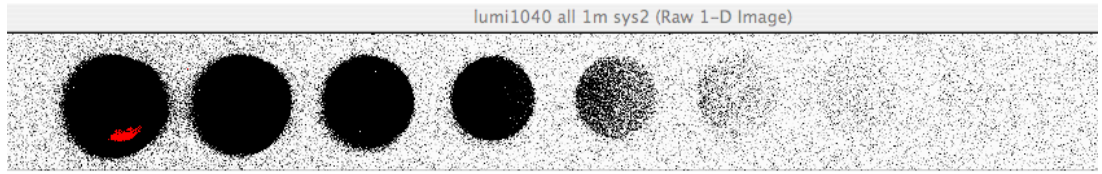
.....Greater Dynamic Range.

Gel Doc EQ



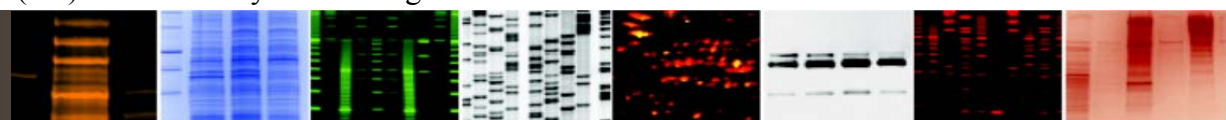
4 LEDS

Gel Doc XR



5 LEDS

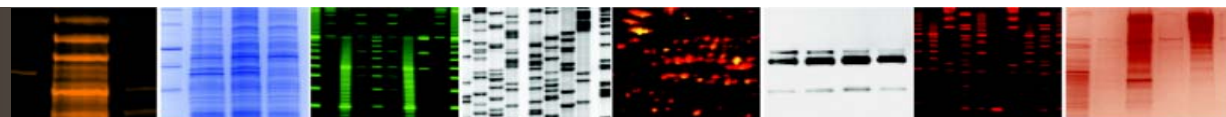
* Greatest number of LEDs detected w/o saturation (red) = Greatest Dynamic Range



Key Advantages of Gel Doc XR system

- Motorized zoon lens - ***#1 Feature***
  - Software or manual control
- 1.4M pixels & FireWire
- Different UV illumination intensities
  - Analytical and Preparative mode for cutting bands/reduce nicking
- 3 position filter slider
- 4 Optional emission filters
- Upgradeable to ChemiDoc XRS

- Quantity One Analysis, Basic Mode, Networking
- On-screen integration
- Print from acquisition window
- Direct links from acquisition to annotation, transformation and analysis



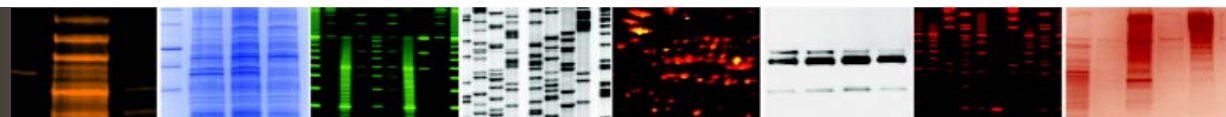
ChemiDoc XRS - e**X**tra **R**esolution & **S**ensitivity

XRS Customers:

Gel Doc XR customers (Basic gel documentation)

