



# FLUORESCENCE and PHOSPHORESCENCE Quality Control in the printing industry



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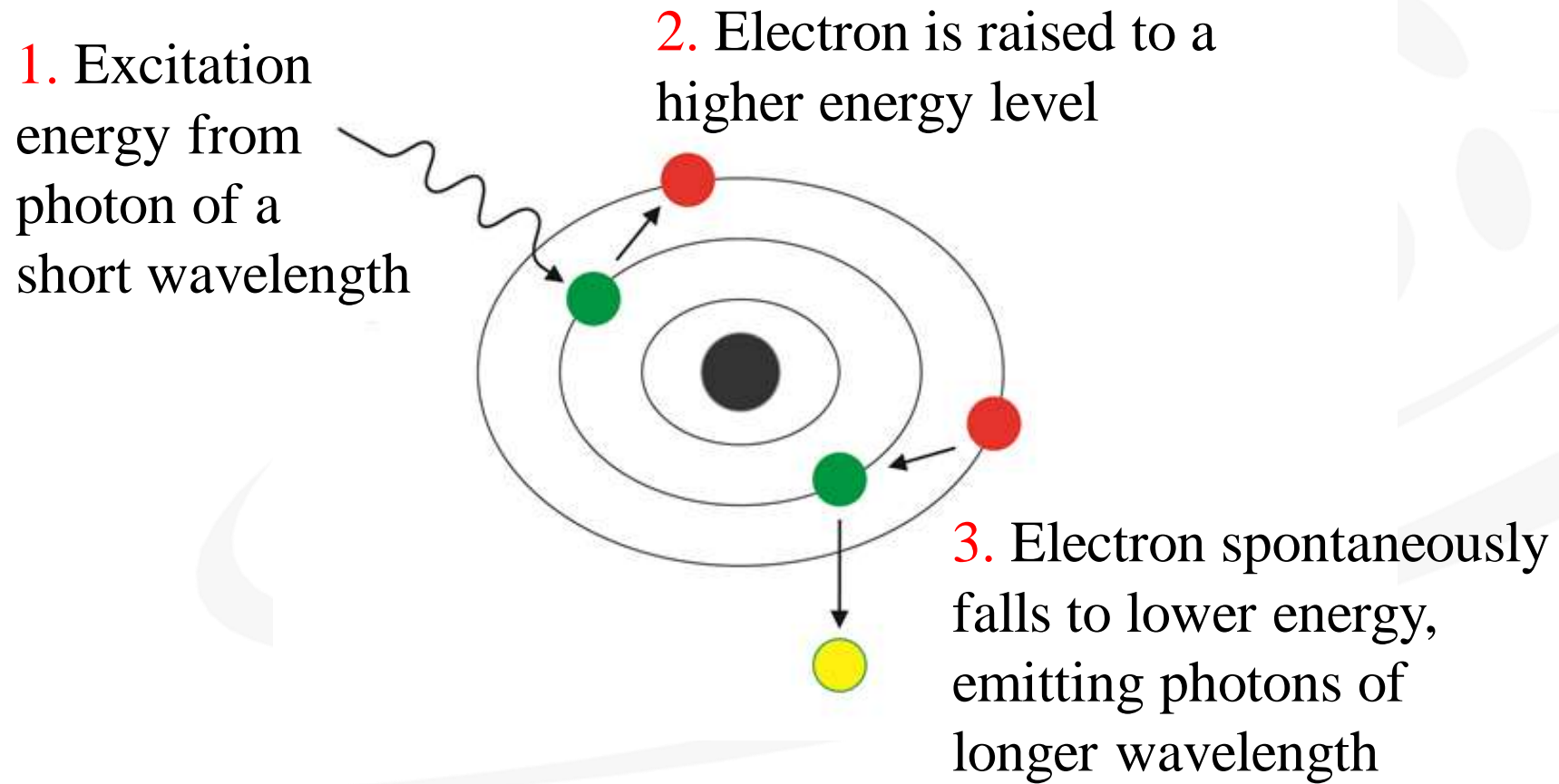


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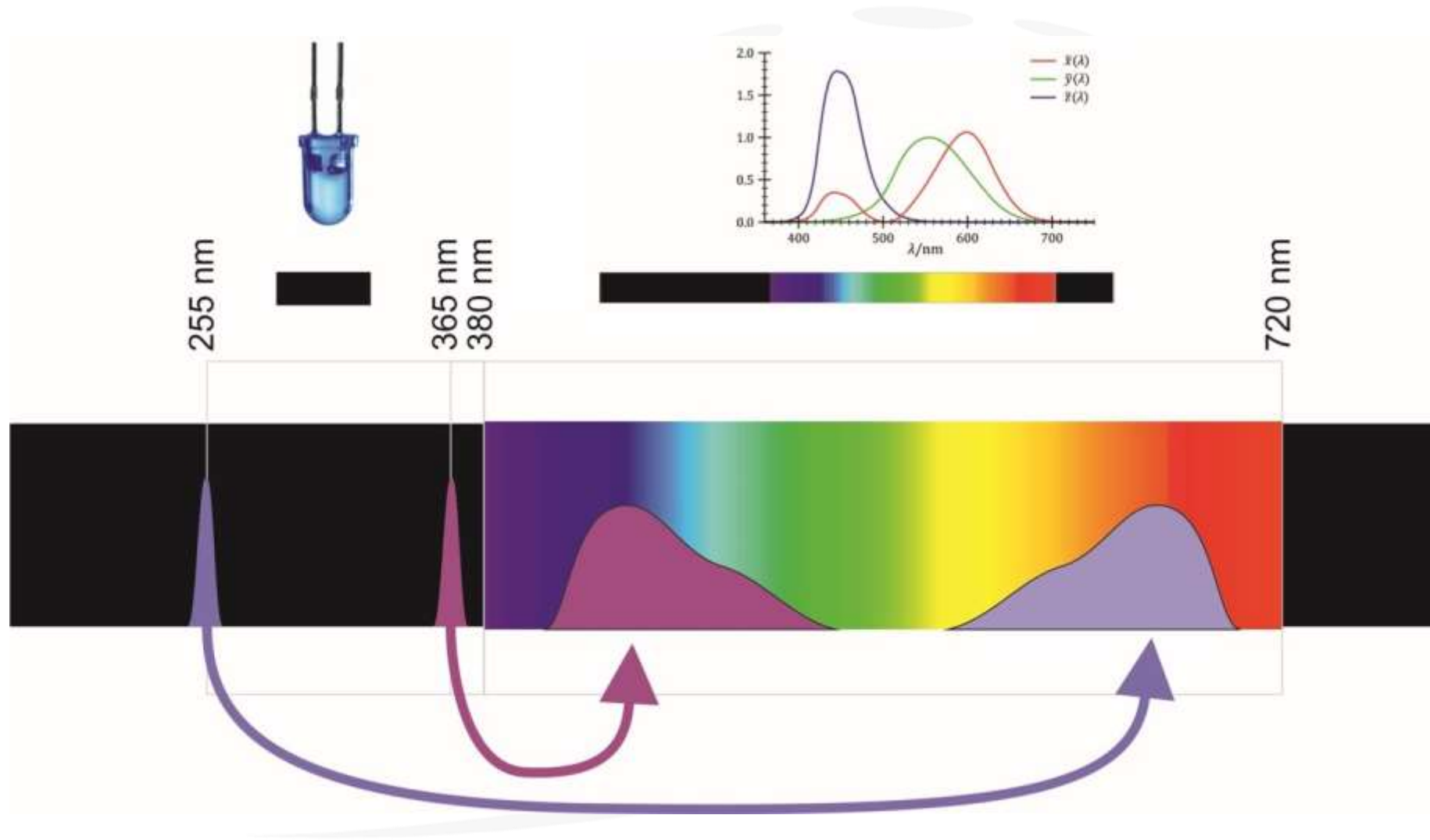
# Luminescence Terminology

- In **Fluorescence** a substance's glow is triggered by (UV) light. The substance absorbs light and emits light of a longer wavelength while the light source is on.
- In **Phosphorescence** a substance's glow is triggered by (UV) light. The substance absorbs light and emits light of a longer wavelength and continues after the light source has been switched off.
- Other Luminescence types are triggered by a chemical reaction, electricity, X-rays, sound, temperature, mechanical impact.

