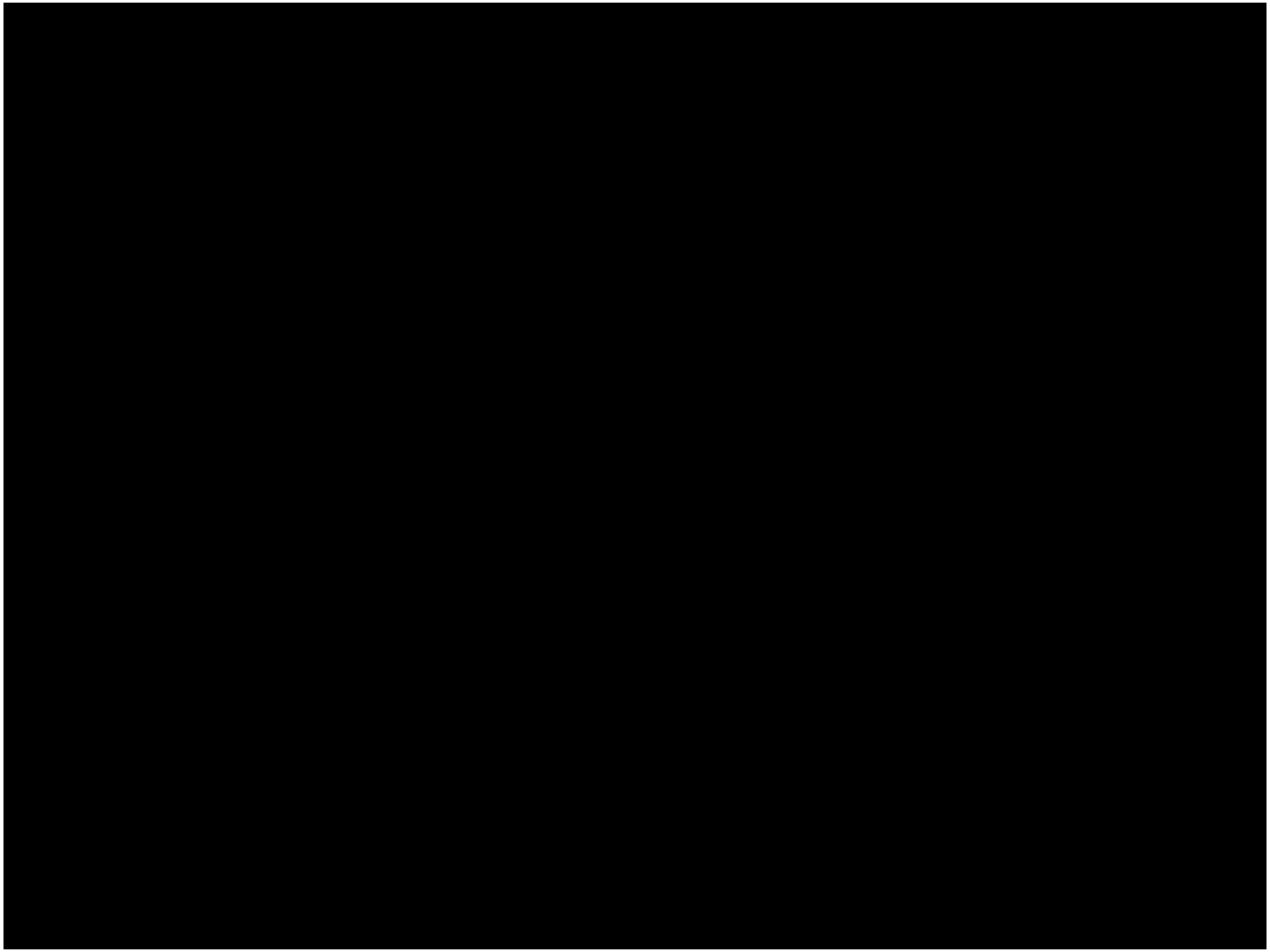
KIM FOREST ENTERPRISE CO.,LTD

SpectraMax i3x Multi-Mode Detection Platform

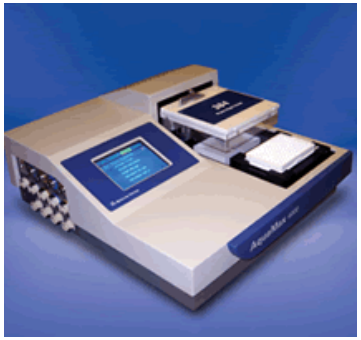
產品經理 楊博甦 *Hant Yang*
金萬林企業股份有限公司

Molecular Devices



About MD products

- **Research**
  - ✓ Microplate reader
  - ✓ Washer
  - ✓ Genepix
- **Drug Screening**
  - ✓ FLIPR
  - ✓ Flexstation 3
  - ✓ ImageXpress
  - ✓ Ionworks Quattro



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MD microplate reader—The TOP1 !!

第一台可以動力學偵測

第一台連續光譜光度儀

第一台可以**Pathcheck®**

第一台多功能光度儀

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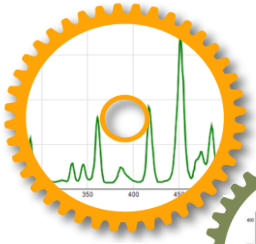
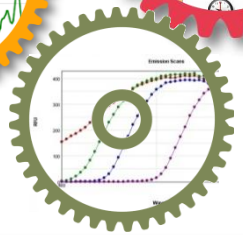
Imagine a Multi-Mode Plate Reader that evolves over time