PLUS

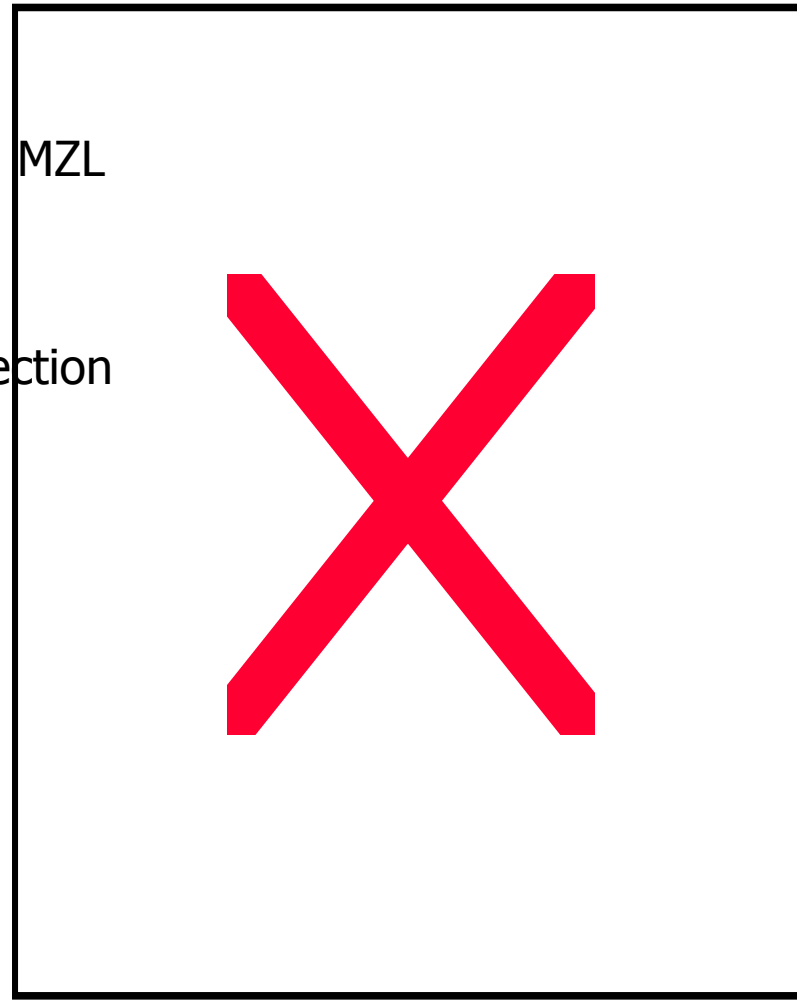
- Imaging of robust and "faint" chemi signal
- Customer's primary imaging need is for chemiluminescence
- Customer's routine chemi samples require an exposure time greater than 7 minutes

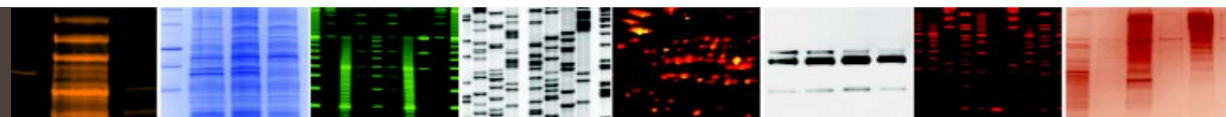


ChemiDoc XRS - e**X**tra **R**esolution & **S**ensitivity

Key Advantages

- High resolution (1.4M pixel) camera
- Standard computer & instrument controlled MZL
- 3-position filter slider
- Optional filters available
- Optional lenses available for maximum detection
- 3.4 Orders dynamic range
- 1392 x 1040 pixels
- PC & Mac compatible
- Dynamic Flat Fielding
- List price $24,995





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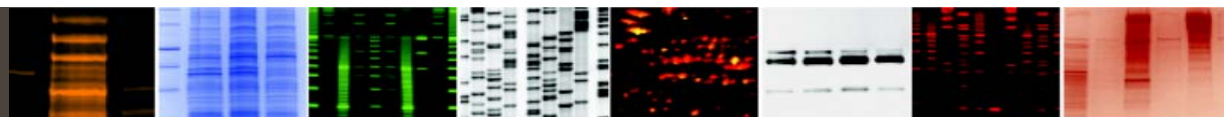