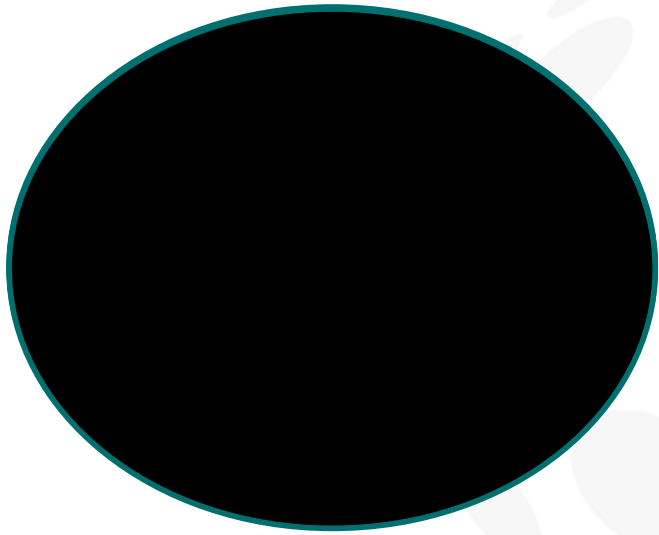
# Luminescence



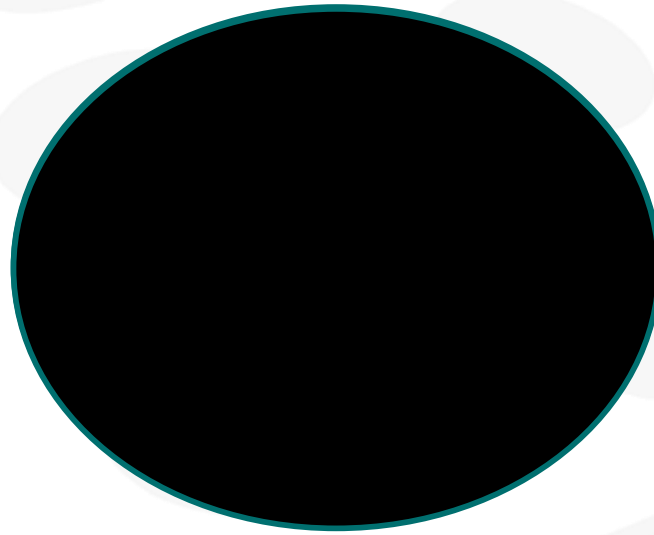
# Fluorescence and Phosphorescence



## Phosphorescence – an Intensity – Timing scenario

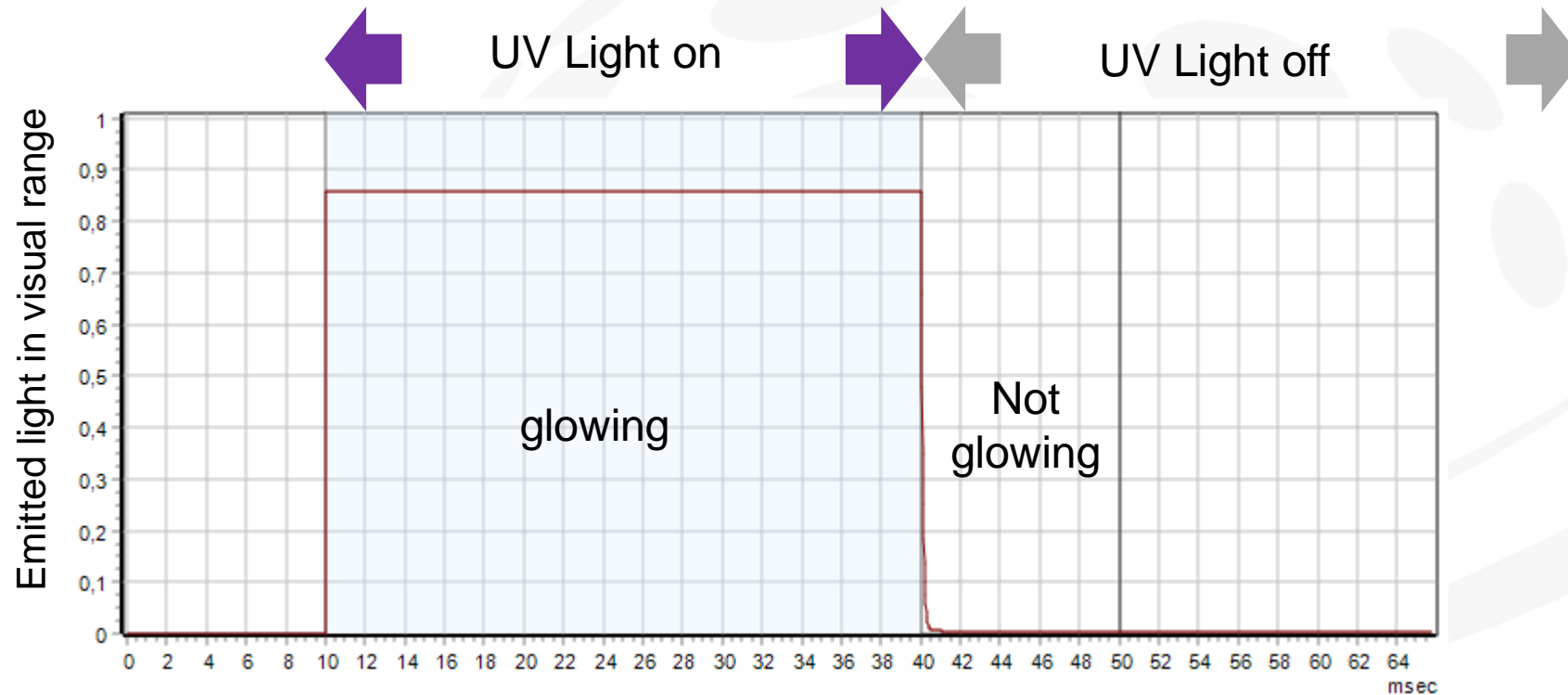


Fluorescence

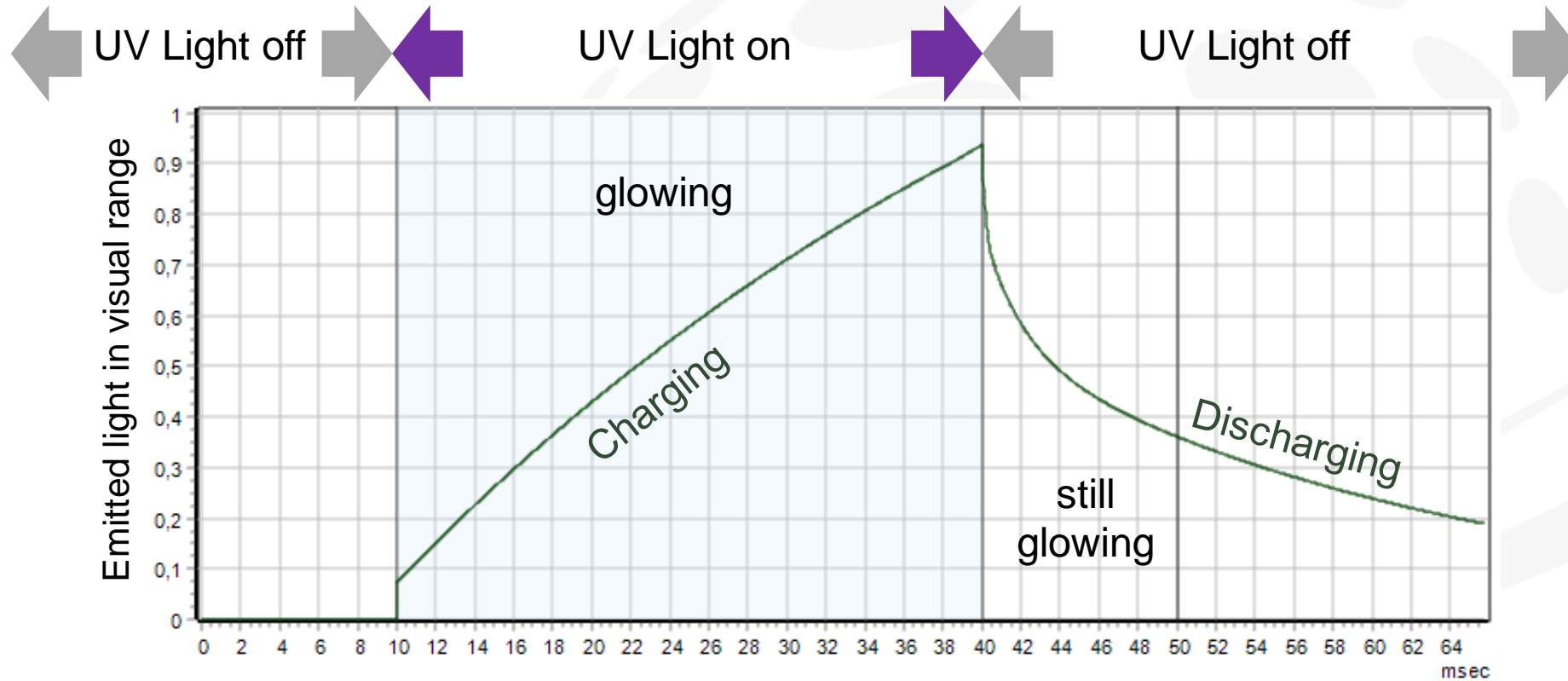


Phosphorescence

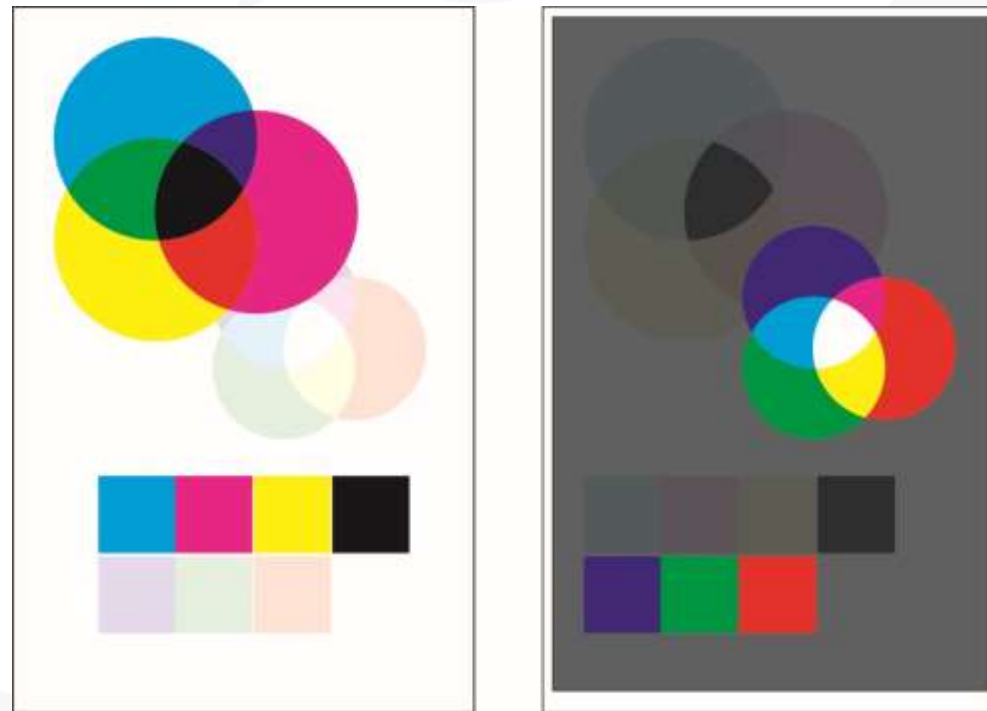
# Fluorescence light emission



# Phosphorescence light emission



## Design a fluorescence sighting feature

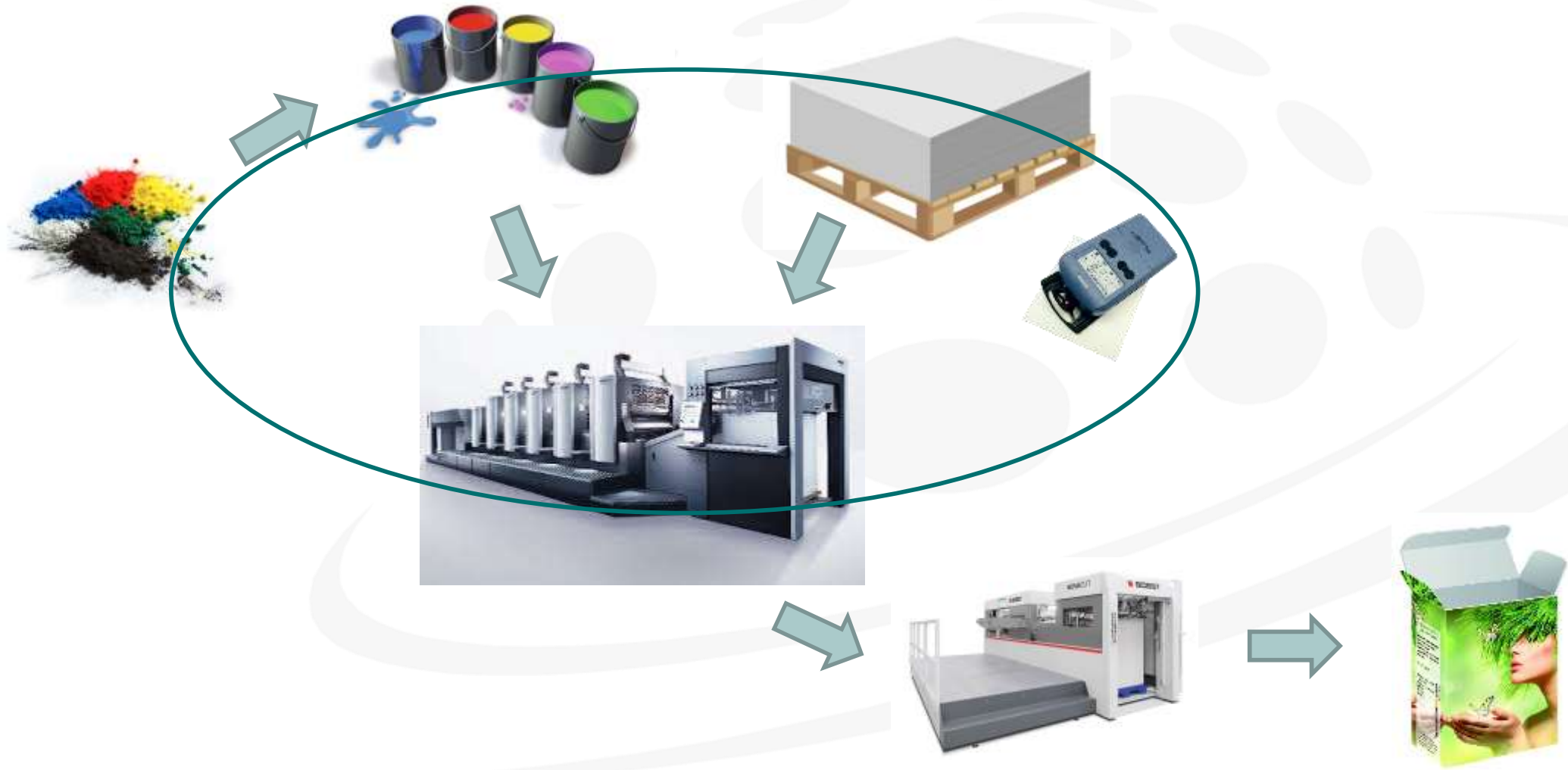


