Electronic Supplementary Information

Label-free Optical Bio-Sensing of Non-cancerous and Cancerous Tissues from Mice: Distinct Spectroscopic Features of Thiazole Orange

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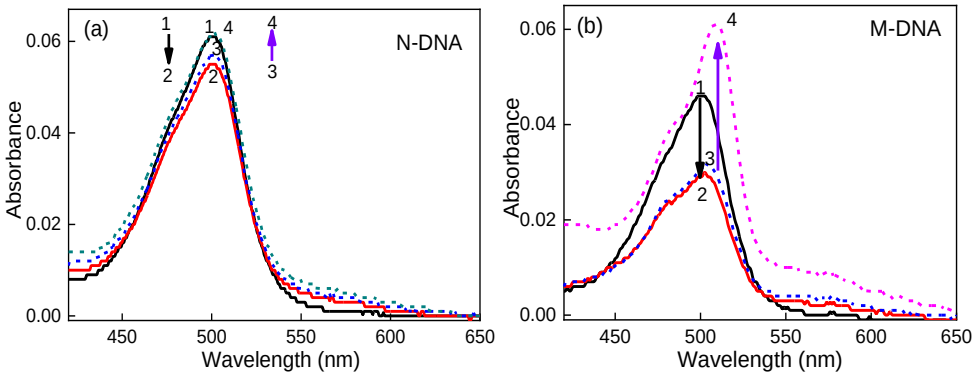

Fig. S1 Absorption spectra of TO (~4 μM) at different concentrations of **(A)** [N-DNA]/μM:(1) 0, (2) 1, (3) 2 and (4) 6. **(B)** [M-DNA]/μM: (1) 0, (2) 0.4, (3) 0.8 and (4) 29. The above data set is the representative of the individual mouse of C57BL/6J strain.

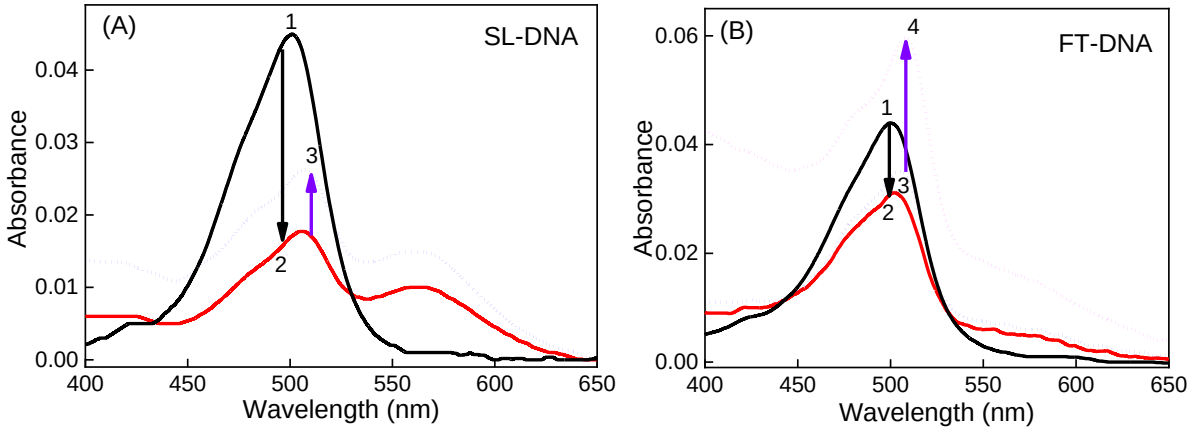

Fig. S2 Absorption spectra of TO (~4 μM) at different concentrations of **(A)** [SL-DNA]/μM: (1) 0, (2) 1, (3) 6; **(B)** [FT-DNA]/μM: (1) 0, (2) 0.8, (3) 3, (4) 38; The above data set is the representative of the individual mouse of Swiss albino strain.