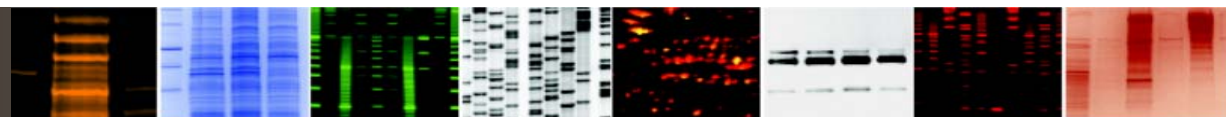
Key Advantages of ChemiDoc XRS system

ChemiDoc XRS – many of the same features as Gel Doc XR

- Motorized zoon lens - ***#1 Feature***
  - Software or manual control
- 1.4M pixels
- Different UV illumination intensities
  - Analytical and Preparative mode for cutting bands/reduce nicking
- 3 position filter slider
- 4 Optional emission filters
  - Same or better than most competitors
- Quantity One Analysis, Basic Mode, Networking
- On-screen integration
- Print from acquisition window
- Direct links from acquisition to annotation, transformation and analysis

PLUS

- Super cooled camera at -35°C for excellent signal to noise ratio
- Excellent quantum efficiency for chemi detection
- Two optional (manual) lenses – low f/stop for faster imaging
- Dynamic Flat Fielding