visible light

UV-LED



## Security Elements have to be reproduced within narrow tolerances to be secure

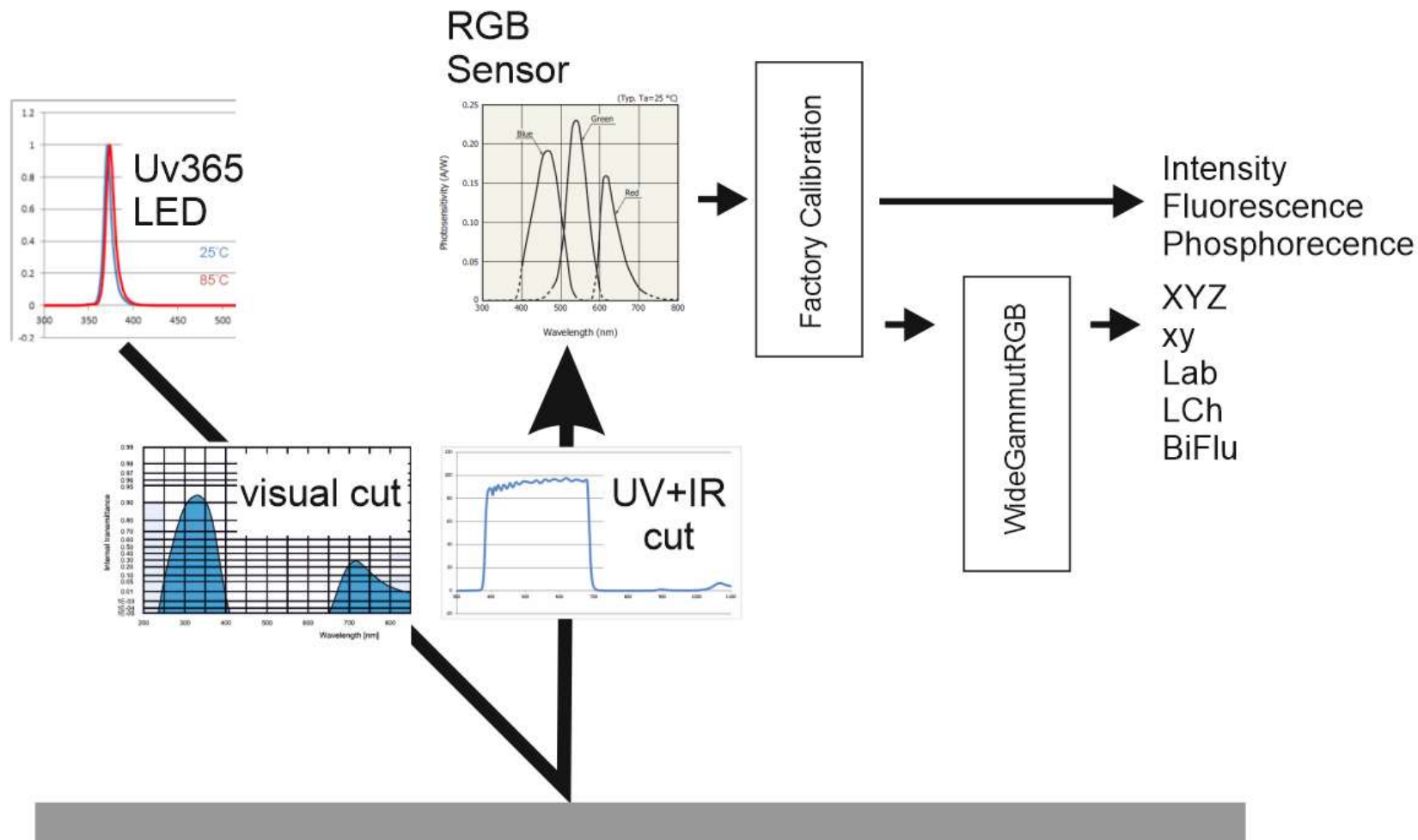


# FLUODX Fluorescence and Phosphorescence Colorimeter

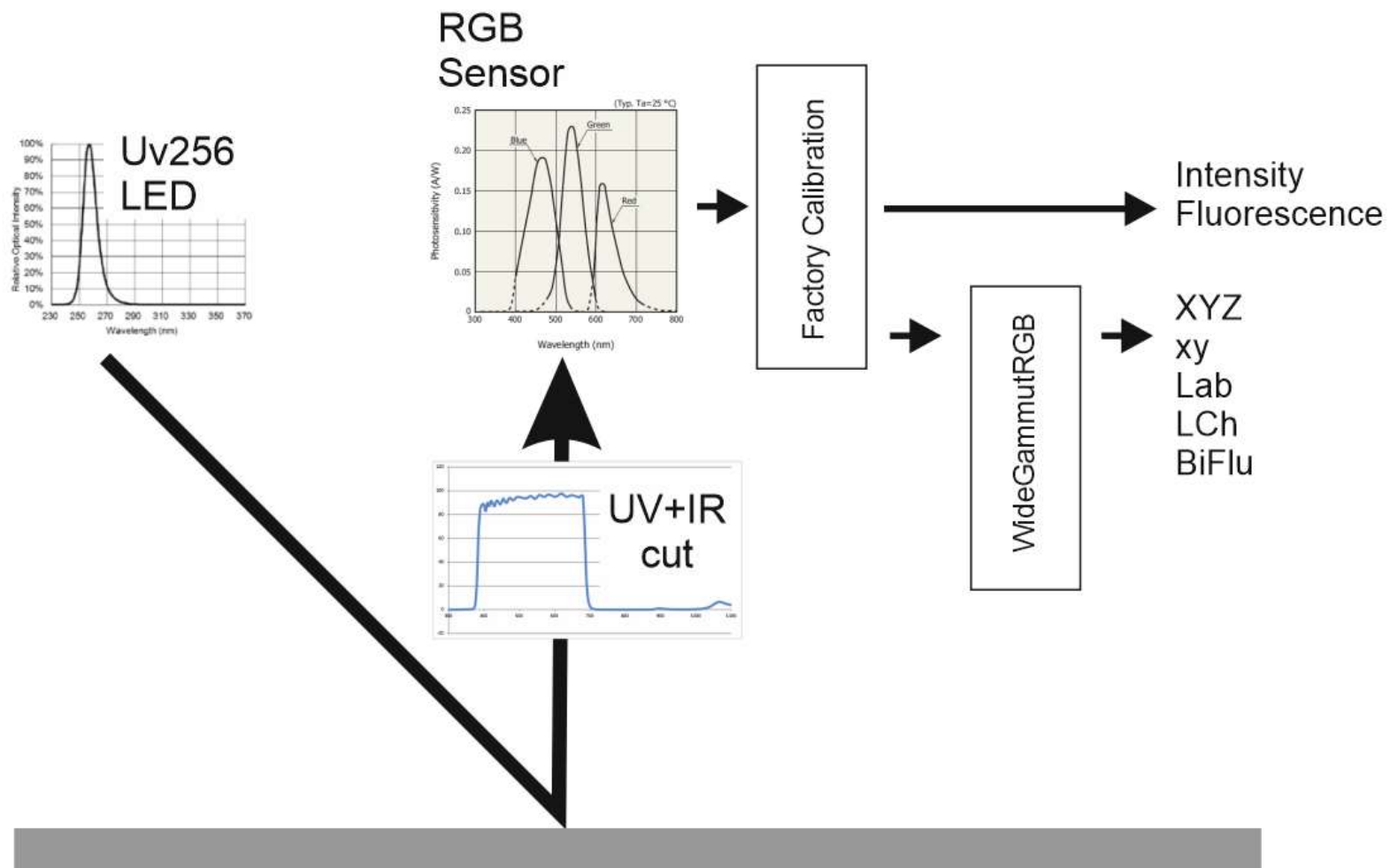


- Fluorescent intensity production quality control
- Phosphorescent production quality control
- Fluorescent color Analysis (XYZ, xy, Lab, LCh, BiFL, Delta E)
