

WLS and Scintillator spectra for ECAL SPD

On behalf of SPD Collaboration
JINR 2024

Scintillator for ECAL SPD

Scintillator production for ECAL SPD : Vladimir, April-June 2024

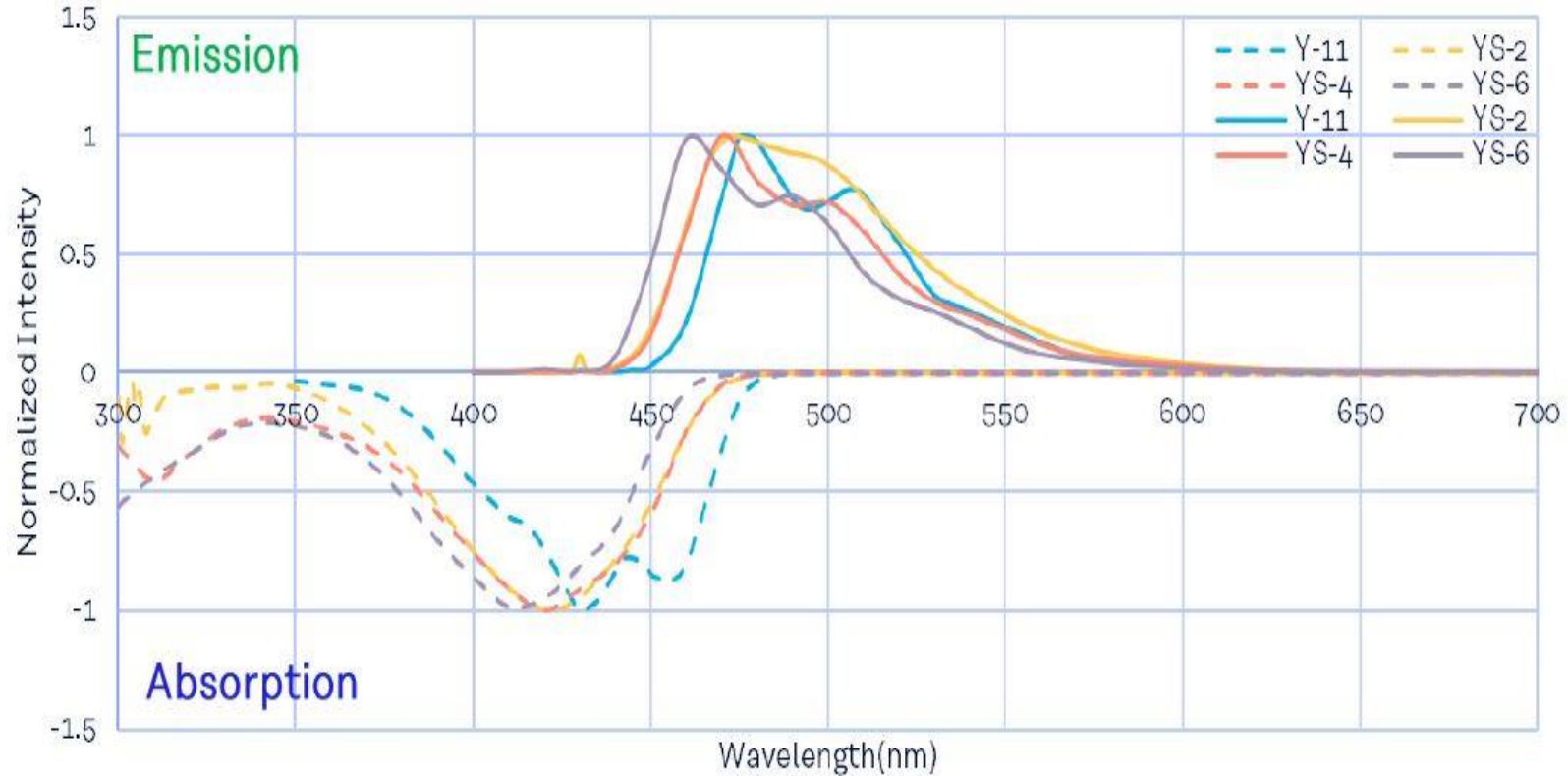
1. 165000 tiles 40x40x1.5 mm³ with composition:
 1. 1.5% p-Terphenyl + 0.04% POPOP
 2. 1.5% p-Terphenyl + 0.05% POPOP
 3. 2.0% p-Terphenyl + 0.05% POPOP