Blotting

Western Blotting 1-D and 2-D

Luminescent

- **Immun-Star HRP & AP**
- ECL
- ECL Plus
- SuperSignal

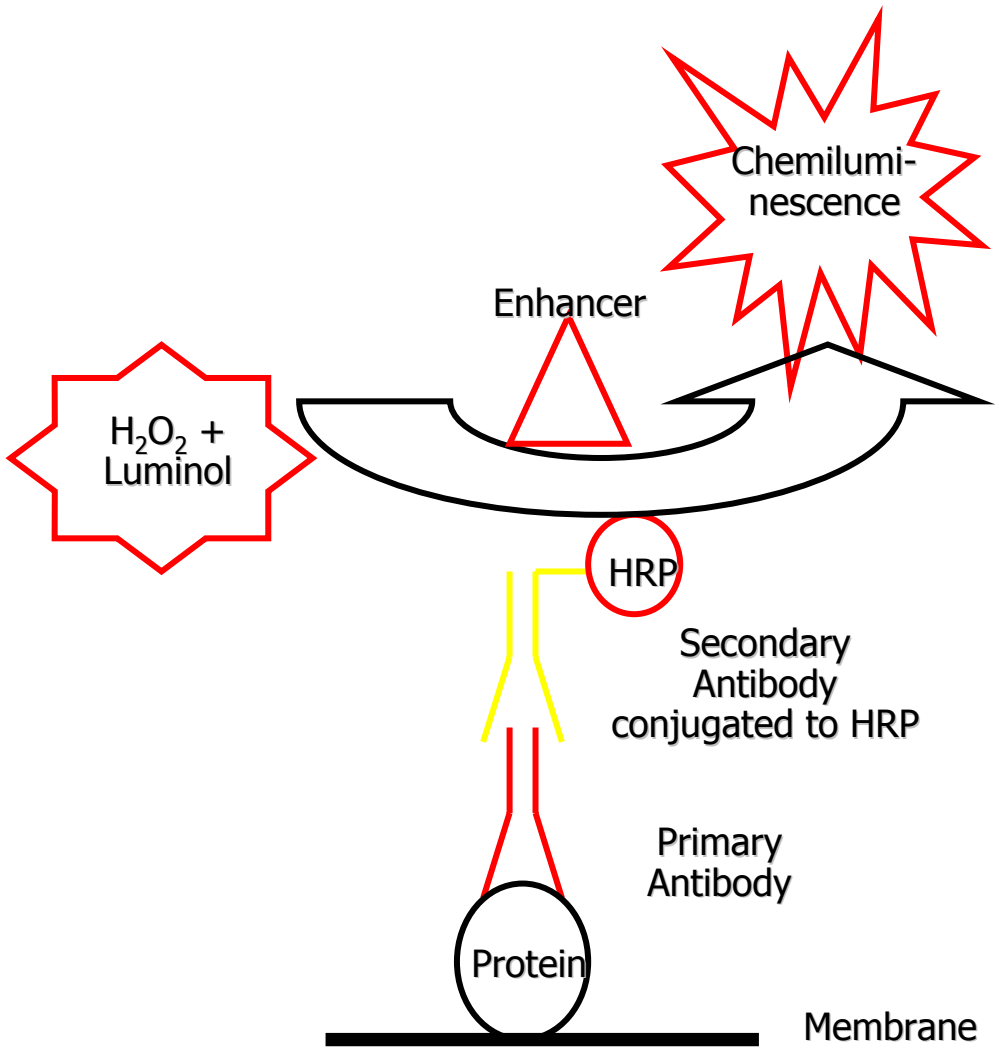
} VersaDoc 4000 & 5000

Fluorescent

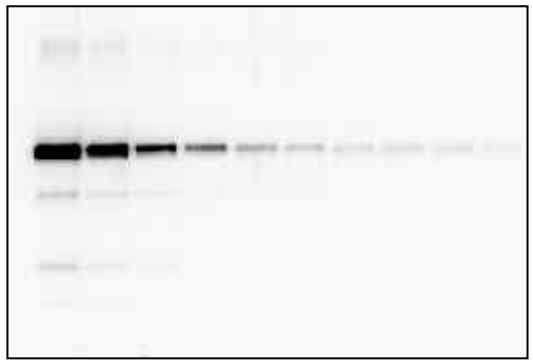
- Attophos
- ECL Plus

Colorimetric detection

- **DAB**
- **NBT-BCIP**



Chemiluminescence



Typical Chemiluminescent Reagents

Luminols – Immun-star HRP (Bio-Rad),

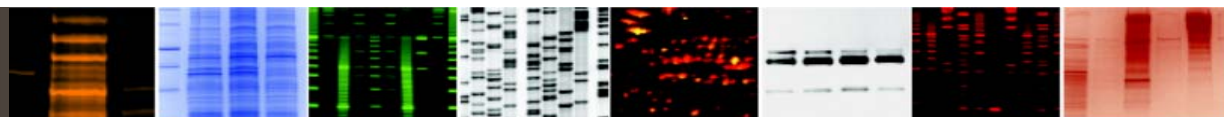
- Horseradish Peroxidase mediated
  - Brighter Signal, shorter half-life (less than 60 minutes)

1,2-Dioxetanes – CDP-*Star* (Tropix)

- Alkaline Phosphatase mediated
- Less intense signal, long half-life (24 hours +)