- Phosphorescence Analysis

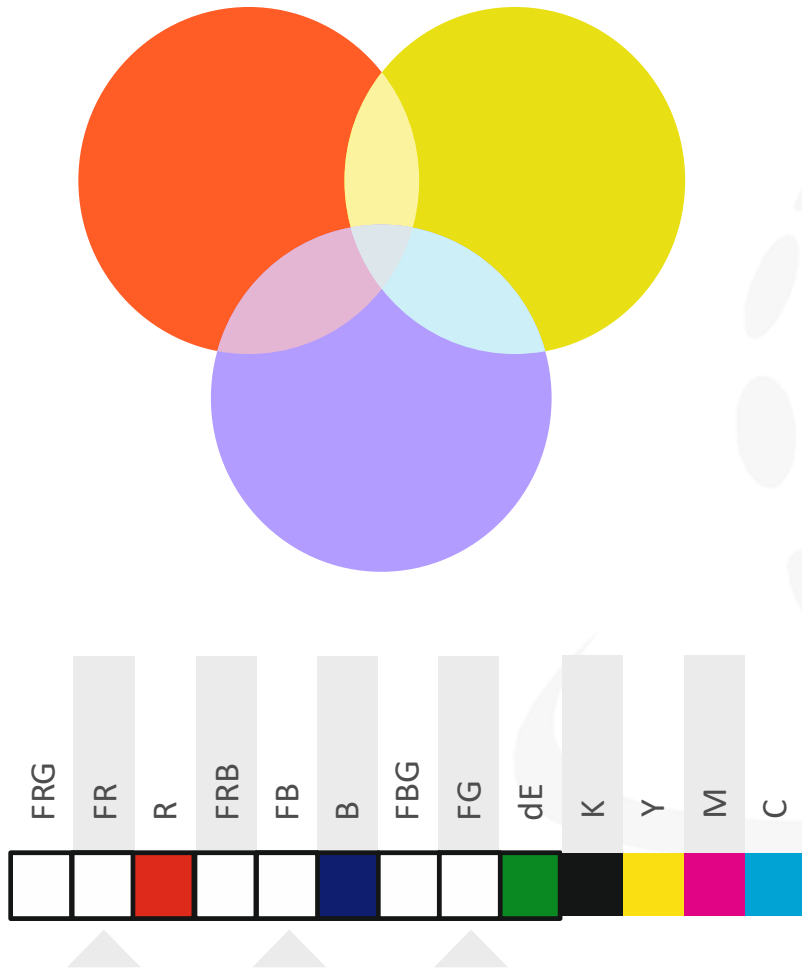
# FLUO DX optical system UV 365nm



# FLUOD DX optical system UV 256nm



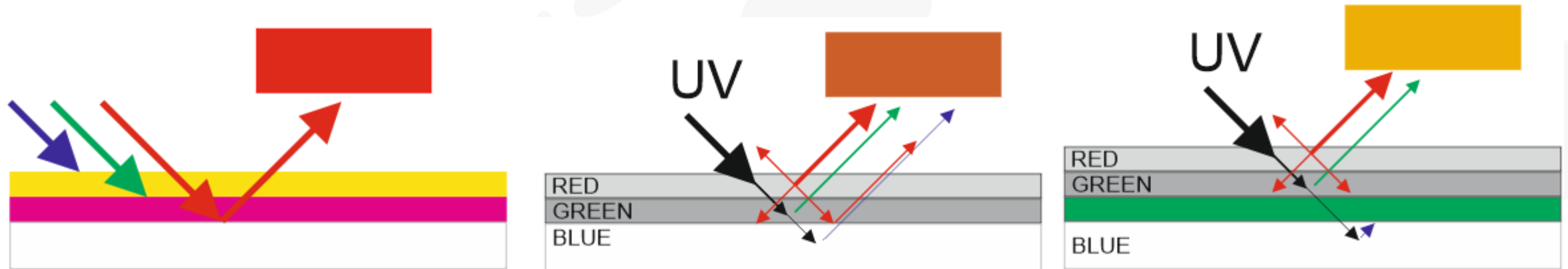
# Fluorescence and Phosphorescence Quality Control in the press room



Invisible inks are invisible if not exposed to UV light

- Add invisible ink patches to the color bar
- Add a black frame to invisible ink patches in the color bar
