

WLS tiles for the FD2 Module-1

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WLS-LG: Attenuation length (λ_{att})

- Both the Absorbance of the pTP photons & the λ_{att} of the photons emitted by the secondary WLS depends on the WLS chromophore concentration
 - The chromophore concentration & WLS-LG thickness are tuned to maximize the Photon Collection Efficiency (PCE)
- λ_{att} (400-500 nm) is the leading parameter for high PCE.
 - **Required: $\lambda_{att} > \text{Optical Path}$**

$$A = \log_{10}(1/T)$$

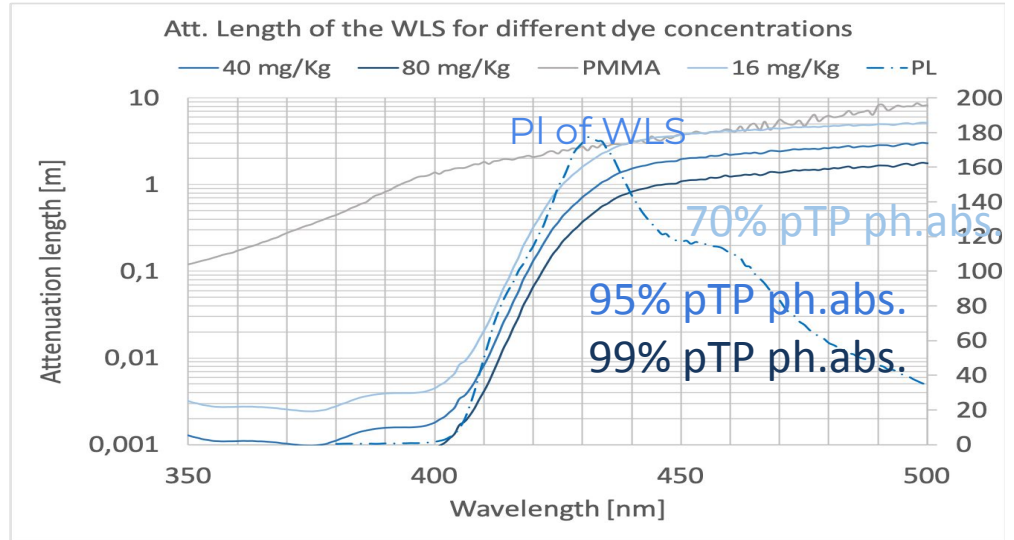
$$T = I/I_0 \exp(-d/\lambda_{att})$$

$$A = \epsilon c d$$

ϵ = molar extinction coeff.

c = concentration

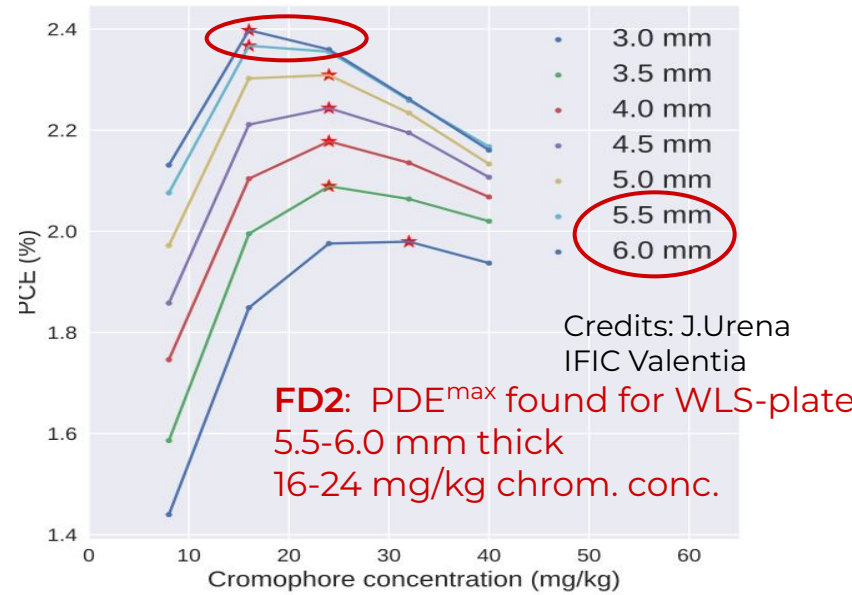
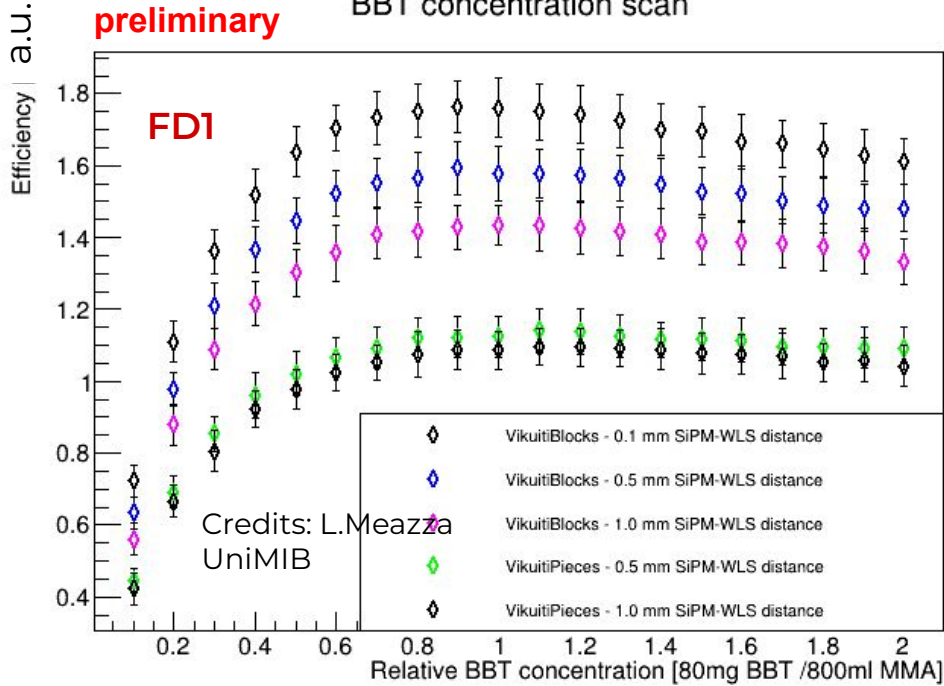
d = optical path