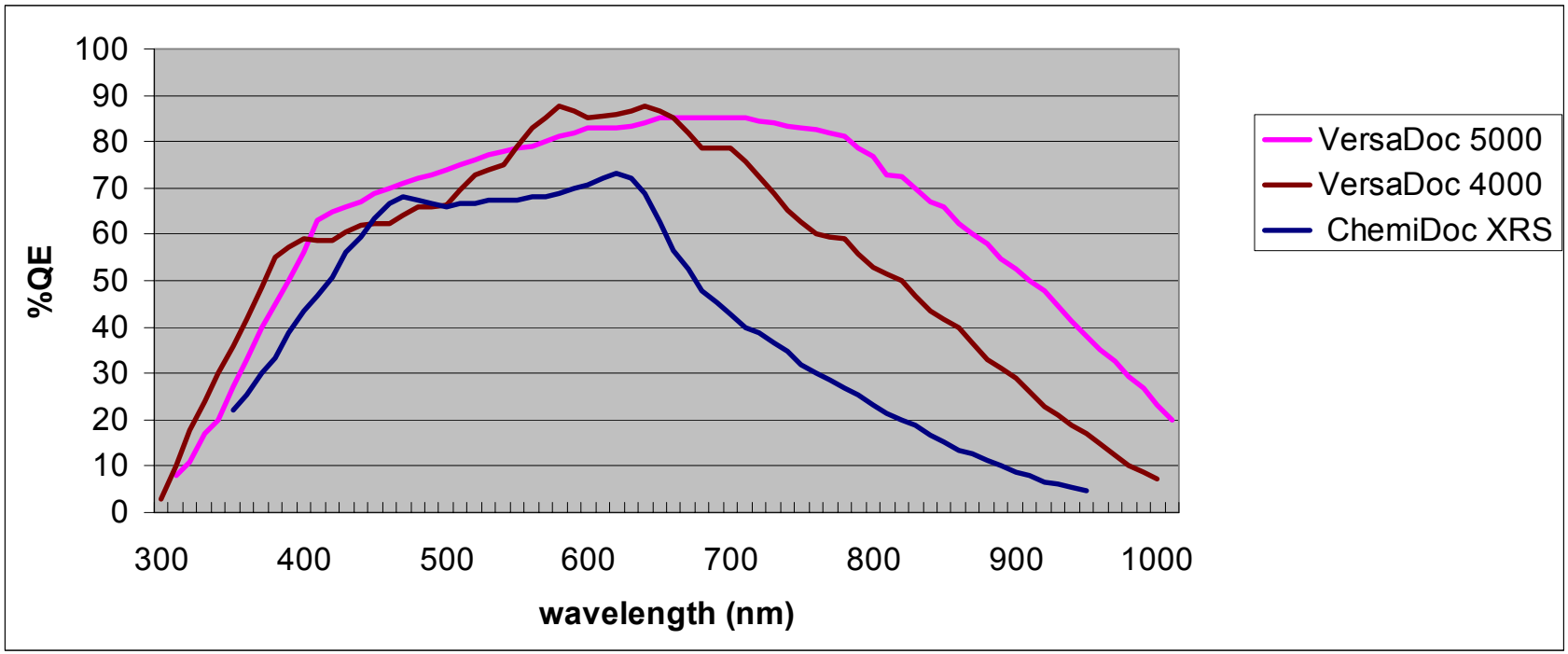
Chemiluminescence with Film

- Film manufacturers
  - Kodak and Fuji
- Film Advantages
  - Fast exposure times
  - Very fine resolution (approx. 3 micron silver grains)
- Film Disadvantages
  - Poor dynamic range (1.5 orders of magnitude, which is less than a chemi reaction!)
  - Must be scanned to use in presentation/publication



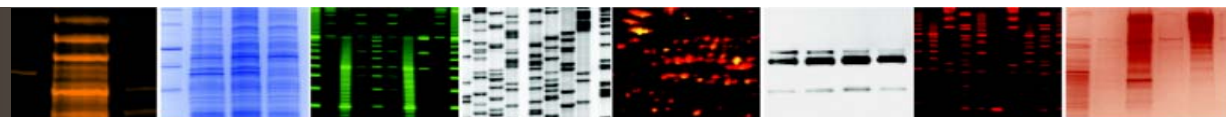
Quantum Efficiency

The efficiency at which photons of light are converted into electronic signal. If a detector had 100% QE every photon that reaches it would be converted to electronic signal.