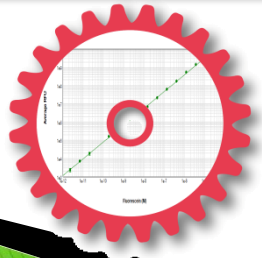
3 Mode Base Functionality

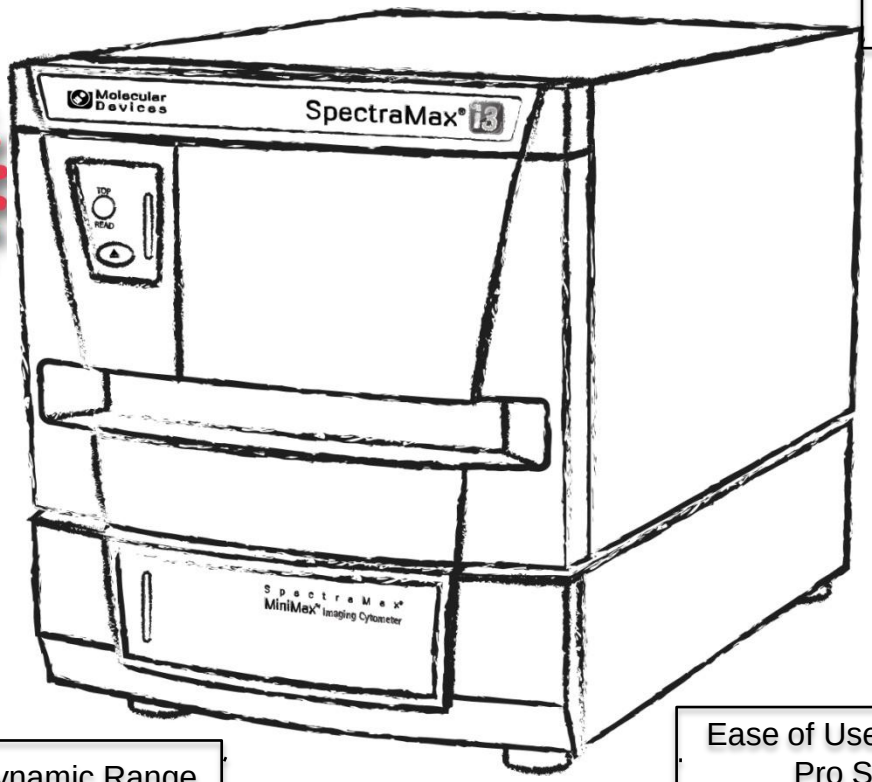




Improved sensitivity with Spectral Fusion™ Illumination

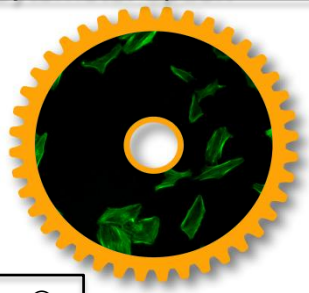
Extended Dynamic Range



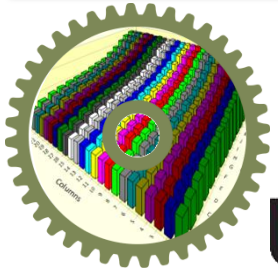


Flexibility of User-Upgradeable Application Cartridges

MiniMax™ Imaging Cytometer option



Ease of Use of SoftMax® Pro Software



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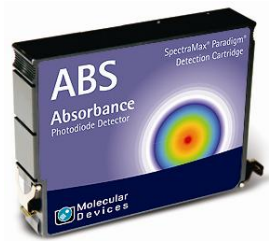
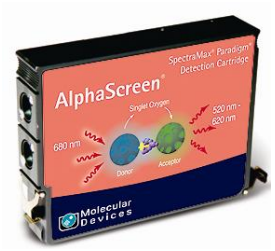
Cartridges – Future Ready

- User-upgradeable within 2 minutes
  - No messy upgrades
  - No instrument down time
  - Only cost – new cartridge
- Applications (18 options)
  - ScanLater™ (Western Blot)
  - AlphaScreen® (PE)
  - HTRF® (Cisbio)
  - Customization
  - And more





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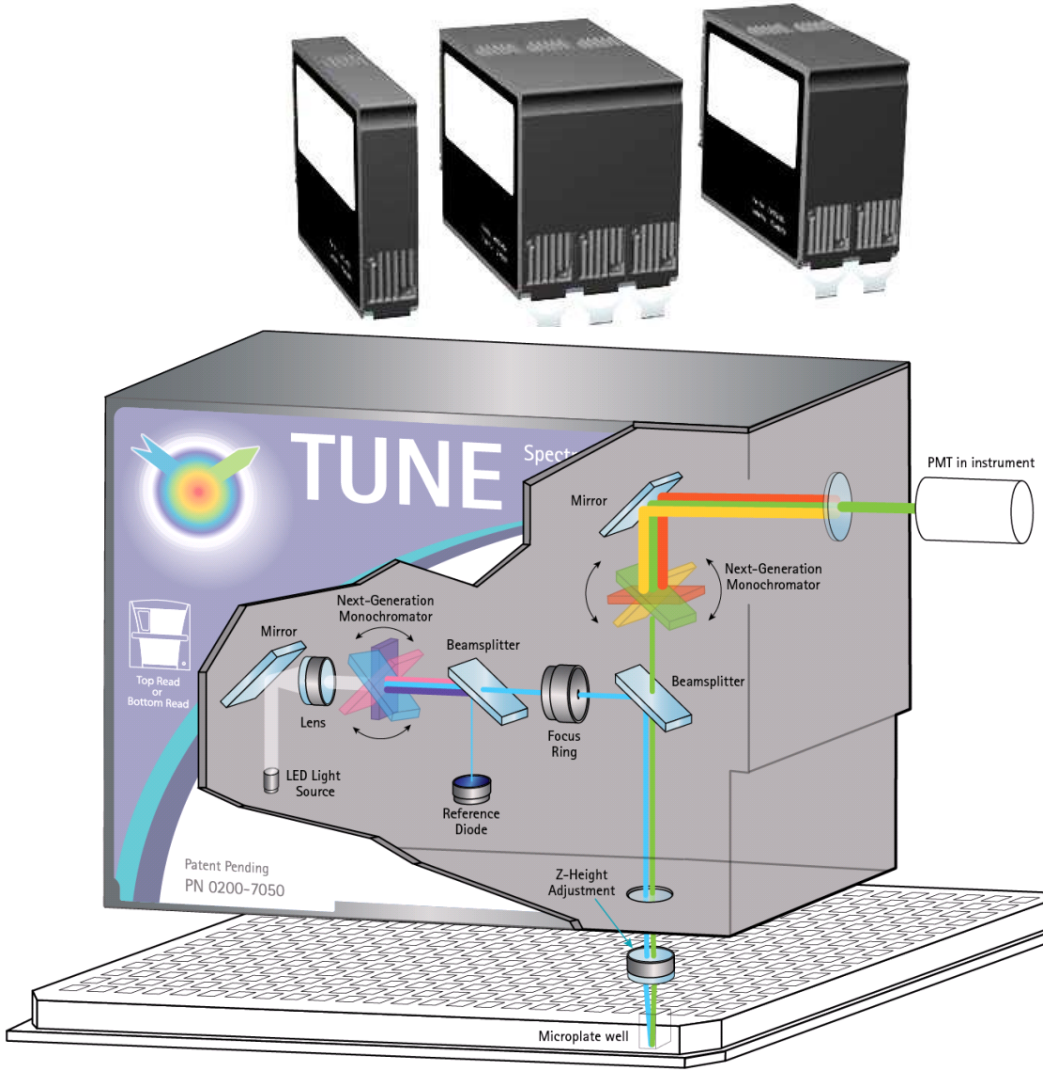
Each Cartridge Is One Microplate Reader

- Detection Cartridges include:
  - Optimal Light Source
    - AlphaScreen®: **laser diode**
    - FL: **LED**
  - Detection Specific Electronics
  - Label Specific Optics
    - Excitiation filter (s)
    - Emission filter (s)
    - Dichroics
    - Polarizer(s) for FP