WLS absorption and emission Peaks

Description	Emission			Absorption Peak[nm]	Att.Leng. ²⁾ [m]	Characteristics
	Color	Spectra	Peak[nm]			
Y-7(100)	green	See the following figure	490	439	>2.8	Blue to Green Shifter
Y-8(100)	green		511	455	>3.0	Blue to Green Shifter
Y-11(200)	green		476	430	>3.5	Blue to Green Shifter (K-27 formulation) Long Attenuation Length and High Light Yield
B-2(200)	blue		437	375	>3.5	UV to Blue shifter
B-3(200)	blue		450	351	>4.0	UV to Blue shifter
O-2(100)	orange		550	535	>1.5	Green to orange shifter
R-3(100)	red		610	577	>2.0	Green to red shifter

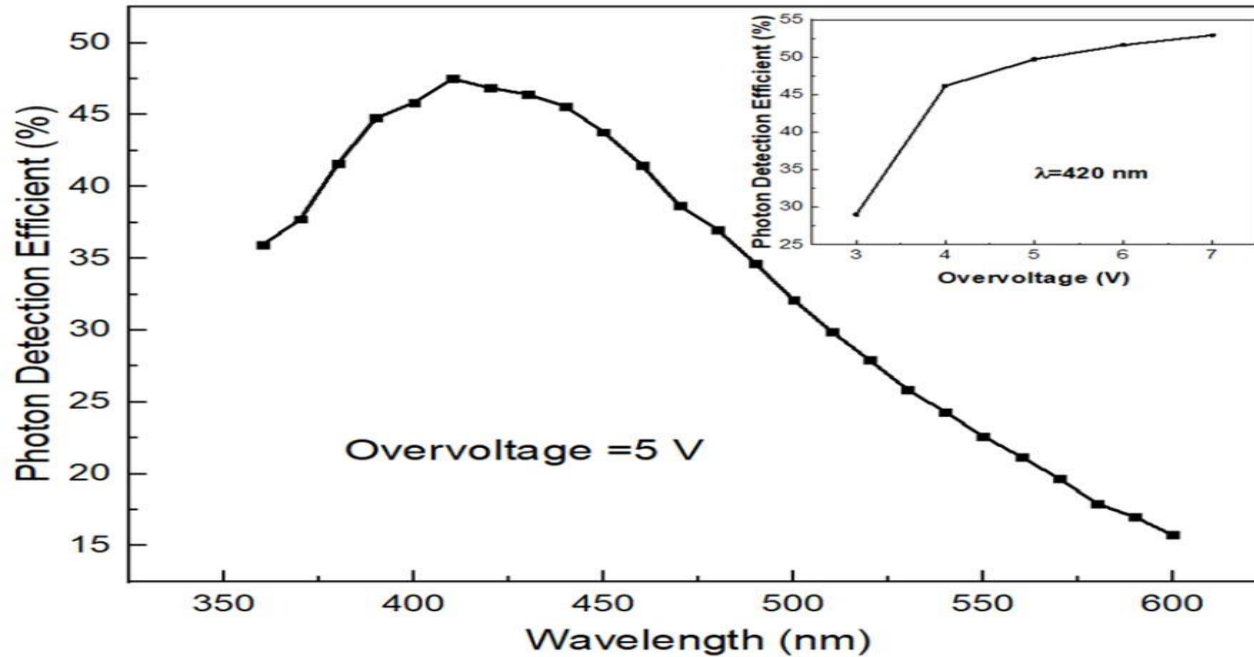
<http://kuraraypsf.jp/psf/ws.html>

WLS and Scintillator emission and absorption spectra



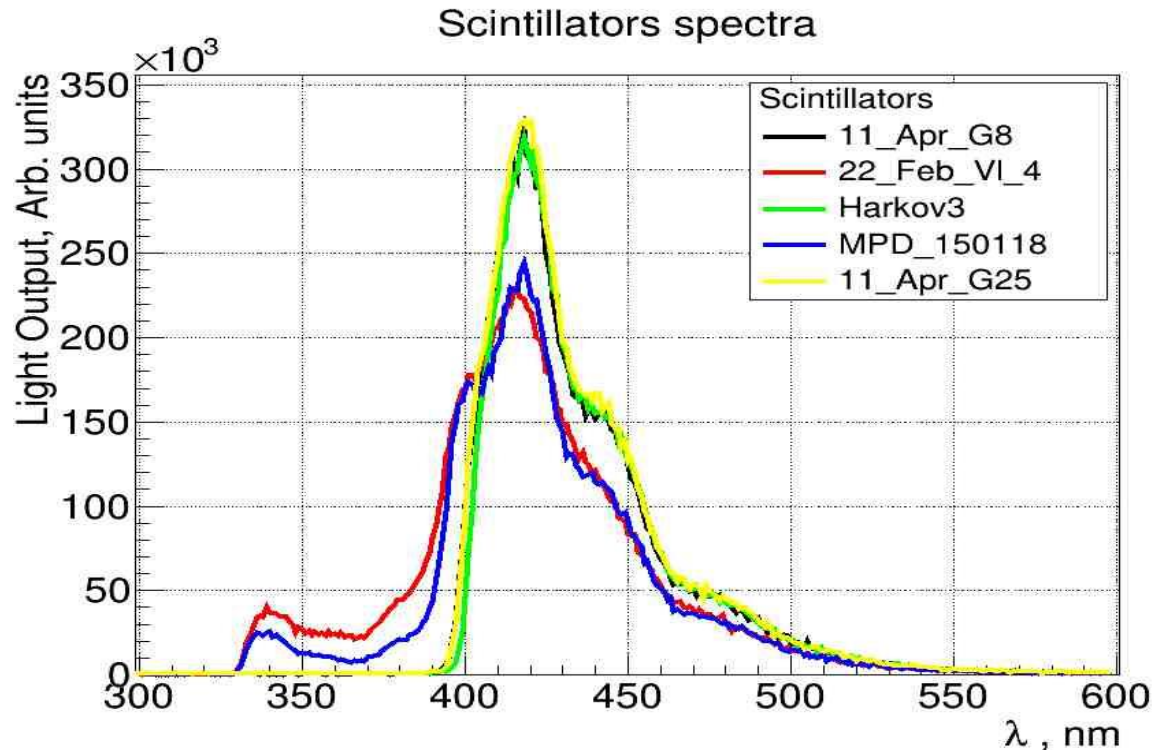
Photon Detection Efficient for SiPm EQR11-15-60