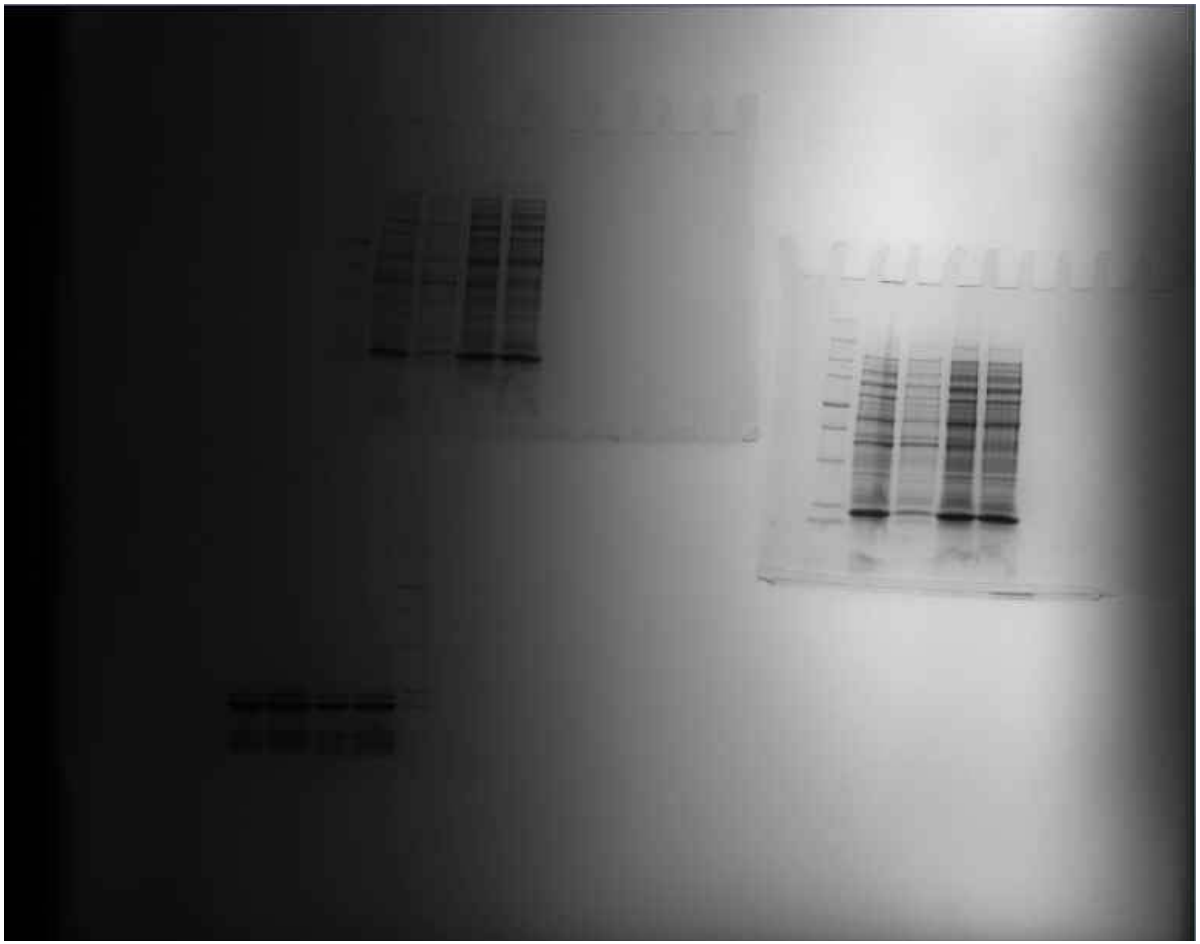


What Is Flat Fielding?