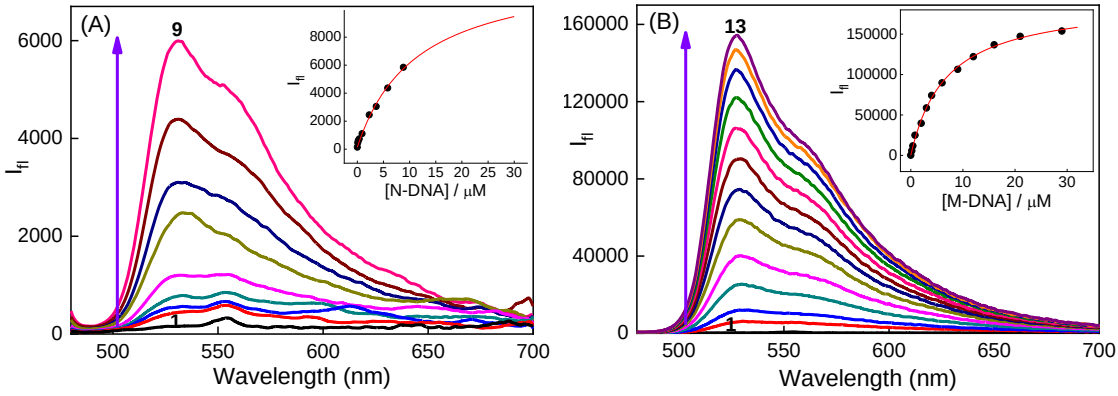

Fig. S3 Steady-state fluorescence spectra of TO (~4 μM) at different concentrations of **(a)** [N-DNA]/μM: (1) 0, (2) 0.1, (3) 0.2, (4)0.4, (5) 1, (6) 2, (7) 4, (8) 6, (9) 9. **(b)** [M-DNA]/μM: (1) 0, (2) 0.2, (3) 0.4, (4) 0.8, (5) 2, (6) 3, (7) 4, (8) 6, (9) 9, (10) 12, (11) 16, (12) 21, (13) 29. **Insets** show the binding isotherm of TO with the respective DNA. The above data set is the representative of the individual mouse of C57BL/6J strain.

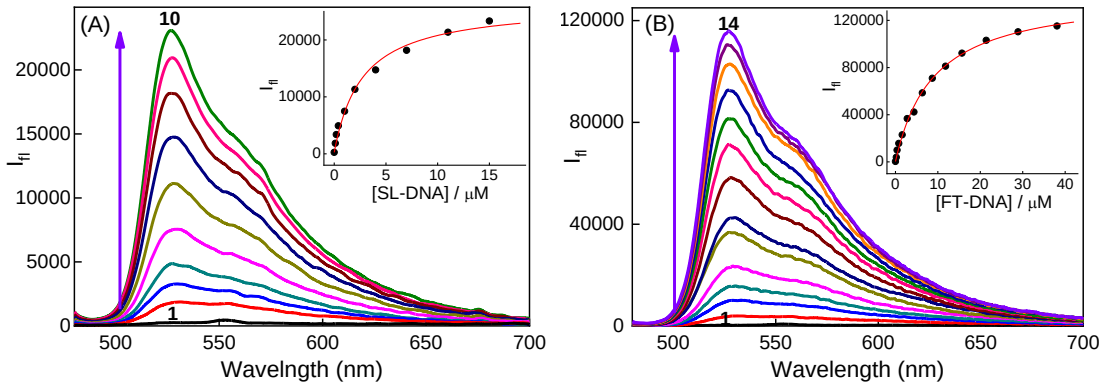

Fig. S4 Steady-state fluorescence spectra of TO (~4 μM) at different concentrations of **(a)** [SL-DNA]/μM: (1) 0, (2) 0.1, (3) 0.2, (4) 0.4, (5) 1, (6) 2, (7) 4, (8) 7, (9) 11, (10) 15; **(b)** [FT-DNA]/μM: (1) 0, (2) 0.2, (3) 0.4, (4) 0.8, (5) 2, (6) 3, (7) 4, (8) 6, (9) 9, (10) 12, (11) 16, (12) 21, (13) 29, (14) 38; **Insets** show the binding isotherm of TO with the respective DNA. The above data set is the representative of the individual mouse of Swiss albino strain.