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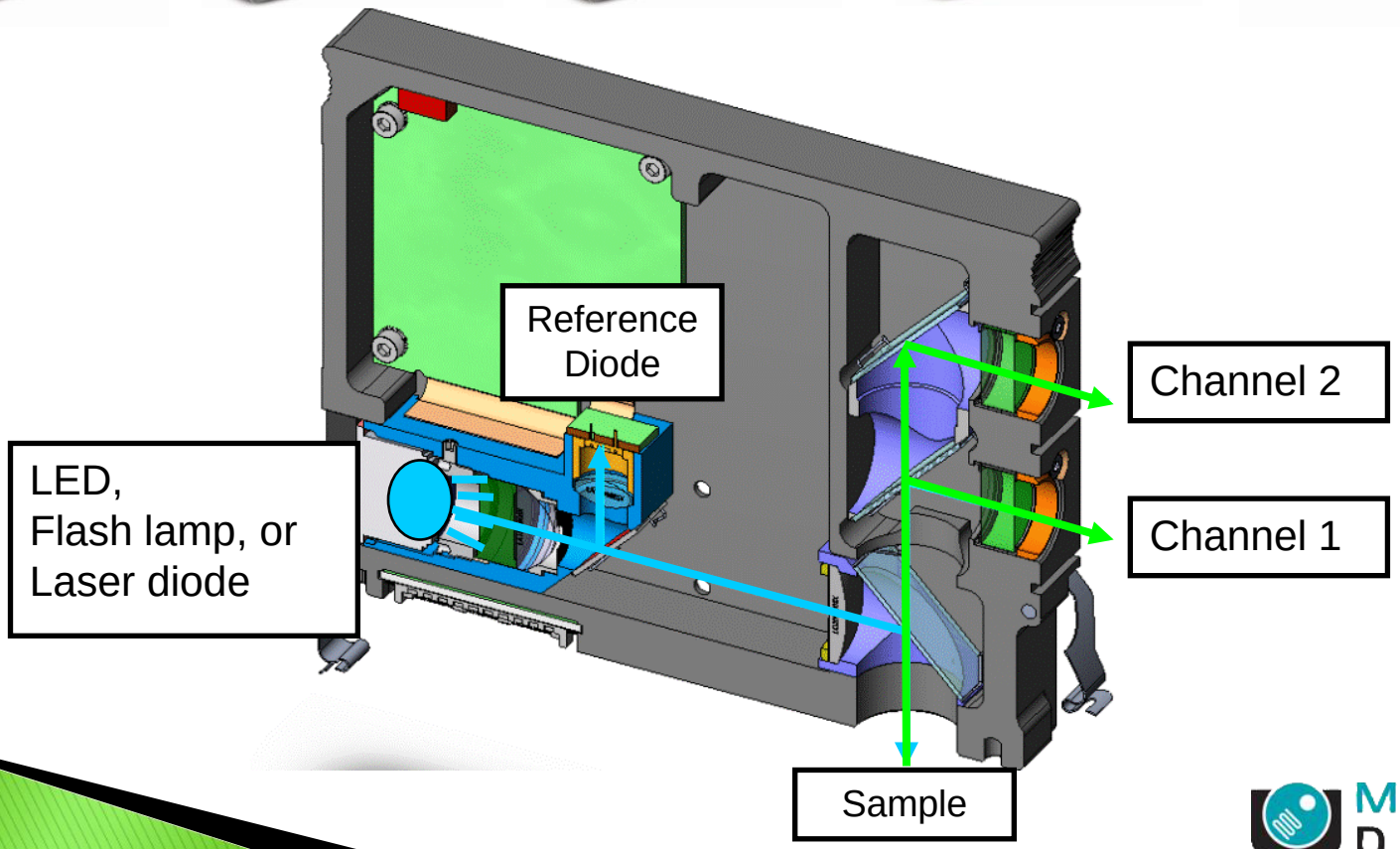
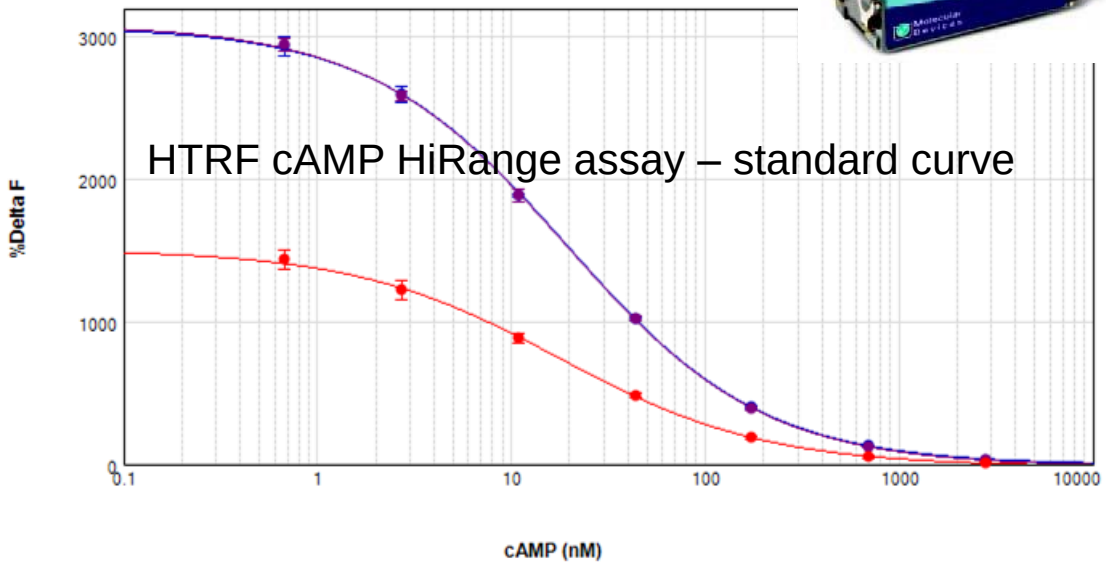
Detection Cartridge Options – How they work



Molecular Devices

HTRF with I3x

Cisbio requirements	Passing value	i3x
Signal/bkg	≥ *40*	106.8
DF% High	≥ *600*	939.3
DF% Low	≥ *15*	24.4
CV Std 0	< *10*	3.8



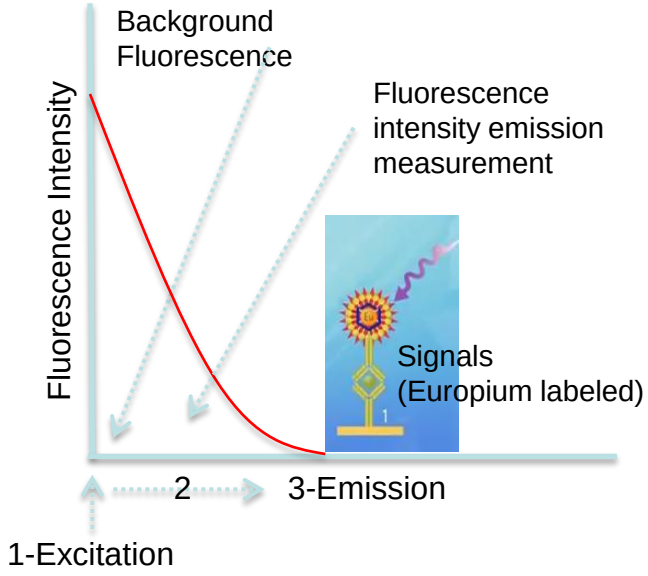
* Optimal setting for i3 as determined with Cisbio Certification are 30 µs delay, 400 µs integration, 30 pulses

Reader	EC_{50}*	Z' factor	Window (Ratio)	Window (%Delta F)
SpectraMax i3	19.3 nM	0.91	8747	3024

Molecular Devices

ScanLater™ Western Blot Detection

- First western blot detection on a multi-mode microplate reader
- Time-resolved fluorescence (TRF) based assay
  - Eu 2nd antibody
  - Scan now or up to 30 days later
- Cost saving
  - Less expensive than buying an gel imager
- Quantitation
  - High sensitivity for fg concentrations
- Time-saving protocols
  - Eliminate substrate, darkroom, or exposure time requirements



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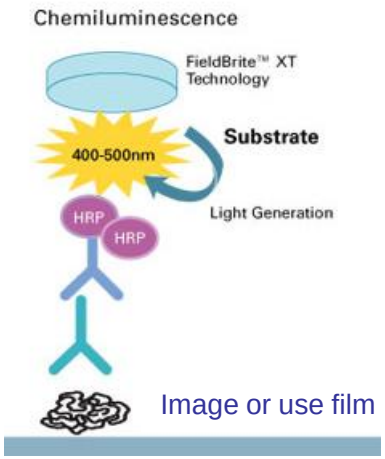
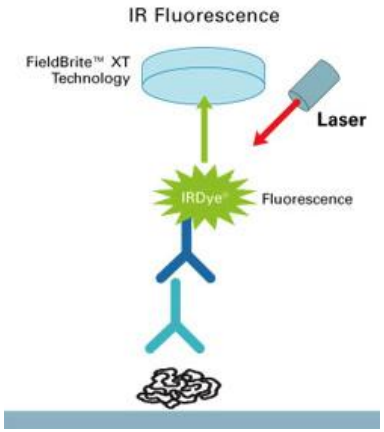
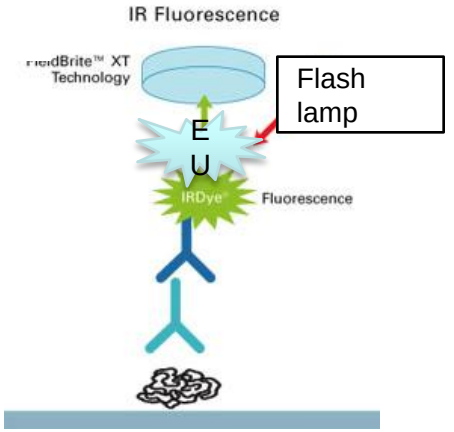
ScanLater™ Advantages Over Other Methods





