

Supplementary Materials
of the review of P.G. Pronkin and A.S. Tatikolov “Photonics of Trimethine Cyanine Dyes as
Probes for Biomolecules”

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Table S1. Spectral-fluorescent properties of trimethine cyanine dyes in a complex with DNA (in the presence of high concentrations of DNA): maxima of the absorption and fluorescence spectra $\lambda_{\text{abs}}(\text{DNA})$ and $\lambda_{\text{fl}}(\text{DNA})$, respectively, spectral shifts upon the interaction with DNA $\Delta\lambda_{\text{abs}}$ and $\Delta\lambda_{\text{fl}}$, ratios of fluorescence intensities/quantum yields in the presence and in the absence of DNA $I_{\text{fl}}(\text{DNA})/I_{\text{fl}0}$ or $\Phi_{\text{fl}}(\text{DNA})/\Phi_{\text{fl}0}$; as well as dye–DNA binding constants K_{b} and limits of detection/quantification of DNA LOD/LOQ using the dyes as probes

Dye	$\lambda_{\text{abs}}(\text{DNA})$ ($\sim\Delta\lambda_{\text{abs}}$)	$\lambda_{\text{fl}}(\text{DNA})$ ($\sim\Delta\lambda_{\text{fl}}$)	$I_{\text{fl}}(\text{DNA})/I_{\text{fl}0}$ $\Phi_{\text{fl}}(\text{DNA})/\Phi_{\text{fl}0}$	K_{b}	LOD/LOQ	Ref.
	nm			L mol ⁻¹	μmol L ⁻¹	
1	541 (6)	563 (-1)	177.6	4.8×10^5	–	[24, 27, 40]
2	554 (3)	577 (8)	4.59	9.5×10^4	–	[27, 32, 33]
4	551 (-2)	651 (-6)	2.59	–	–	
5	558 (10)	644 (1)	45.0	–	–	
6	551 (50)	632 (-4)	2.36	–	–	
7	561 (34)	587 (9)	70.9	–	–	
8	558 (0)	596 (-119)	71.0	–	–	
9	501 (5)	604 (-25)	5.87	–	–	[27]
10	506 (6)	583 (-72)	207.4	–	–	
11	505 (2)	583 (-89)	222.0	–	–	
12	557 (30)	627 (-5)	127.7	–	–	
13	515 (-13)1	637 (8)	5.28	–	–	
15	575 (11)	582 (8)	23.0	$\sim 10^6 \sim 5 \times 10^4$	–	[29]
18	566 (5)	586 (1)	8.21	1.2×10^5	~ 0.2	
19	554 (10)	567 (3)	263.0	1.24×10^5	~ 0.022	
20	565 (6)	581 (5)	10	1.2×10^5	~ 1	[30, 31]
21	568(8)	580 (6)	6.67	3.7×10^4	~ 2.7	

Dye	$\lambda_{\text{abs}}(\text{DNA})$ ($\sim\Delta\lambda_{\text{abs}}$)	$\lambda_{\text{fl}}(\text{DNA})$ ($\sim\Delta\lambda_{\text{fl}}$)	$I_{\text{fl}}(\text{DNA})/I_{\text{fl}0}$ $\Phi_{\text{fl}}(\text{DNA})/\Phi_{\text{fl}0}$	K_b	LOD/LOQ	Ref.
	nm			L mol ⁻¹	μmol L ⁻¹	
22	695 (23)	575 (23)	3	–	–	[34]
23	581 (-)	618 (-)	150	–	–	[35]
24	610 (-)	651 (-)	140	–	–	
26	538 (-1)	565 (-5)	15	–	–	
27	501 (6)	525 (1)	9	–	–	[38–41]
28	550(5)	665 (2)	87	–	–	
29	499 (13)	513 (8)	55	–	–	
30	504 (11)	518 (7)	41	–	–	
31	515 (12)	522 (10)	2.6	–	–	
38	–	514 (10)	27.7	–	–	[45]
39	–	603 (6)	13.4	–	–	
40	–	565 (-3)	132.1	–	–	
41	–	573 (4)	60.7	–	–	
42	–	449 (-131)	46.8	–	–	
43	–	701 (45)	~0.9	–	–	
44	–	637 (-35)	76	–	–	
45	–	615 (-27)	5.6	–	–	
46	–	628 (-4)	12.3	–	–	
47	–	652 (10)	9.9	–	–	
50	571 (37)	602 (12)	72	8.8/2.6× 10 ⁵	–	[48–50]

Table S2. Spectral-fluorescent properties of trimethine cyanine dyes in a complex with BSA (in the presence of high concentrations of BSA): maxima of the absorption and fluorescence spectra $\lambda_{\text{abs}}(\text{BSA})$ and $\lambda_{\text{fl}}(\text{BSA})$, respectively, spectral shifts upon the interaction with BSA $\Delta\lambda_{\text{abs}}$ and $\Delta\lambda_{\text{fl}}$, ratios of fluorescence intensities /quantum yields in the presence and in the absence of BSA $I_{\text{fl}}(\text{BSA})/I_{\text{fl}0}$ or $\Phi_{\text{fl}}(\text{BSA})/\Phi_{\text{fl}0}$; as well as dye–BSA binding constants K_{b} and limits of detection/quantification of BSA LOD/LOQ using the dyes as probes