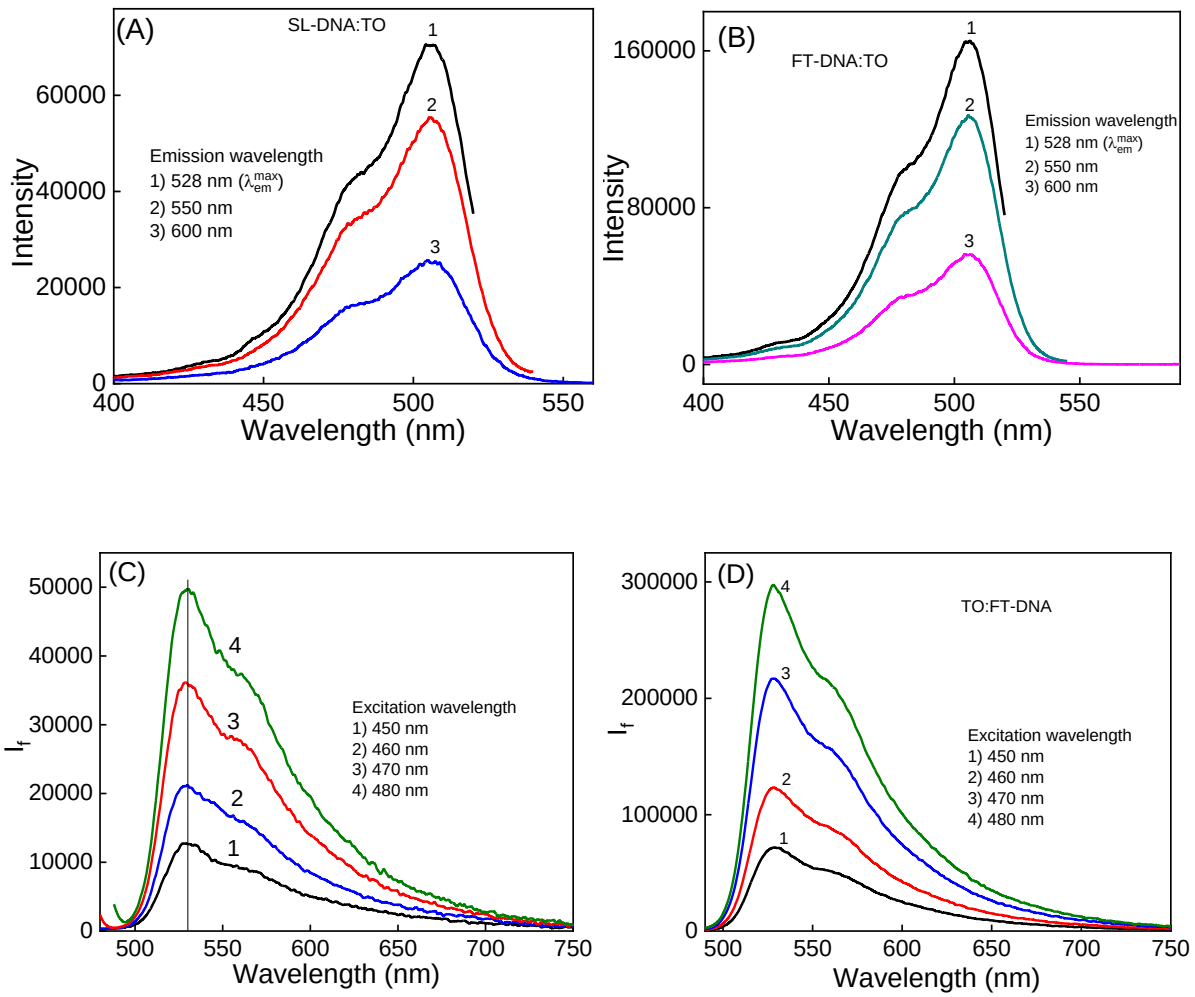

Fig. S5 Excitation spectra of SL-DNA:TO (**A**) and FT-DNA:TO (**B**) recorded by choosing three different emission wavelengths. Emission spectra of SL-DNA:TO (**C**) and FT-DNA:TO (**D**) recorded by varying excitation wavelengths

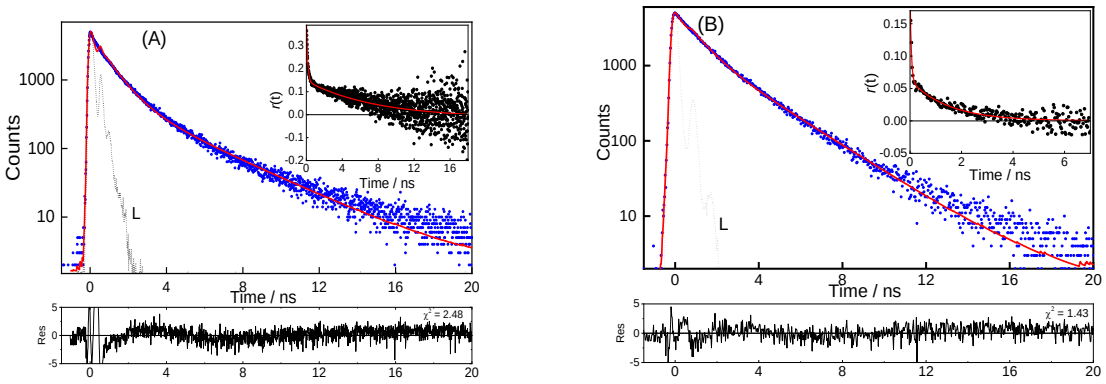

Fig.S6. Transient decay trace of TO (λ_{ex} = 445nm, λ_{em} =535nm) with (A) N-DNA (9 µM) and (B) M-DNA (29µM). The black dotted line L represents instrument response function (IRF). **Insets:** Time-resolved anisotropy trace recorded for (A) TO-N-DNA; (B) TO-M-DNA systems. The residuals are given for the decay traces in the respective figures.