<http://www.ndl-sipm.net/PDF/Datasheet-EQR15.pdf>



PDE Maximum close to 420-440 nm

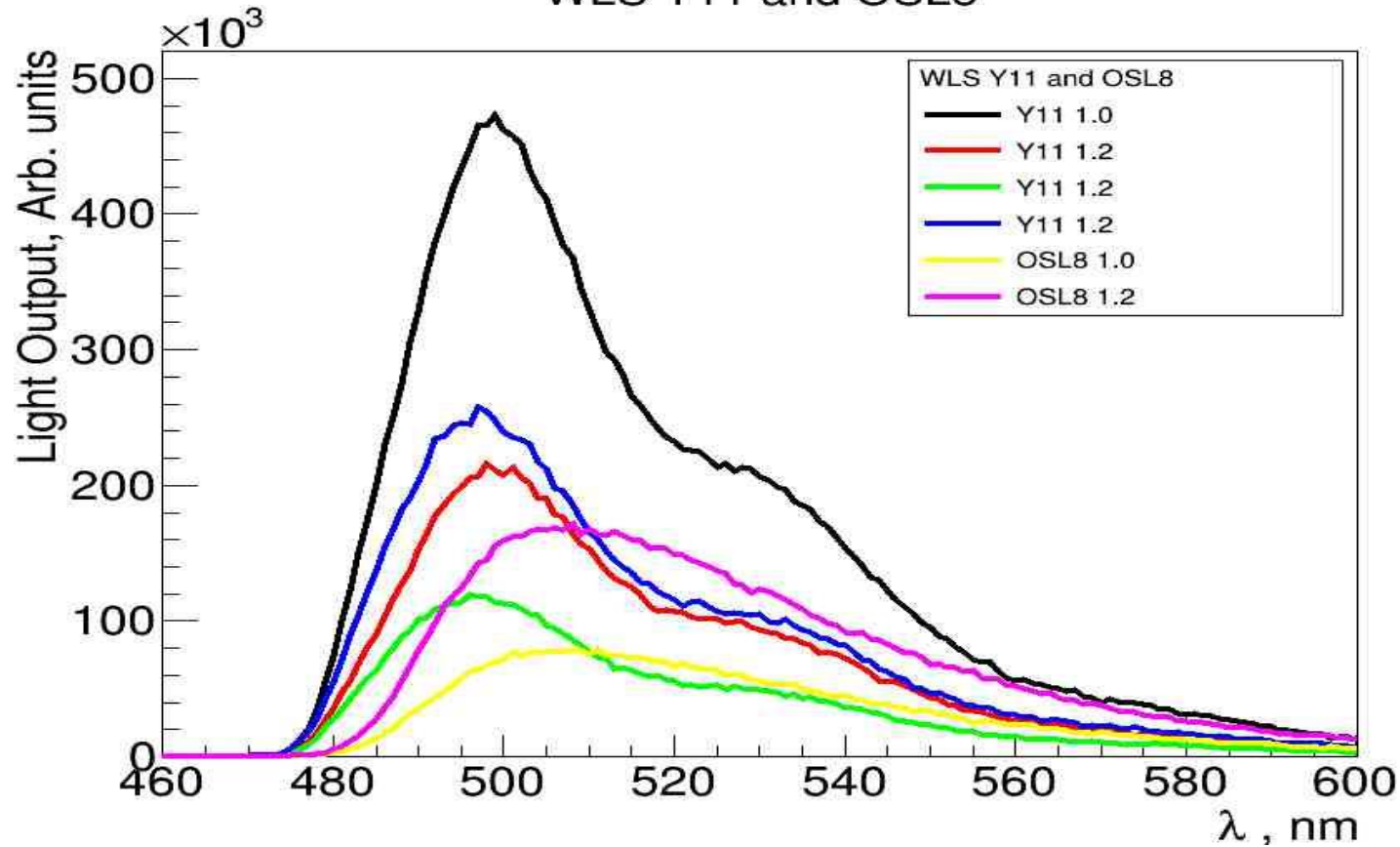
Scintillators spectra (Vladimir)



1. Red - 1.5% pTP + 0.04% POPOP
2. Blue – look like same – MPD
3. Yellow – 1.5% pTP + 0.05% POPOP
4. Green – 2.0% pTP + 0.05% POPOP