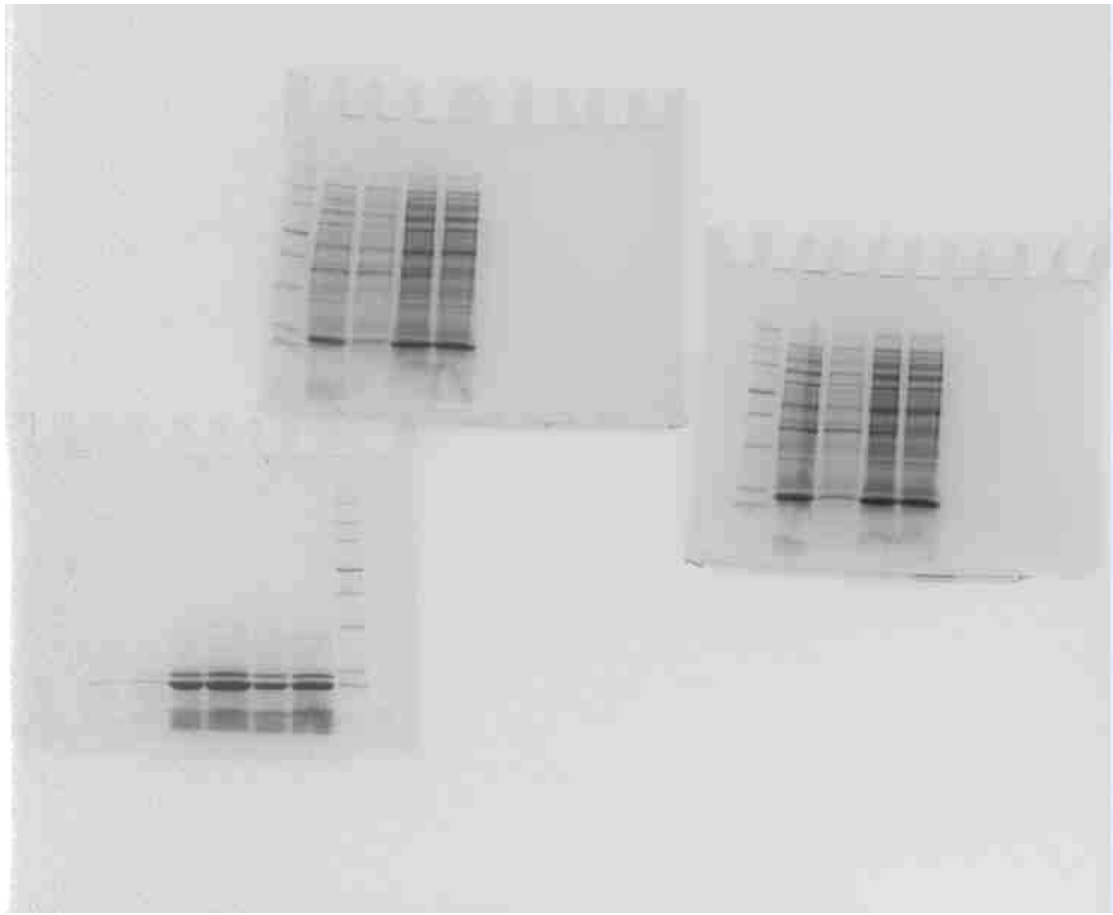
- It is a patent pending Bio-Rad technology for the elimination of non-uniformity's caused by variations in the optical path due to zoom setting, illumination, and/or lens.
- It is available for Trans UV and white light illumination.
- Bio Rad's VersaDoc CCD technology improves image quality by reducing background noise and enhancing the signal to noise ratio.
- Flat fielding is featured in the ChemiDoc XRS & VersaDoc



