Electronic Supplementary Material (ESI) for Lab on a Chip.

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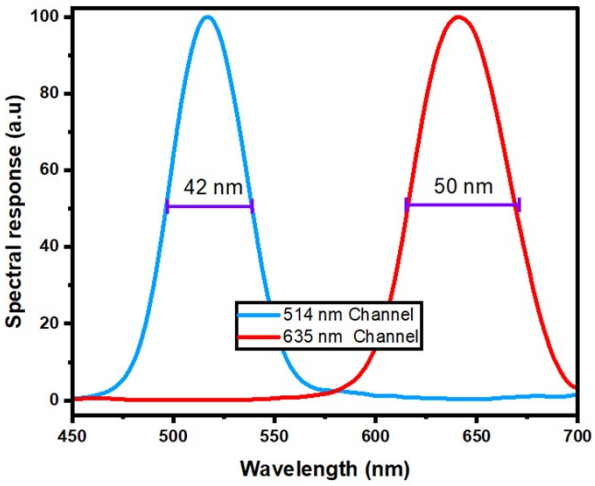
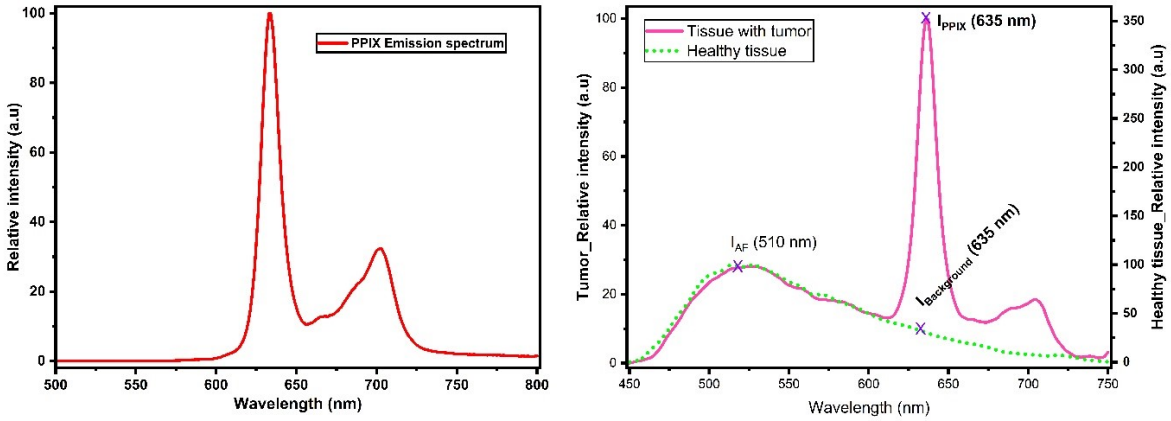
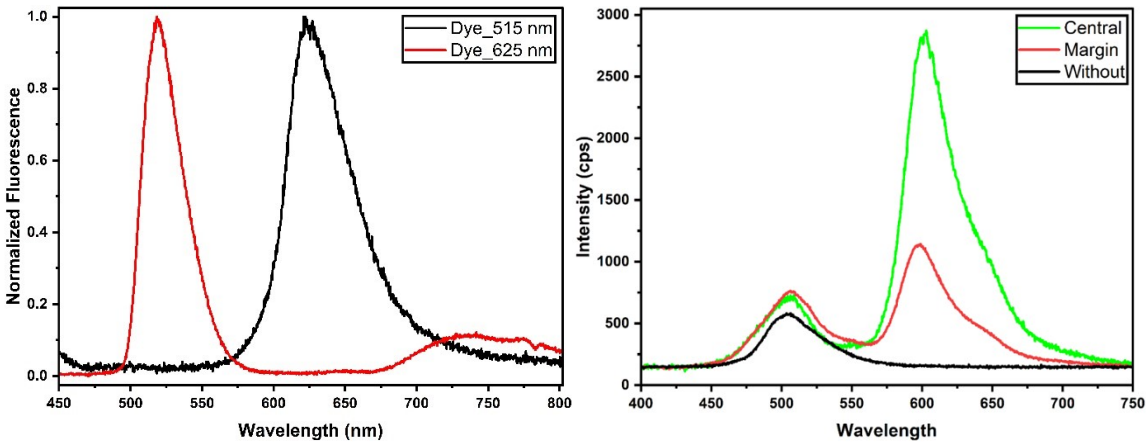
Supplementary materials