This Data obtained in February-April 2024 and presented by Vladimir Baranov

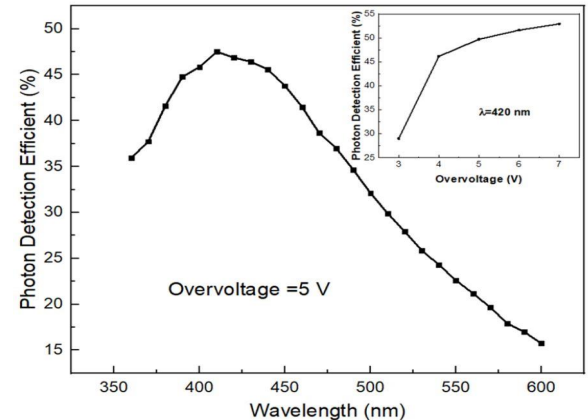
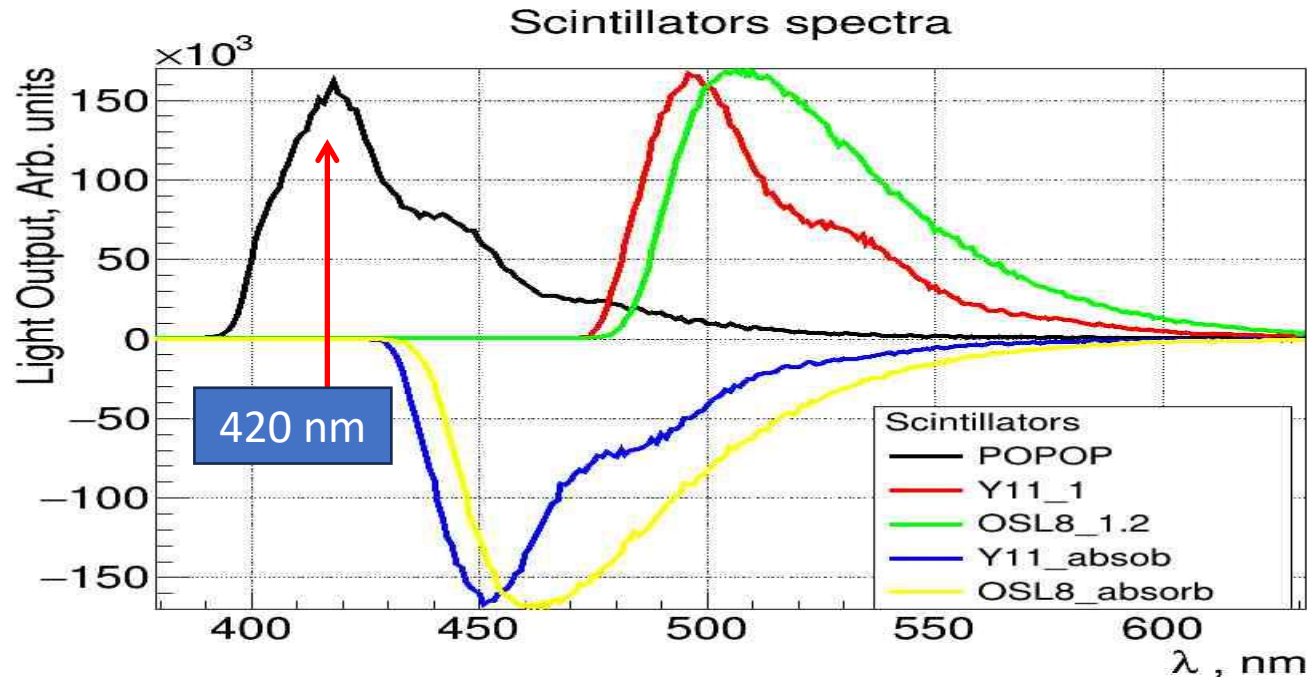
WLS Y11 and OSL8



Black – Y11