- Add a black description to the invisible ink patches in the color bar
- Measure the invisible ink patches using the FLUO DX colorimeter

## Visible vs. Invisible Inks overprint



# Anti Counterfeiting Applications

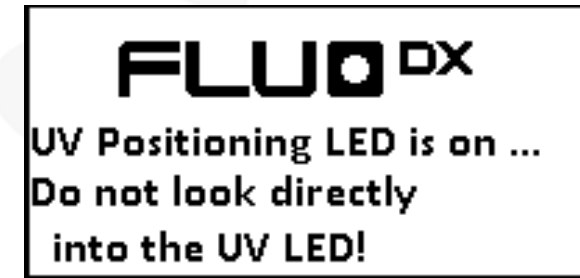
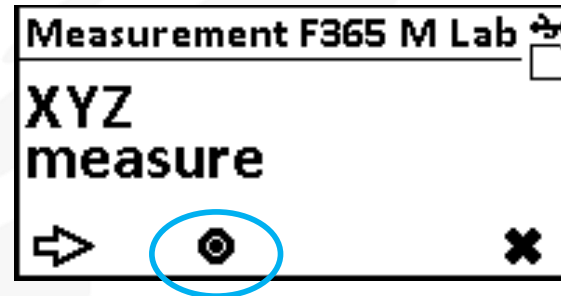


- Folding Cardboard boxes
  - ❑ Pharma,
  - ❑ Food,
  - ❑ Spare parts,
  - ❑ Others
- Gift vouchers
- Admission tickets
- Public transport tickets