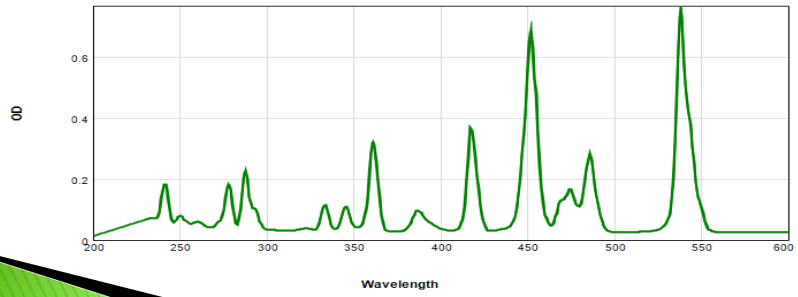


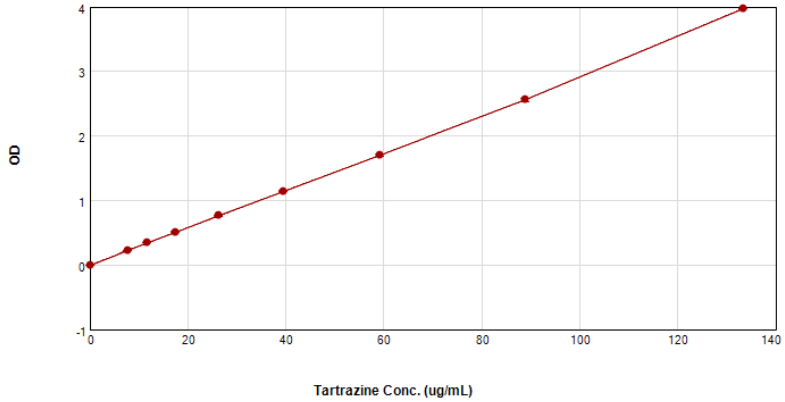
Sensitivity	fg	pg	fg/pg
Dynamic Range	1-2 logs	4 logs	4 logs
Substrate	Yes	Not needed	Not Needed
Stability	Hours	Weeks	Months
Quantitative	Semi/indirect measurement	Quantitative/direct measurement	Quantitative/direct measurement
Output	Film/Imaging	Imaging	Imaging

Molecular Devices

Absorbance with SpectraMax i3 Platform

- Light source: **Xenon Flash Lamp**
- Detection: Photodiode
- Wavelength selection: Dual Monochromator
- Spectral Range: 230-1000 nm
- Read: top to bottom
- Bandwidth: 4nm
- **Performance**
  - System has less stray light than single Monochromator system
    - More sensitive
    - Linearity up to 4OD





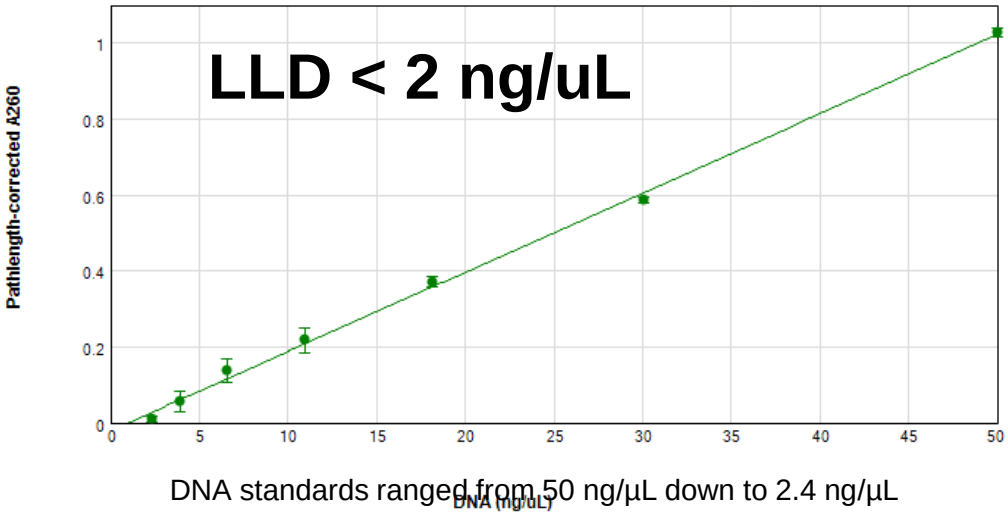
Absorbance scan of Holmium oxide; 300-600nm in 1nm increments

Molecular Devices

Micro-Volume DNA/RNA Quantitation

SpectraDrop Micro-Volume Microplate

- SBS format holder + 2 slide design
  - 24 or 64 spot microplate
  - 2uL or 4uL configurations
- Sensitivity
  - 2ng/uL (dsDNA)
- Easy to clean
- Replaceable slide design



DNA standards ranged from 50 ng/µL down to 2.4 ng/µL

Molecular Devices

Fluorescence with SpectraMax i3 Platform

- Light source: **Spectral Fusion™ Illumination**
- Detection: PMT
- Wavelength selection: 2x2 Monochromator Design
- Spectral Range: 250-850 nm
- Read: top and bottom
  - Top read no fibers for Ex and Em
  - Bottom: fibers for the Ex and Em
- Bandwidth: **Ex 9 or 15 nm, Em 15 or 25 nm**
- **Performance**
  - 2x2 Monochromator design in combination with Spectral Fusion™ Illumination allow this system to be
    - More sensitive
    - Higher dynamic range
    - Full spectral range

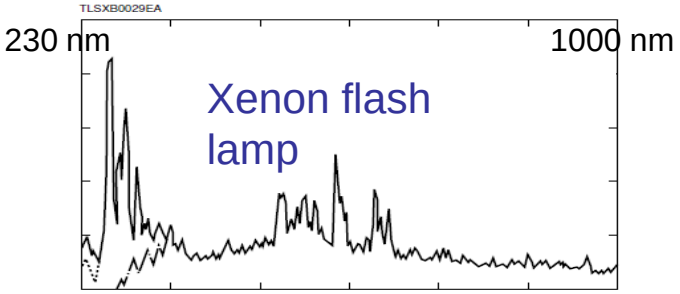
Fluorophore	i3 LLD
Coumarin	200pM
Alexa 430	20pM
Fluorescein	1pM
Rhodamine	5pM
Texas Red	10pM
Alexa 633	5pM
Alexa 647	3pM
Alexa 700	10pM

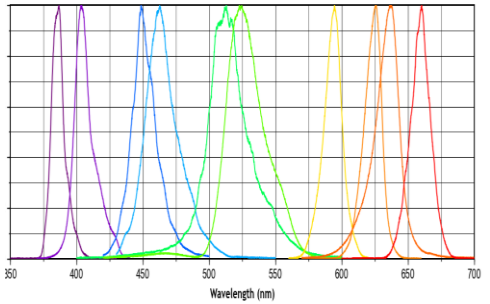
384 Top, Optimized LLD results

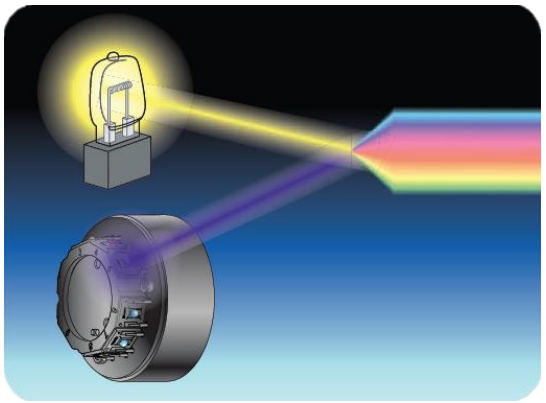
Molecular Devices

Unique Spectral Fusion™ Illumination

- Revolutionary light source design
  - Xenon flash lamp (**for deep UV**)
  - Intensified by LEDs in visible range
  - More powerful
- Increased sensitivity
  - Ultimately increasing the sensitivity of the system across the full spectrum
- Auto LED
- High dynamic range for all conc. on one plate
  - **No need to reread**
  - **No saturation**