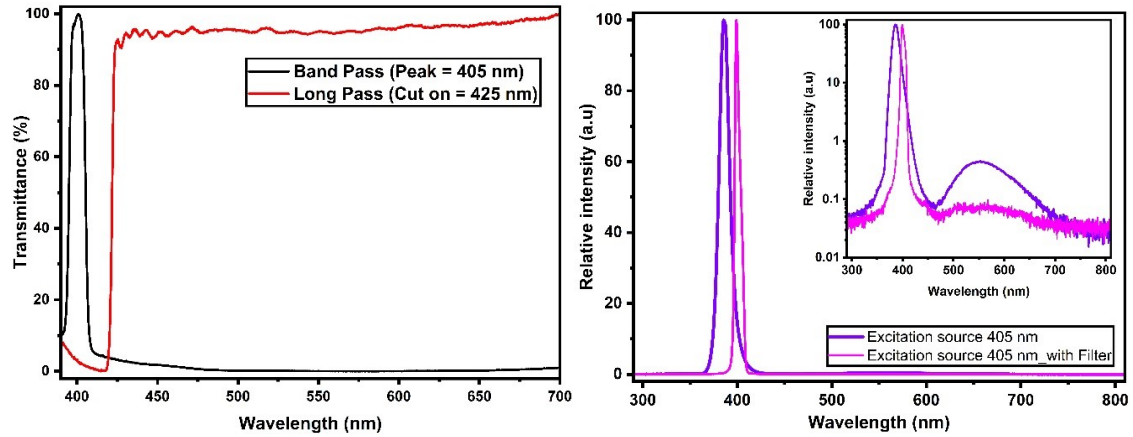
SI Fig. 1: Spectral distribution of the pigment colour filters used in the sensor chip. The colour filters offer spectral resolutions of Full Width Half Maximum (FWHM) of 42 nm and 50 nm for green (514 nm) and red channels (635 nm), respectively.



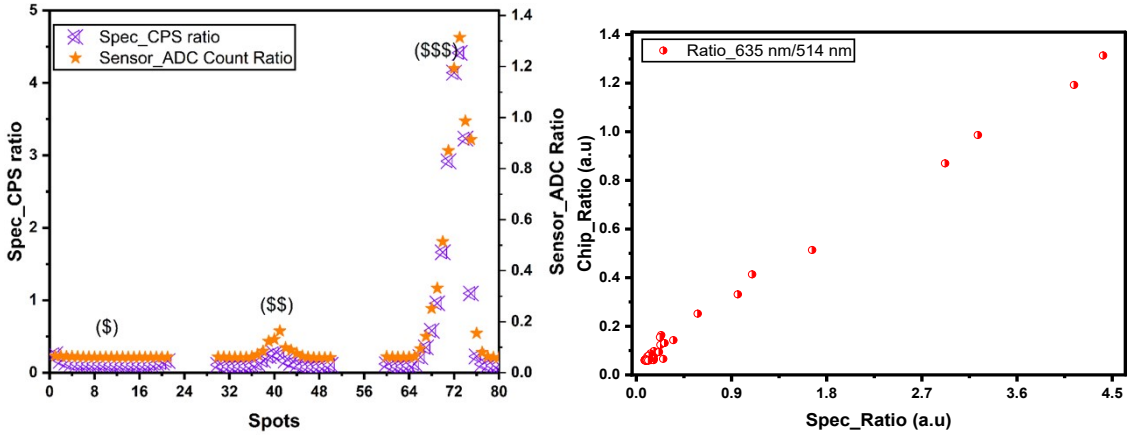
SI Fig. 2: Spectral distribution: (a) PPIX emission spectrum, (b) Tumour tissue and healthy tissue. Data were obtained from our experiments' measurements and agree with results reported by N. Haj-Hosseini et al. (https://doi.org/10.1002/lsm.20868).