Dye	$\lambda_{\text{abs}}(\text{BSA})$ ($\sim\Delta\lambda_{\text{abs}}$)	$\lambda_{\text{fl}}(\text{BSA})$ ($\sim\Delta\lambda_{\text{fl}}$)	$I_{\text{fl}}(\text{BSA})/I_{\text{fl}0}$ $\Phi_{\text{fl}}(\text{BSA})/\Phi_{\text{fl}0}$	K_{b}	LOD/LOQ	Ref
	nm	nm		L mol ⁻¹	μg mL ⁻¹	
1	535 (0)	572 (8)	0.22	–	–	[27]
2	551 (-3)	572 (-5)	0.002	–	–	
4	562 (9)	661 (4)	3.57	–	–	
5	577 (29)	668 (25)	21.5	–	–	
6	501 (–)	638 (2)	3.75	–	–	
7	525 (-2)	578 (–)	1.1	–	–	
8	557 (-1)	601 (-114)	2.09	–	–	
9	524 (28)	596 (-33)	3.47	–	–	
10	509 (9)	569 (-86)	11	–	–	
11	510 (7)	655 (-17)	5.25	–	–	
12	528 (1)	655 (33)	10.6	–	–	
13	518 (-10)	632 (3)	0.678	–	–	
46	618 (46)	653 (11)	7.90	–	–	[65]
47	607 (1)	638 (10)	1.20	–	–	
52	584	608	100	3.5×10^5	5.4/16.6	[79]
58	670 (12)	695 (22)	19.5	–	–	[65]
59	557 (7)	590 (15)	14.1	–	–	
69	509 (7)	525 (10)	16	$1.45 - 1.59 \times 10^5$	–	[75]
70	680 (14)	701 (1)	11	$1.83 - 3.02 \times 10^5$	–	[77]
71	678 (14)	699 (-1)	7.75	$7.6 - 9.2 \times 10^4$	–	
72	674 (12)	700 (2)	10.3	$3.14 - 3.88 \times 10^4$	–	
73	675 (13)	702 (6)	7.75	$1.26 - 1.71 \times 10^4$	–	
79	596 (20)	596 (-13)	53	4.1×10^5	1.73/5.7	[79]
80	570 (10)	597 (14)	41	4.9×10^4	5.8/17.3	

Table S3. Spectral-fluorescent properties of trimethine cyanine dyes in a complex with HSA (in the presence of high concentrations of HSA): maxima of the absorption and fluorescence spectra $\lambda_{\text{abs}}(\text{HSA})$ and $\lambda_{\text{fl}}(\text{HSA})$, respectively, spectral shifts upon the interaction with HSA $\Delta\lambda_{\text{abs}}$ and $\Delta\lambda_{\text{fl}}$, ratios of fluorescence intensities/quantum yields in the presence and in the absence of HSA $I_{\text{fl}}(\text{HSA})/I_{\text{fl}0}$ or $\Phi_{\text{fl}}(\text{BSA})/\Phi_{\text{fl}0}$; as well as dye–HSA binding constants K_{b} and limits of detection/quantification of HSA LOD/LOQ using the dyes as probes

Dye	$\lambda_{\text{abs}}(\text{HSA})$ ($\sim\Delta\lambda_{\text{abs}}$)	$\lambda_{\text{fl}}(\text{HSA})$ ($\sim\Delta\lambda_{\text{fl}}$)	$I_{\text{fl}}(\text{HSA})/I_{\text{fl}0}$ $\Phi_{\text{fl}}(\text{HSA})/\Phi_{\text{fl}0}$	K_{b}	LOD/LOQ	Ref.
	nm			L mol ⁻¹	nmol L ⁻¹	
15	565 (12)	–	–	$1.05 - 1.74 \times 10^4$	–	[15]
19	563 (21)	–	–	1.0×10^4	–	
52	604 (12)	616 (-44)	885	3.7×10^7	0.79/2.6	[78, 79]
53	610 (11)	–	718	$>10^6$	1.83/6.0	[15, 78]
60	558 (10)	–	–	$3.0 - 6.0 \times 10^7$	–	[15]
61	574 (12)	–	–	$4.9 - 5 \times 10^7$	–	
64	567 (10)	–	–	3.5×10^3	–	
66	566 (9)	–	–	$2.0 - 3.0 \times 10^6$	–	
69	513 (15)	529 (15)	15.5	2.23×10^5	32/105	[74, 78]
78	563 (11)	–	45.4	1.09×10^5	4.2/14.7	[78]
79	606 (30)	620 (11)	119	4.3×10^5	1.4/4.6*	[79]
80	592 (32)	606 (23)	183	2.1×10^6	0.35/1.14*	
82	529 (-27)	561	–	7.54×10^5	–	[84]
83	531 (-25)	605	–	8.75×10^5	–	
84	532 (-31)	565	–	8.03×10^5	–	
85	569 (-27)	603	–	3.25×10^5	–	
86	572 (-28)	605	–	8.33×10^5	–	
87	572 (-45)	607	–	4.13×10^5	–	
88	764 (-4)	771	–	1.55×10^5	–	
89	758 (-12)	774	–	1.06×10^6	–	
90	758 (-15)	775	–	3.51×10^5	–	

* In $\mu\text{g mL}^{-1}$