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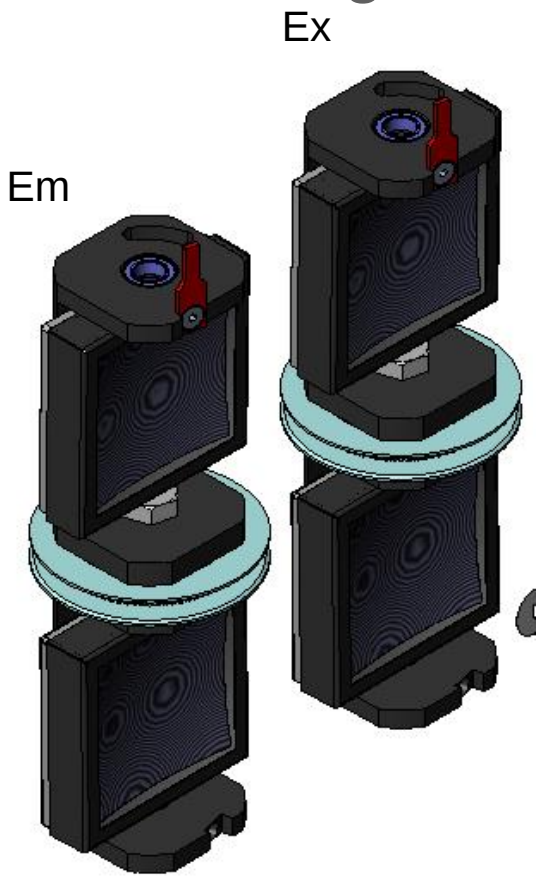
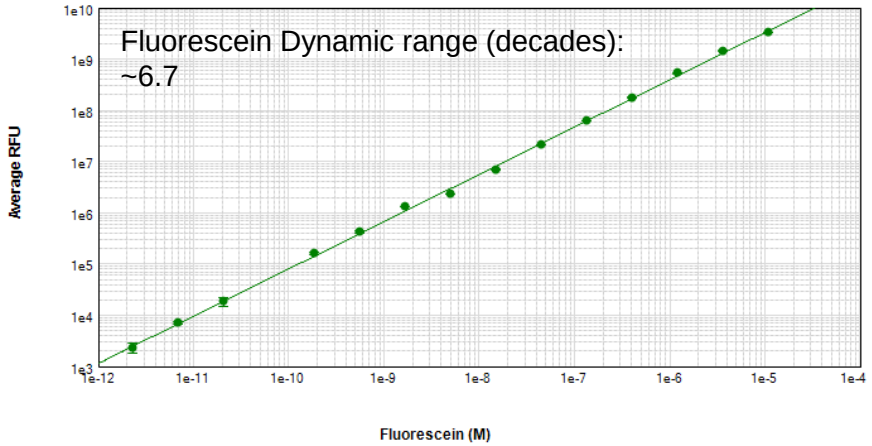
Wavelength Selection: 2x2 Monochromator Design

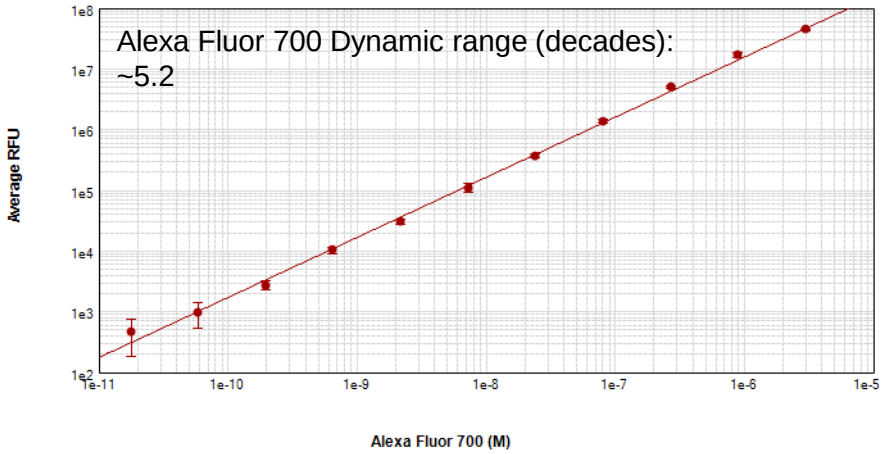
- Advantage:
  - Dual monochromators for excitation and/or emission provide best stray light elimination
- Limitation
  - Loss of excitation and emission signal (poor light efficiency) can lead to decreased sensitivity
- Solution for I3:
  - Better light source with Spectral Fusion Illumination overcomes the efficiency limitations of 2x2 Monochromator Design
  - More sensitive than other 2x2 Monochromator Design system



Extended Dynamic Range

SpectraMax i3 Base System	Est. dyn. range (decades)
Alexa 430	> 4
Fluorescein	> 6
Alexa 700	> 5