Red – Y 11
Green – Y11
Blue – Y11
Yellow – OSL8
Magenta – OSL8

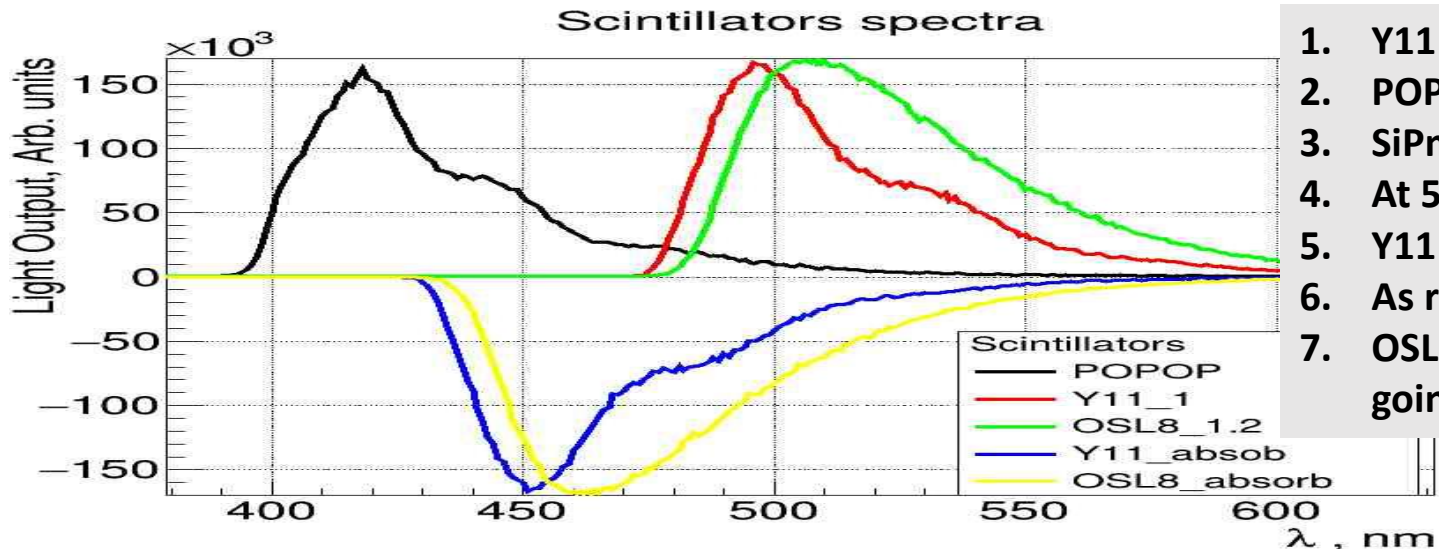
This Data obtained in November 20-24 2024 and presented by Vladimir Baranov