## Find the measurement position outside the control bar



- FLUO DX almost in horizontal position
- FLUO DX in parking position
- After 20 seconds the UV light goes off automatically



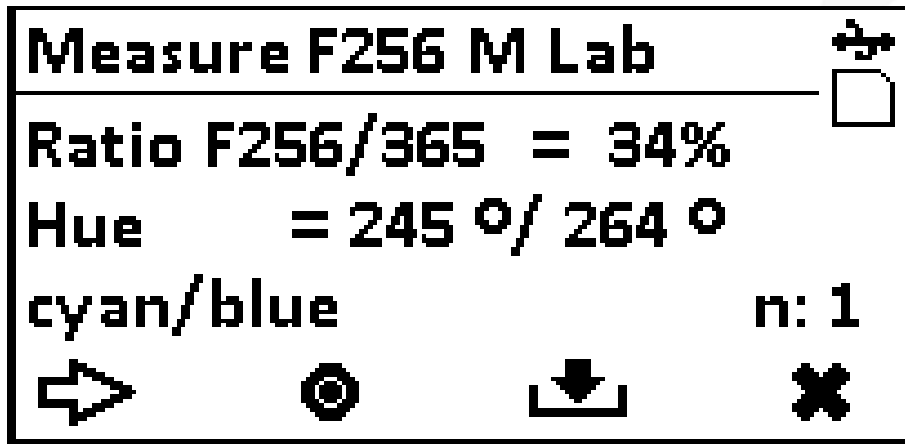
## Usage Scenarios M Int Fluorescence quality control in the press room

- M Int Fluorescence
  - ❑ Measure Fluorescence Intensity against a reference or absolute
  - ❑ Up to 20 Zones
  - ❑ UV256nm or UV365nm

- M Int Phosphorescence
  - ❑ Measure Phosphorescence Intensity against a reference or absolute
  - ❑ Up to 20 Zones
  - ❑ Up to 10 Readings for every single Zone with automatic average calculation
  - ❑ UV365nm

- M Lab Fluorescence UV256nm and UV365nm
  - ❑ XYZ
  - ❑ xy
  - ❑ Lab
  - ❑ LCh
  - ❑ BiFlu
  - ❑ Delta E

## Check the BiFluorescence of a sample



When measuring with F256, the BiFL Information is displayed in addition to other color information

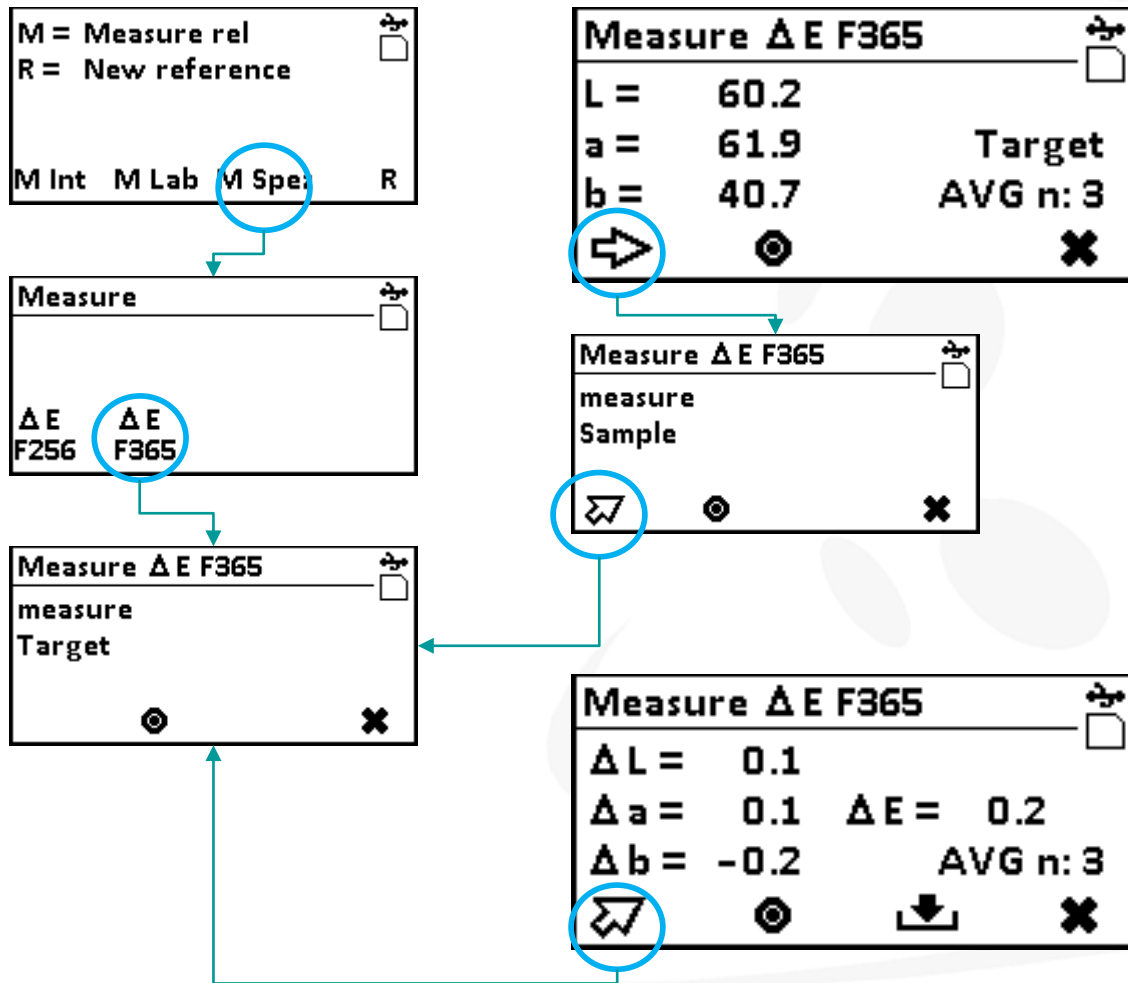
### Ratio

The sample glows 34% as strongly when excited with 256nm as it glows when excited with 365nm

### Hue

The sample glows in cyan color when excited with 256nm but it glows in blue color when excited with 365nm