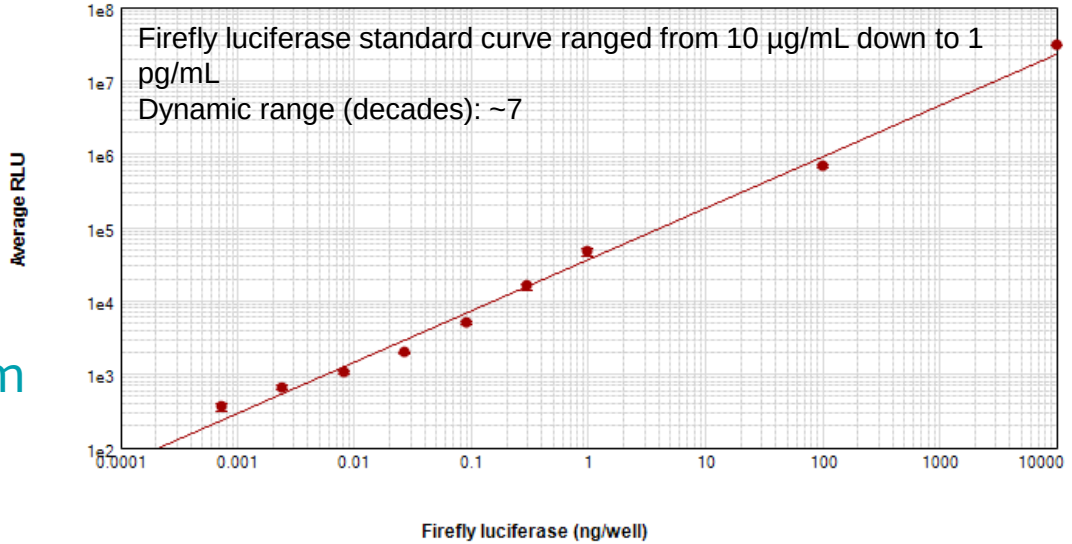


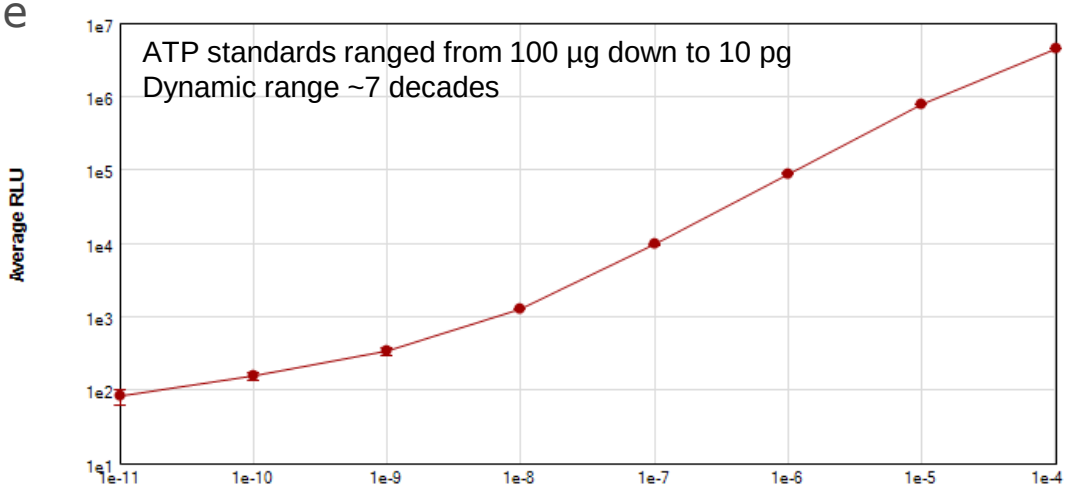


Molecular Devices

Luminescence with SpectraMax i3 system

- Detection: **Cooled PMT**
- Wavelength selection: Dual Monochromator for Em only
- Spectral Range: 300-850 nm
- Read: top only
- Bandwidth for Em: 15 or 25 nm
- **Performance**:
  - Low instrument background
  - High sensitivity across the visible range (most applications)





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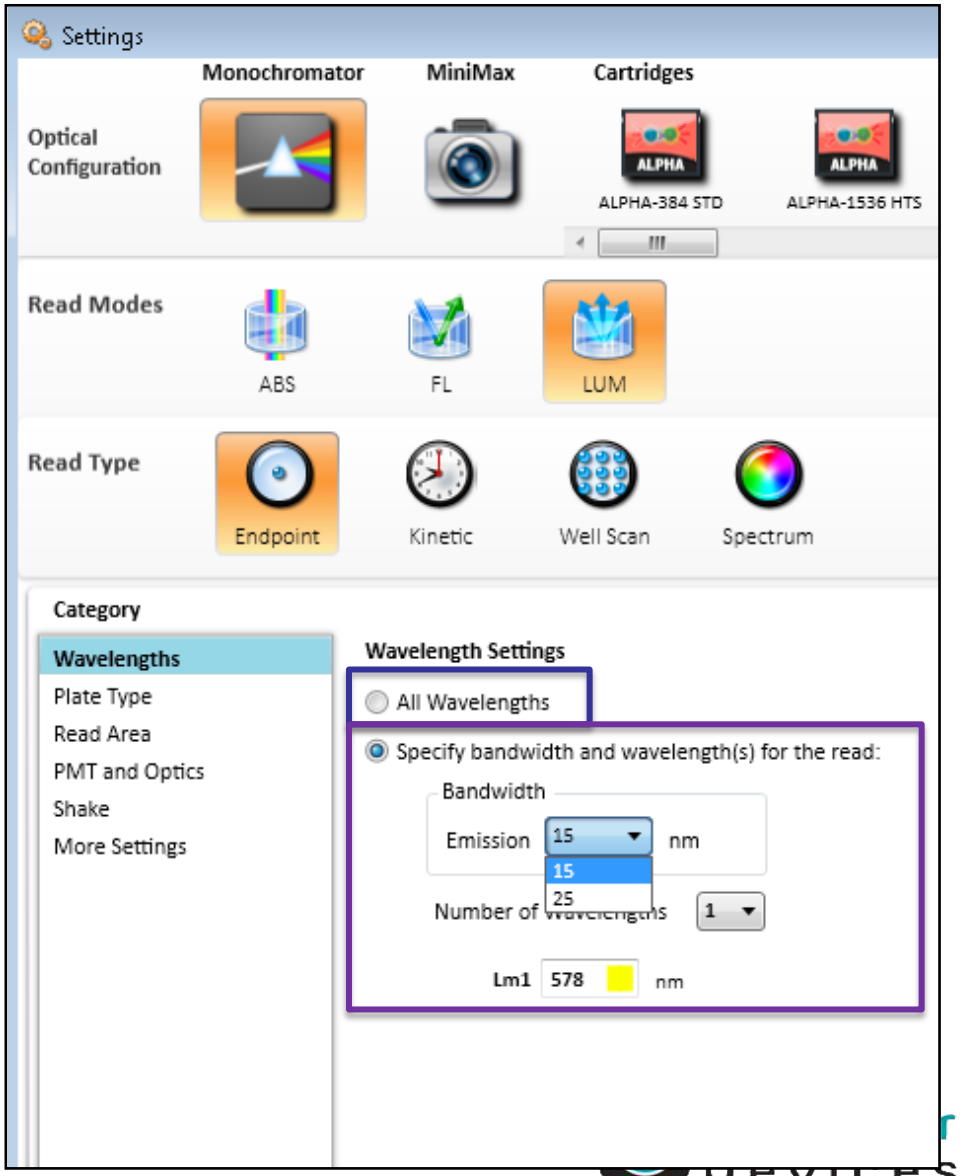
Luminescence with SpectraMax i3 system

- In SoftMax pro two options for Emission:

1. Read at all wavelengths
2. Read at specific wavelengths (BRET)
   a) Choose the BW
   b) Choose up to 4 different wavelengths
   c) Choose the Wavelength



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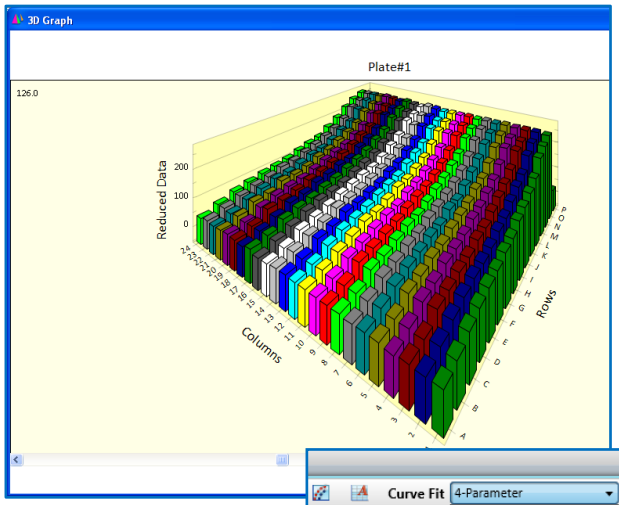
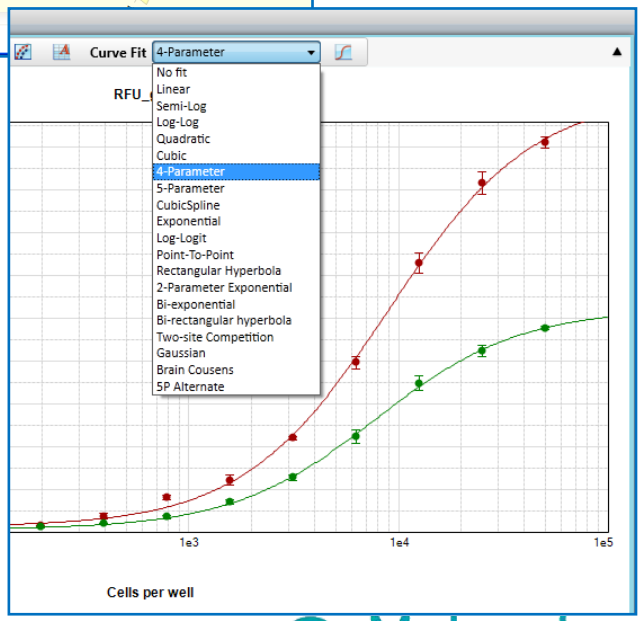
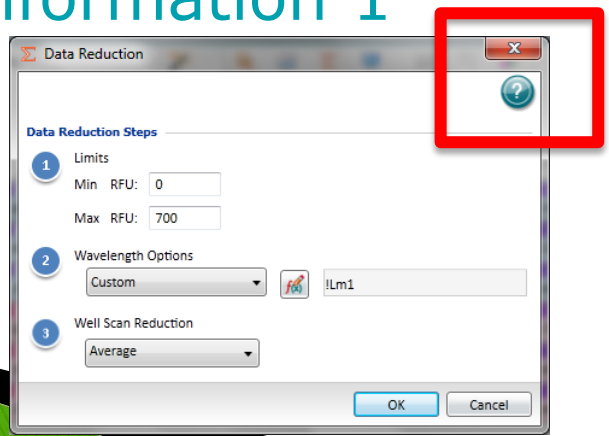
SoftMax Pro Powerful Data Analysis