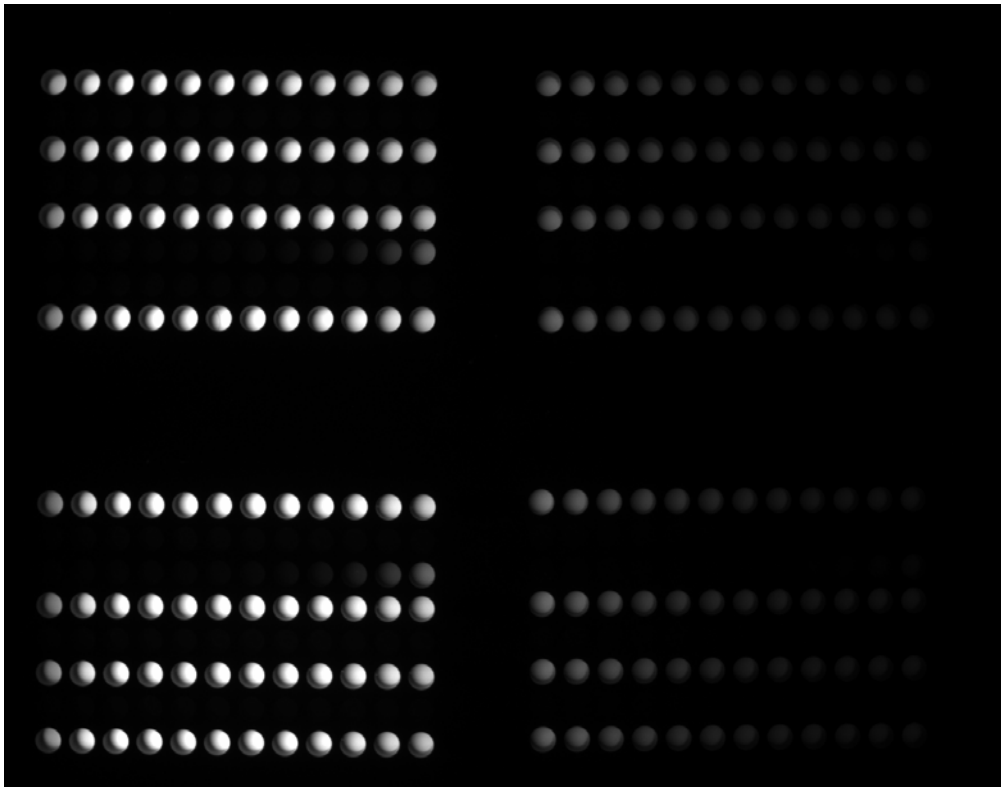
Gels Without Flat Fielding



Three Gels With Flat Fielding



Microtiter Plates w/o Flat Fielding



Microtiter Plate w/Flat Fielding

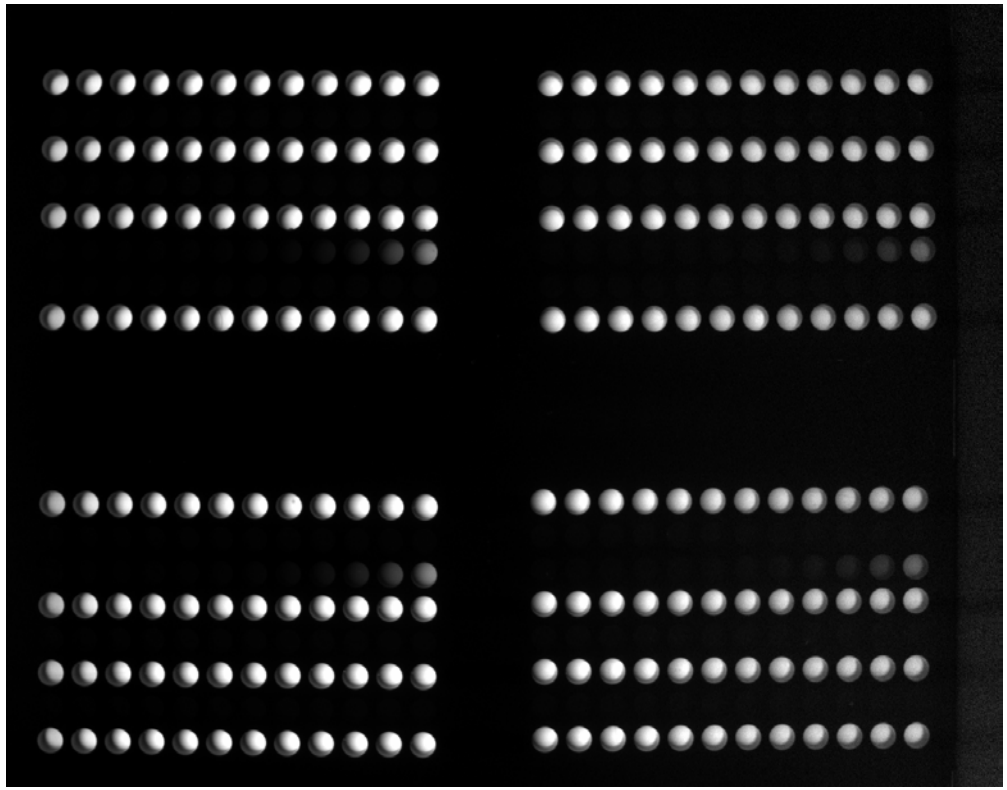


Image File Reduction

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