# Measure Delta E with 256nm or 365nm illumination

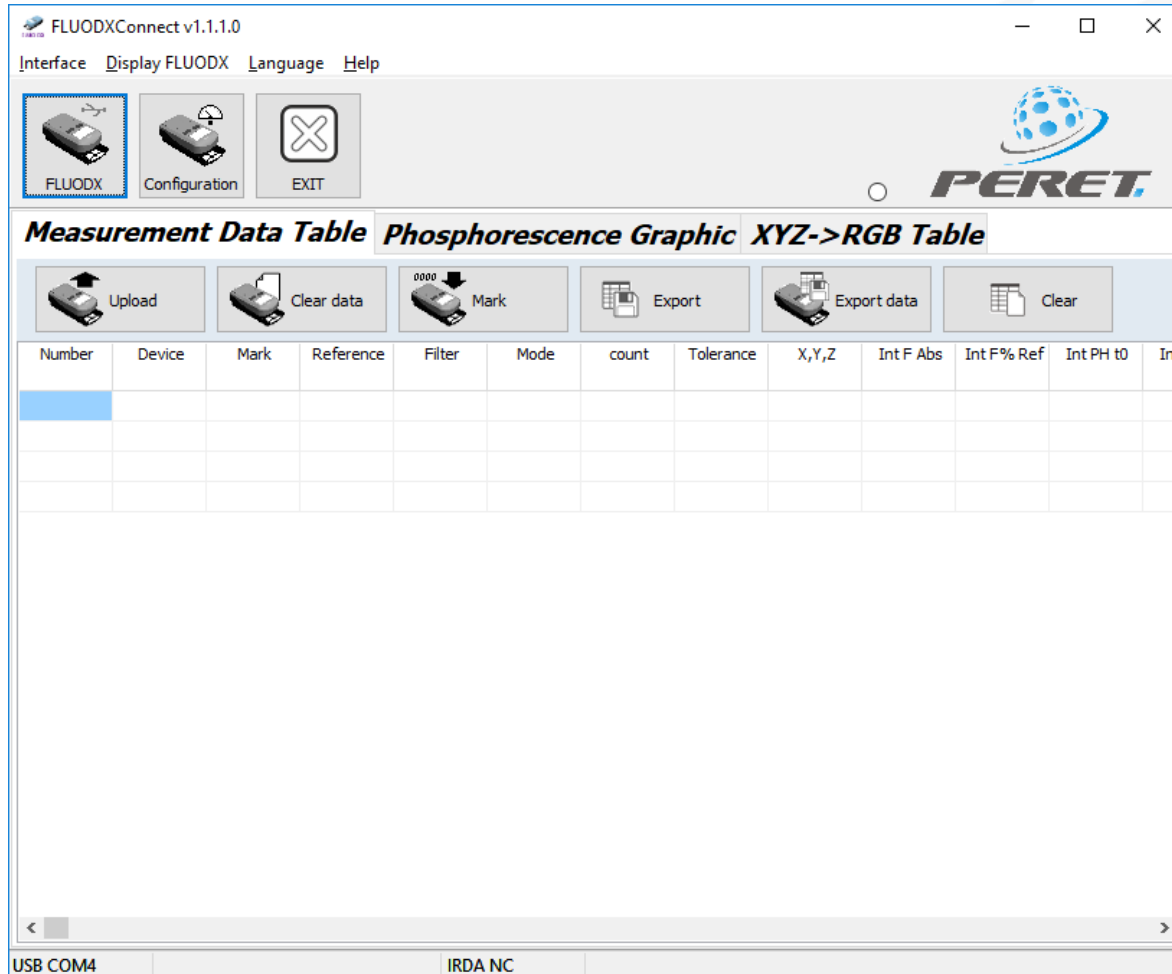


- Measure the Target several times. The average of the measurements is calculated and displayed
- Measure the sample several times. The average of the measurements is calculated and displayed
- Save the measurement and upload it to the PC later (Target and Sample)



- M Lab Phosphorescence UV365nm
  - ❑ Charging / Discharging Curve
  - ❑ Phosphorescence Intensity after cool down time
  - ❑ Relative Phosphorescence Intensity after cool down time
  - ❑ Charging / Discharging Time estimate
  - ❑ AK1/AK2 Discharging level time

# FLUODXConnect Software



# Main Screen Functions

- Upload data from the FLUO DX and export it to a file
- Test phosphorescence samples to find the best parameter setting
- Measure fluorescent colors and display the visual perception

# Measure Fluorescent Colors




**Measurement Data Table** **Phosphorescence Graphic** **XYZ->RGB Table**

Color Space  
WideGamutRGB

☒ F365 ☐ F255

XYZ->RGB 2.55

XYZ Delete last line Clear Export Load

RGB	R	G	B	X	Y	Z	x	y	L	a	b	C	h
	8	35	93	13,25	13,52	36,62	0,21	0,21	43,54	1,38	-49,90	49,92	271,58
	40	153	37	30,75	46,53	20,85	0,31	0,47	73,89	-45,85	28,55	54,01	148,09
	208	8	9	34,01	19,95	5,33	0,57	0,34	51,78	61,13	36,63	71,26	30,93

- Select the Illumination UV365nm or UV255nm
- Select the Brightness Factor XYZ->RGB (2.55 default)
- Click the XYZ Icon to perform a reading
- Export data to a file



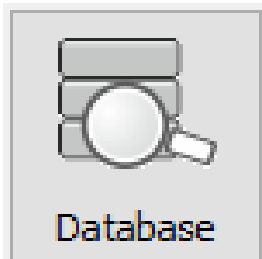
## FLUODXConnect PRO Software – easy jump into security printing



- Create your own security element with a few mouse clicks based on a simple Jpeg, Png, Bmp Image



- Save and restore reference colors in a database. Organize colors by customers and jobs



- Save measurement data to a database. Create reports and print data analysis

# FLUODXConnect PRO Security Element creation



Configuration Source Picture Output simulation Output Simulation

Source image configuration

☒ Use transparency

☒ AUTO Transparency (Color of the top-left pixel is considered to be the transparent color)