- Extensive Data Analysis Features
  - 3D data visualization
  - 19 Curve Fit options
  - Plate Cloning feature
  - Custom formula writing
  - Customizable protocol editing
  - Now with image analysis features
- Relevant Help information 1 click away





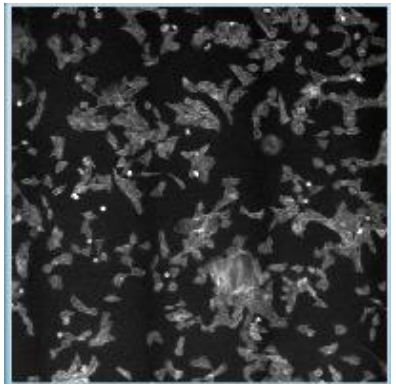


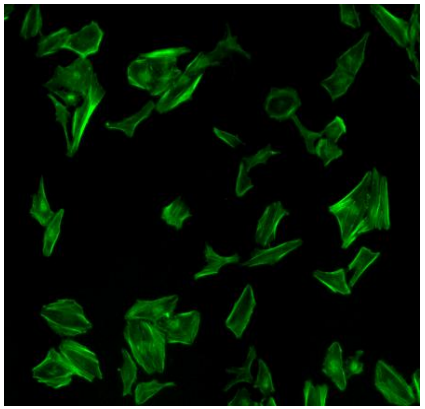
Molecular Devices

The SpectraMax® MiniMax Imaging Cytometer

- A field upgradeable option for the SpectraMax i3 system
- Adds imaging capabilities to the plate reader
- Images in bright-field/transmitted light and fluorescence
- Add functionality for:
  - Quick check of your cells
  - Cellular resolution assays

"When is the last time you actually looked at your cells?"





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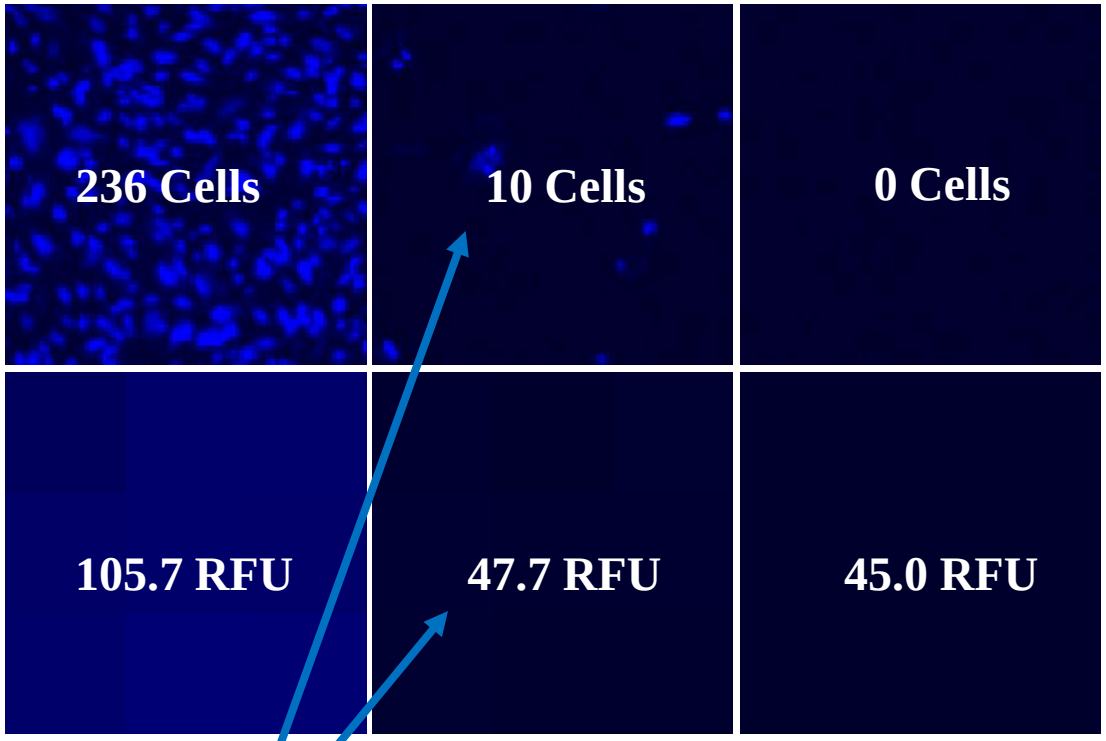
What advantage does MiniMax offer?

MiniMax "sees" cells →

The Plate reader detector "sees" RFUs →



Total intensity

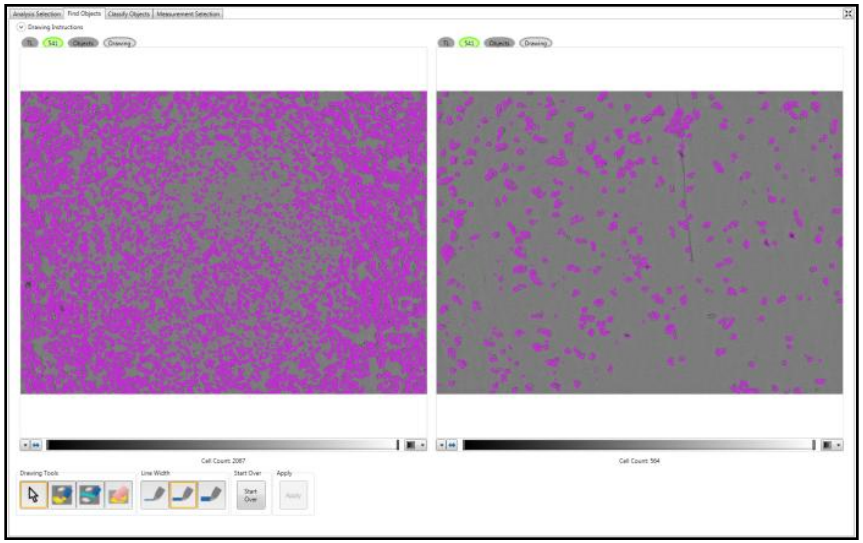
Easily **see** your low cell concentration, where in plate reader data might be in the **noise**

Molecular Devices

SpectraMax® MiniMax™ 300 Imaging Cytometer

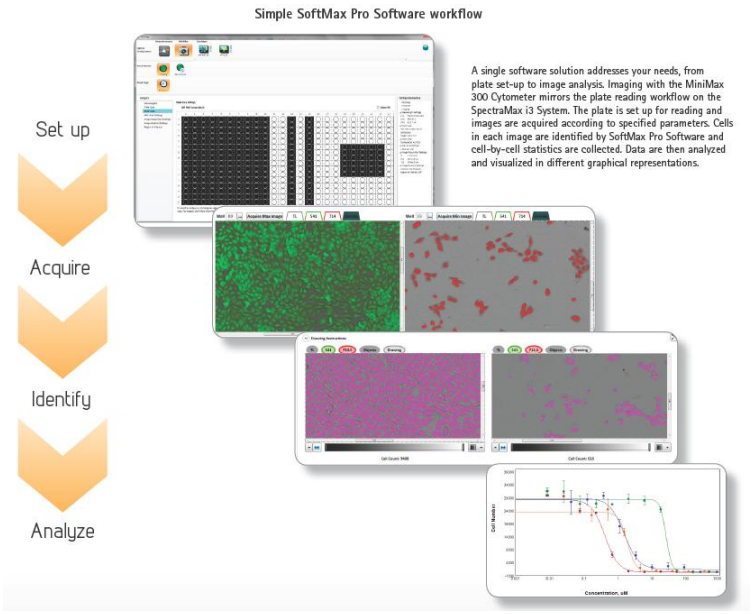
- Combine cellular imaging and microplate assays
- StainFree™ Technology
  - Eliminate staining and maintain cell viability
  - Cell count
  - Confluency
- Multi-channel
  - Transmitted, green, red channels
  - Toxicity assays
- SoftMax® Pro Software
  - Powered by MetaMorph®
  - Acquire and analyze