Absorption (red and green) and emission spectra for POPOP – Black, Y-11 – Blue, OSL8 – Yellow

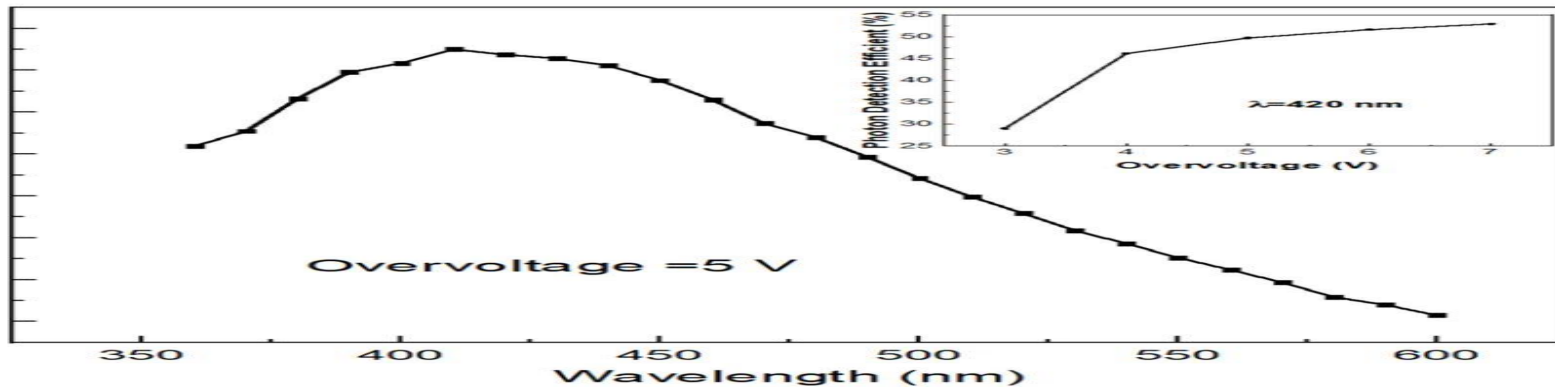


EQR11-15 PDE vs I
Peak ~ 425 nm

This Data obtained in November 24 2024

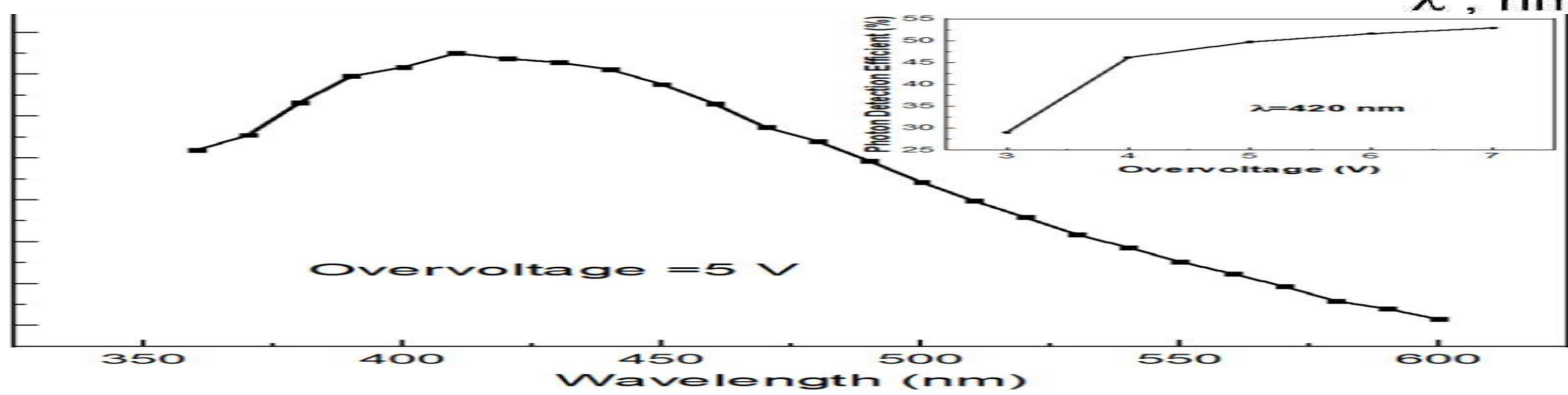
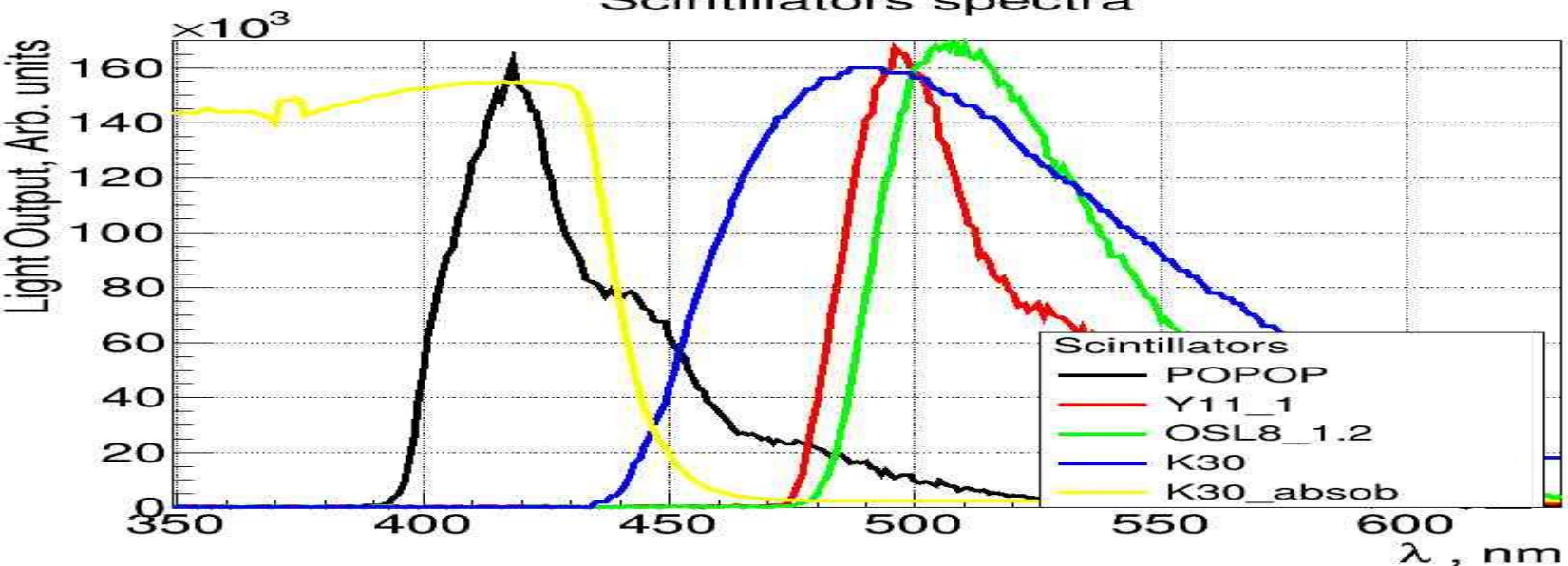


1. Y11 – OSC8=20 nm
2. POPOP – 420 nm
3. SiPm – 430 nm
4. At 500 nm – PDE~30%
5. Y11 more close to POPOP
6. As result:
7. OSL8 - potentially never going to be better of Y11



This Data obtained in November 24 2024

Scintillators spectra



This Data obtained in December 17

2024

Gavrishuk Oleg

WLS and Scintillator spectra

Conclusions:

1. In such composition OSC8 will never be better than Y11
1. That's why, optimization WLS composition is needed.
2. Shift the scintillator peak over of 420 nm.
3. Or shift the spectrum OSC8 closer to green - 460-480 nm.