Red 0 ☐ BW

Green 0

Blue 0

☐ Invert colors

Output configuration

Image width 50 mm

Output Resolution 2540 DPI

Minimum dot size 25  $\mu\text{m}$  = 19 Pixel

Minimum dot distance 1 Pixel

Encryption key  ☒ AUTO

☐ Apply color corrections based on Ink specifications

☐ Consider Background in color corrections

☐ Mirror the output horizontally

Inks configuration

Background Luminance

R Signal 0

G Signal 0

B Signal 0

Red Ink Luminiscence

R Signal 255

G Signal 0

B Signal 0

Opacity 0

Green Ink Luminiscence

R Signal 0

G Signal 255

B Signal 0

Opacity 0

Blue Ink Luminiscence

R Signal 0

G Signal 0

B Signal 255

Opacity 0

Save Config Load Config

DateTime	Name
30.10.2020 15:32:29	FLUODX PERET Logo

Refresh colors

Print: ☒ Red Channel ☒ Green Channel ☒ Blue Channel

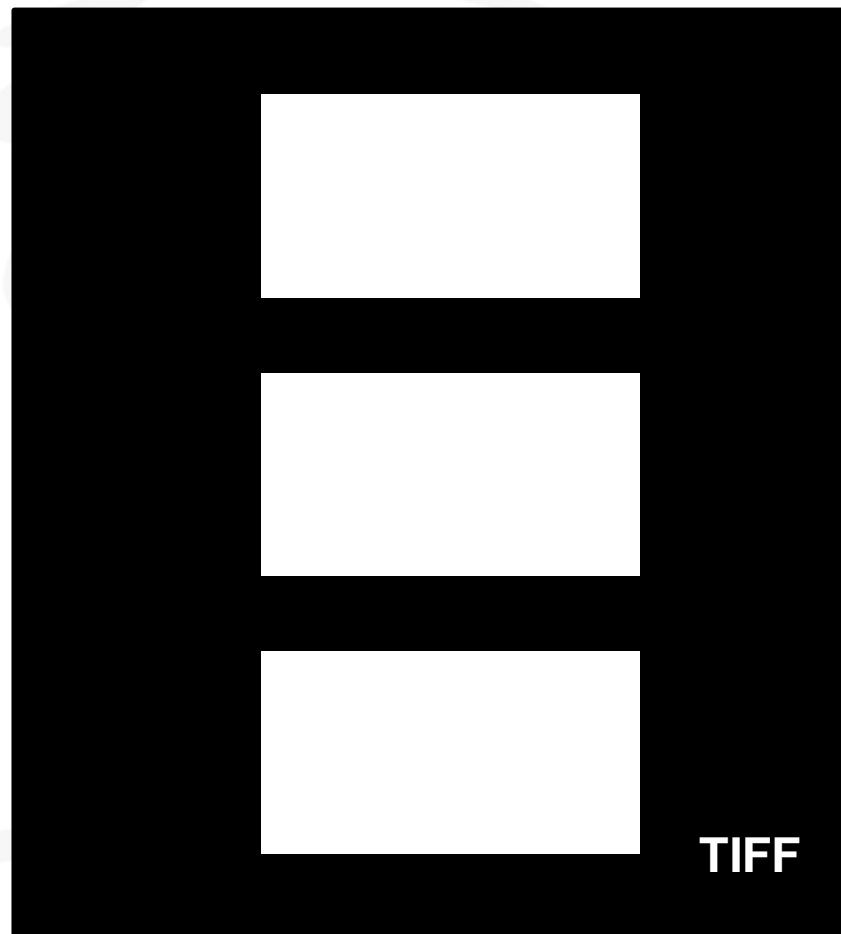
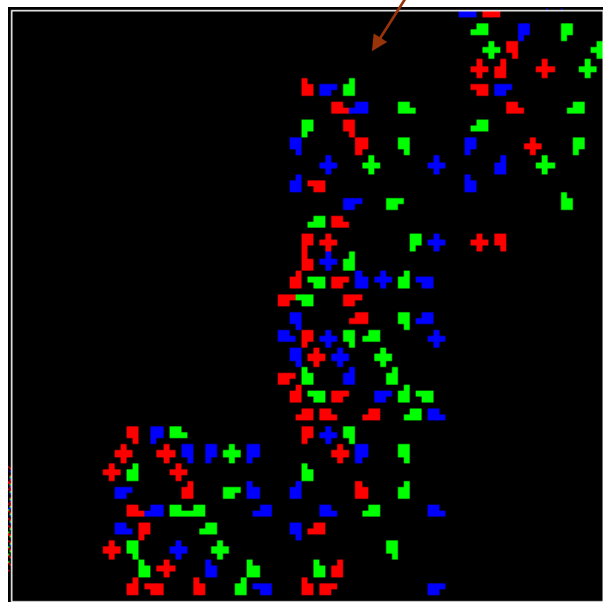
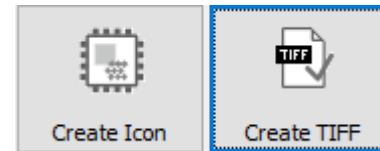
Handling of  
source image

Output parameters  
are unique and  
confidential

Settings are stored  
in a database

Color specifications are confidential

# FLUODXConnect PRO Security Element creation



# FLUODXConnect PRO Reference color management

References

Read all Jobs **EXIT**

**F256 F365 P365A P365B**

Active References

12 Upload Clear Download

	Name	Filter	RGB	LED Power	R Signal	G Signal	B Signal	RGB	Temperature	Device
1	White	G		10,9%	60	342	1724		27,7°	sn00020
2	R	R		19,3%	2480	498	1326		27,7°	sn00020
3	White	G		10,1%	68	371	1859		24,6°	sn00020
4	B	B		10,1%	63	387	1859		25,0°	sn00020
5	G	G		9,3%	564	2564	510		27,8°	sn00020
6	G	G		12,4%	2555	1923	431		27,8°	sn00020
7	White	G		12,2%	2234	1950	1220		2,2°	sn00020
8	B	B		3,8%	126	869	4947		31,8°	sn00020
9	G	G		11,6%	3210	2081	1085		28,3°	sn00020
10	R	R		19,3%	2480	498	1326		27,7°	sn00020
11	G	G		12,4%	2480	498	1326		2,2°	sn00020
12	B	B		4,6%	123	843	4086		25,7°	sn00020

Reference colors

RGB	Reference Name	Description
Magenta	Magenta	Magenta
Blaue	Blaue	Blaue
Lime	Lime	Lime
Grün	Grün	Grün
Gelb	Gelb	Gelb
Braun	Braun	Braun
Papier	Papier	Papier
gruen	gruen	gruen

Jobs

JOBID	NumColor	DateTime	Description
Magenta Job			
Bunter Job			

Job Database

**EXIT**

**Reference Colors Jobs Database Customer Database**

Measurement mode **F365**

JOBID: Magenta Job, Bunter Job

Modename: F365, F365

NumColor: Lime, Mager

Color: Lime, Mager

Job ID: Magenta Job

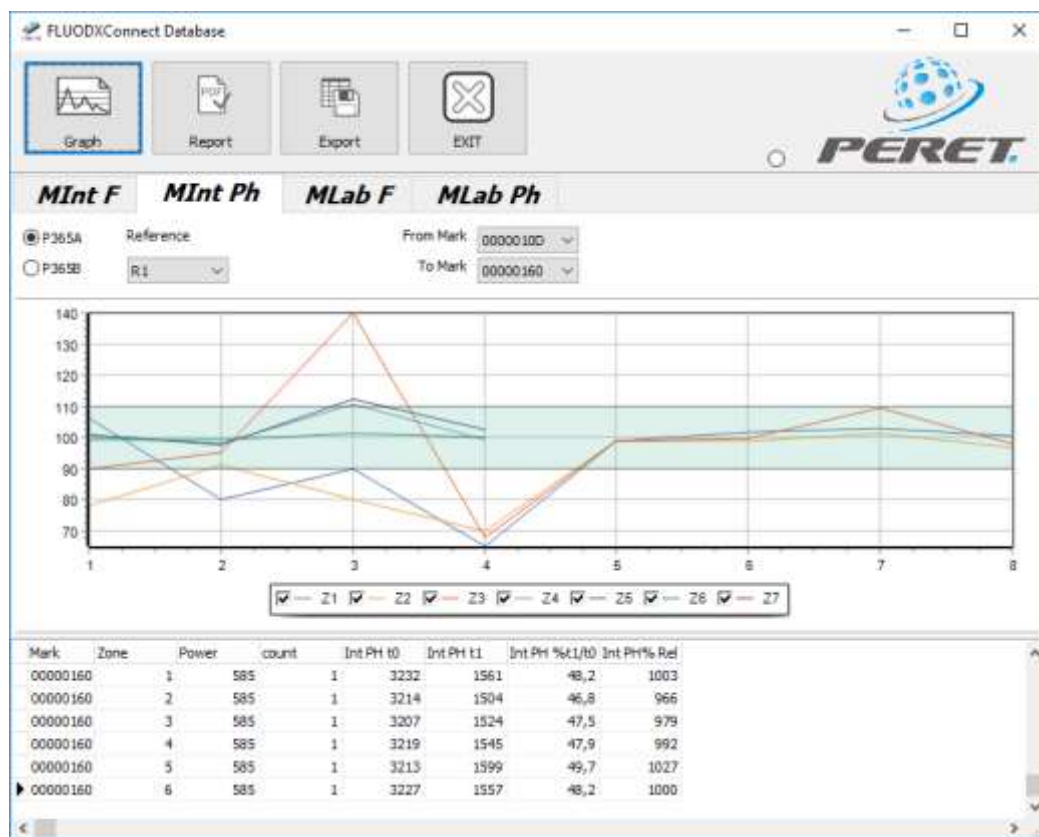
Customer: PERET GmbH

R.1: Lime, R.2: Braun, R.3: Grün, R.4: Papier, R.5: Papier, R.6: , R.7: , R.8: , R.9: , R.10: , R.11: , R.12:

RGB REFNAME

Magenta	Magenta
Blaue	Blaue
Lime	Lime
Grün	Grün
Gelb	Gelb
Braun	Braun
Papier	Papier
gruen	gruen

# FLUODXConnect PRO Measurement data reports





**See what happens**

**Understand why it happens**

**Take corrective actions**