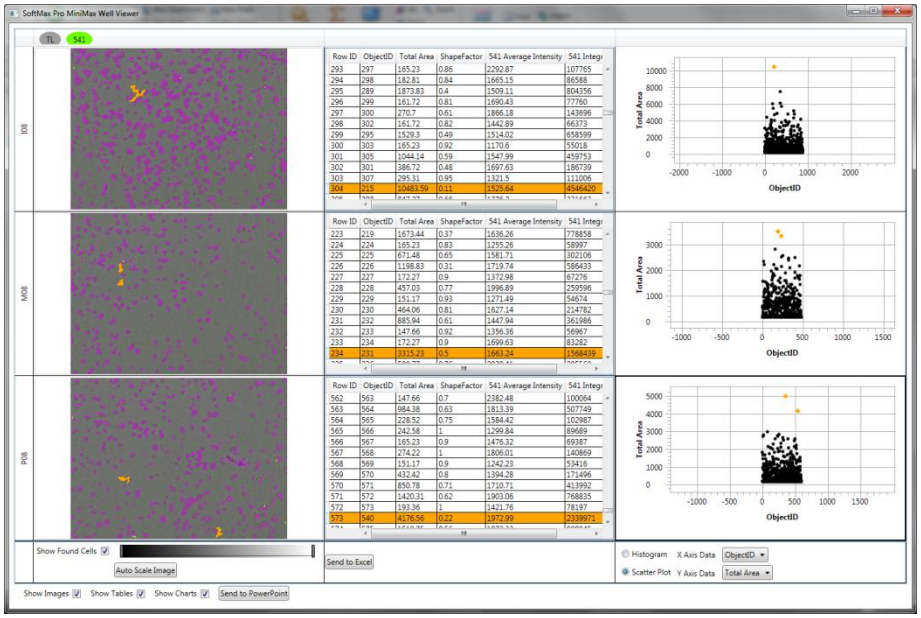
MetaMorph®



Molecular Devices

SoftMax® Pro Software for Imaging Analysis





- Visualization
  - Well-by-well data or cell-by-cell data
- Diverse analysis types

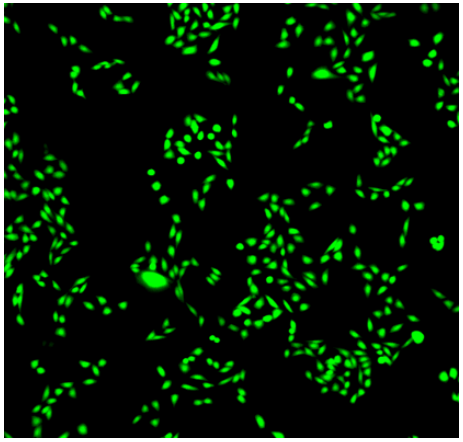
Analysis types	Output parameters
Cell count	• Count • Area • Average intensity • Average shape factor • Average integrated intensity
Cell proliferation	• Percent of well covered
Marker expression	• Expression in image

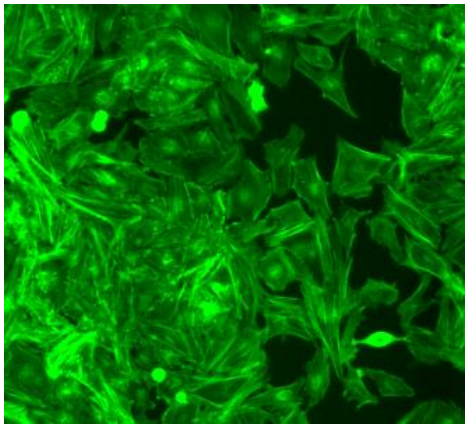
Molecular Devices

Cell Analysis in SoftMax Pro Software

- **Cell Count**
  - Analysis separates and counts cells based on intensity over background and cell size
- **Cell Proliferation/Toxicity**
  - Analysis detects cell coverage in the well- total cell area
- **Marker Expression**
  - Analysis determines level of signal intensity corresponding to protein or marker expression

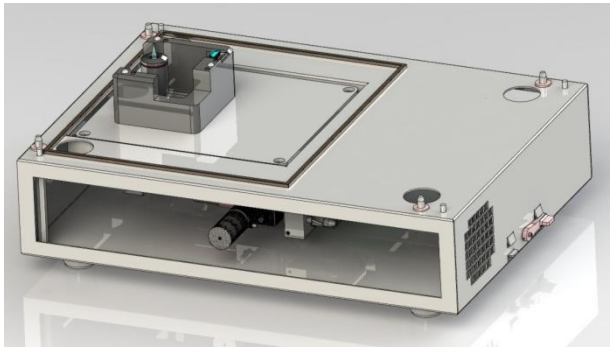
Other output parameters can be also measured





MiniMax Hardware Details

- Single 4X Objective (Nikon PLAN Fluor)
- Proprietary **solid state illumination**
- Fixed dichroic and filters
  - **Green 541/108 nm**
  - **Red 713/123 nm**
- High sensitivity CCD camera (1.25Mpix, 12-bit)
- **Custom laser autofocus**
- Transmitted Light/Bright-field illumination



Molecular Devices

MiniMax Bridging the gap between plate readers and HCS

Wellular Resolution

Cellular Resolution

Plate Reader

MinMax
Imaging Cytometer

HCS Instrument

ELISA
SNP genotyping
Molecular beacons
ATP assay

Cell viability
GFP assays
FRET assays
IMAP

Cell Counting
Cell Migration
Whole organism

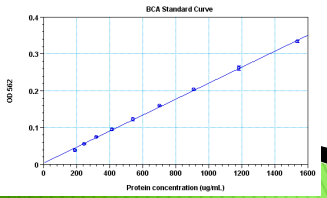
Live - Dead
Cell Cycle
Mitotic index

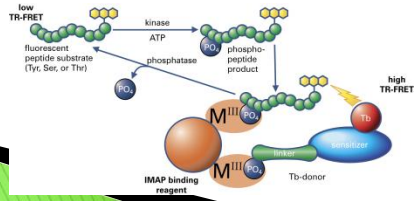
Micronuclei
Neurite Outgrowth
Intracellular Trafficking

Sub-Wellular Resolution

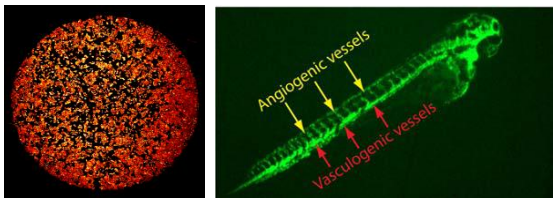
Sub-Cellular Resolution

Single Data Point

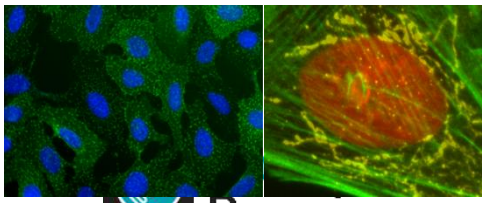




Large Format



Intracellular Detail



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