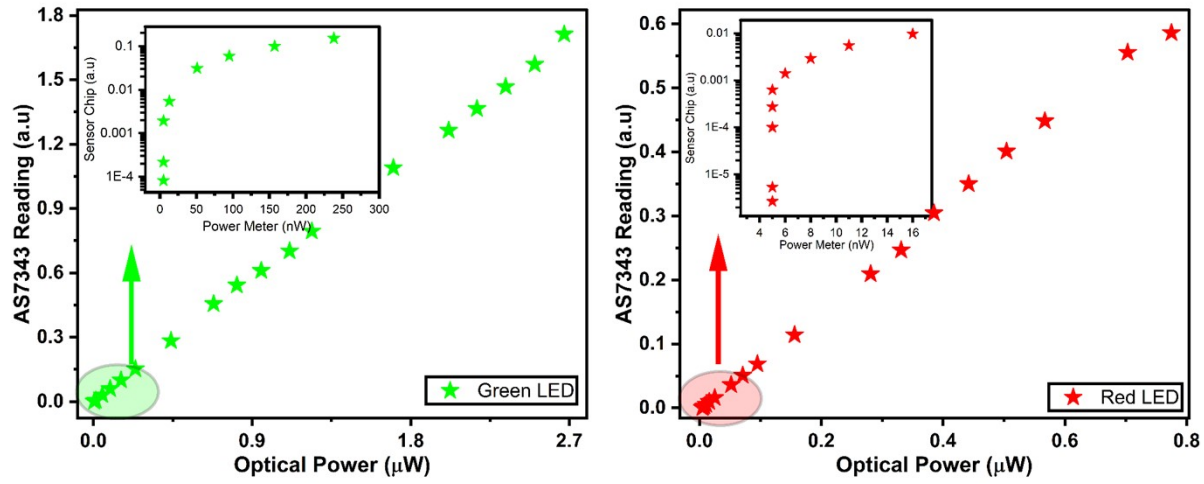
SI Fig. 3: Normalized spectral distribution of used highlighter inks. (b) Spectral distribution of the optical brain-tumour phantom. (b) Photo of the optical phantom with tumour margins and regions taken (i) on open room lighting and (ii) under 405 nm illumination



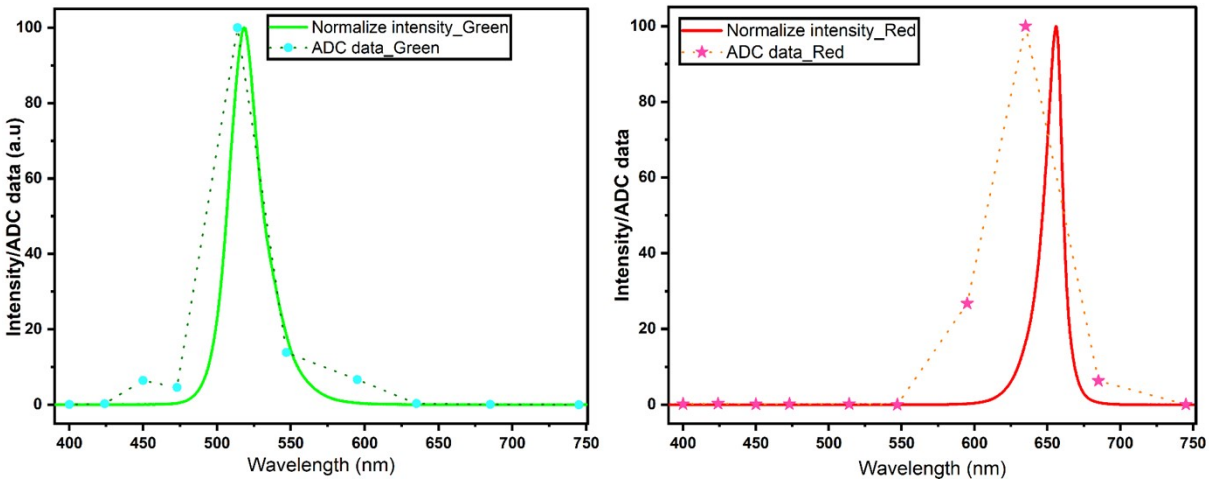
SI Fig. 4: Spectral distribution of the (a) Bandpass and long pass optical filters responses. (b) Excitation source (both with and without the shoulder removal filter).



SI Fig. 5: (a) Comparison of the spectral and on-chip measurements at various spots on the brain optical phantom (1) No tumour, (ii) Tumour margin and (iii) Tumour region. (b) Correlation plot of chip measurements and spectral measurements for validation analysis. The coefficient of determination of over 0.98 was achieved.



SI Fig. 6: Dynamic range analysis – the sensor can detect the intensties below 5 nW for both red and green channels. Given that tumor fluorescence intensity is typically dim, this figure shows that the sensor can detect dim light intensities up to intensities barely visible to the naked eye.



SI Fig. 7: Selectivity study – (a) 514 nm, (b) 635 nm.

SI Tab 1: Electrical and optical characteristics of the sensor chip

Parameter	Conditions	Value (range)
Supply voltage (V_{DD})	-	1.8 V (1.7 - 1.98 V)
Supply current (I_{DD})	Active mode (V_{DD} = 1.8 V)	210 μA (max = 280 μA)
	Idle mode (V_{DD} = 1.8 V)	40 μA (max = 60 μA)
	Sleep mode (V_{DD} = 1.8 V)	0.7 μA (max = 5 μA)
Healthy tissue channel	FWHM = 40 nm, Peak λ = 514 nm	
Tumour channel	FWHM = 50 nm, Peak λ = 635 nm	