WLS- LG: chromophore concentration and thickness optimization for FD1 and FD2

OP ~ 10-100 cm; $\lambda_{att}^{opt} = 37$ cm; thick=3.8mm
 BBT concentration scan

OP ~ 60-200 cm; $\lambda_{att}^{opt} \sim 200$ cm; thick = 5.5 mm



WLS Tiles for M1

Casted in August/September 2023

Laser cut in September 2023

Delivered to INFN MiB on 18/09/2023

ORDINE INFN 2023_01

Inizio produzione 10/08/2023

NIU: 2 x 40 mg/kg

2 x 24 mg/kg

CIEMAT: 2 x 40 mg/kg (1 for PDE)

2 x 24 mg/kg (1 for PDE)

N. SERIALE	Conc. Dye (mg/kg)	SPESSORI (mm)											SCATOLA	ABS @350nm (A)	% fotoni assorbiti @350 nm	
		MISURE corrette								AVG	MIN	MAX				delta max-min
FD2T24A	24	5.5	5.4	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.5	0.1	1	1.27	94.6
FD2T24B	24	5.5	5.5	5.5	5.5	5.4	5.5	5.4	5.5	5.5	5.4	5.5	0.1	1	1.29	94.8
FD2T24C	24	5.4	5.6	5.5	5.5	5.5	5.5	5.5	5.4	5.5	5.4	5.6	0.2	2	1.22	94.0
FD2T24D	24	5.3	5.4	5.3	5.5	5.4	5.5	5.5	5.6	5.4	5.3	5.6	0.3	3	1.27	94.6
FD2T24E	24	5.4	5.5	5.4	5.4	5.4	5.5	5.4	5.4	5.4	5.4	5.5	0.1	3	1.21	93.8
FD2T40A	40	5.6	5.7	5.6	5.5	5.5	5.5	5.4	5.4	5.5	5.4	5.7	0.3	1	2.09	99.2
FD2T40B	40	5.5	5.5	5.5	5.6	5.5	5.5	5.5	5.6	5.5	5.5	5.6	0.1	2	2.12	99.2
FD2T40C	40	5.5	5.6	5.5	5.5	5.4	5.4	5.5	5.5	5.5	5.4	5.6	0.2	2	1.82	98.5
FD2T40D	40	5.6	5.7	5.5	5.5	5.5	5.5	5.4	5.5	5.5	5.4	5.7	0.3	3	1.90	98.7
FD2T40E	40	5.6	5.7	5.6	5.6	5.6	5.7	5.5	5.6	5.6	5.5	5.7	0.2	3	1.84	98.6