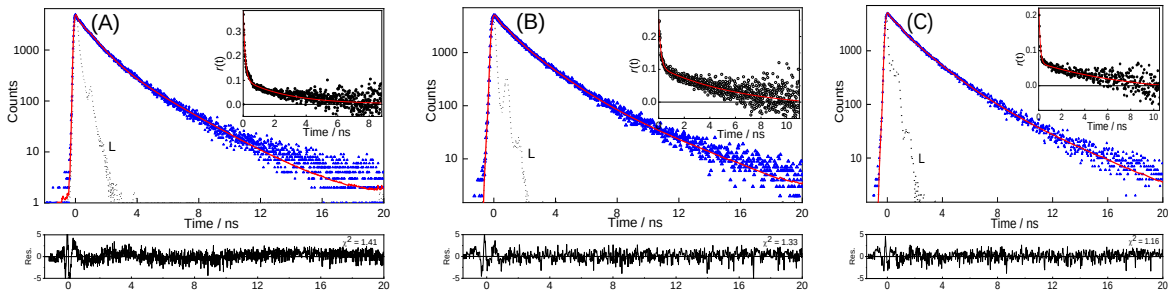

Fig. S7 Transient decay trace of TO (λ_{ex} = 445nm, λ_{em} =535nm) with **(A)** BL-DNA (9 µM); (**B**) WT-DNA (29 µM); **(C)** WL-DNA (29 µM). The dotted black line L represents instrument response function (IRF). **Insets:** Time-resolved anisotropy trace recorded for (**A**) TO-BL-DNA; (**B**) TO-WT-DNA and **(C)** TO-WL-DNA systems. The residuals are given for the decay traces in the respective figures.

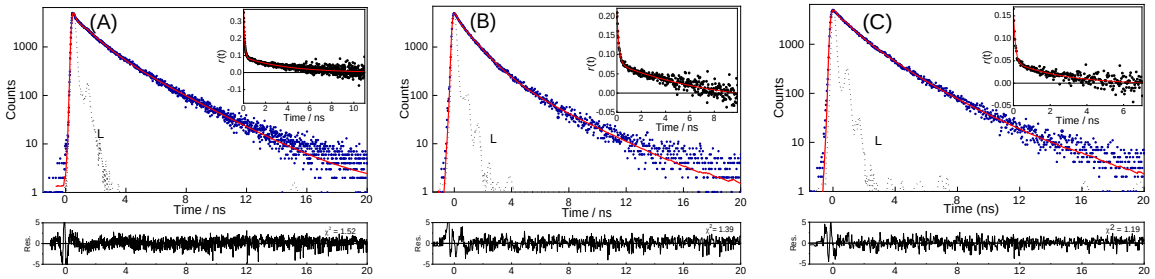

Fig. S8 Fluorescence lifetime decay trace of TO (λ_{ex} = 445nm, λ_{em} =535nm) with **(A)** SL-DNA (15 µM); **(B)** FL-DNA (17.5 µM); **(C)** FT-DNA (38 µM). The solid black line (L) represents instrument response function (IRF). **Insets:** Time-resolved anisotropy trace recorded for (A) TO-SL-DNA; (B) TO-FL-DNA and (C) TO-FT-DNA systems. The residuals are given for the decay traces in the respective figures.

Table S1. Fluorescence lifetime of TO at different concentrations of normal and tumor DNAs.

Origin of DNA	[DNA] / μM	τ_1 (ns)	a_1	τ_2 (ns)	a_2	τ_3 (ns)	a_3	<τ> (ns)	χ^2 [$]
N-DNA (Normal)	9.0	0.04[#]	0.18	0.86	0.46	3.3	0.36	1.59	2.48[$]
M-DNA (Tumor)	29.0	0.04[#]	0.06	0.81	0.36	2.46	0.58	1.72	1.43
BL-DNA (Normal)	9.0	0.04[#]	0.13	0.87	0.49	2.51	0.38	1.39	1.41
WT-DNA (Tumor)	29.0	0.43	0.19	1.62	0.62	3.83	0.19	1.81	1.33
WL-DNA (Tumor)	29.0	1.68	0.61	1.68	0.61	3.78	0.21	1.87	1.16
SL-DNA (Normal)	15.0	0.04[#]	0.13	1.0	0.42	2.53	0.45	1.56	1.52
FT-DNA (Tumor)	38.0	0.42	0.19	1.55	0.57	3.19	0.25	1.76	1.39
FL-DNA (Tumor)	17.5	0.35	0.15	1.46	0.62	3.48	0.23	1.76	1.19

[#] *Considering the limitation of the time resolution, this faster component was fixed the value 40 ps.*

[$] *The increased χ^2 value is due to a fluctuation in the prompt profile and also due to a contribution from scattering developed during the DNA titration.*

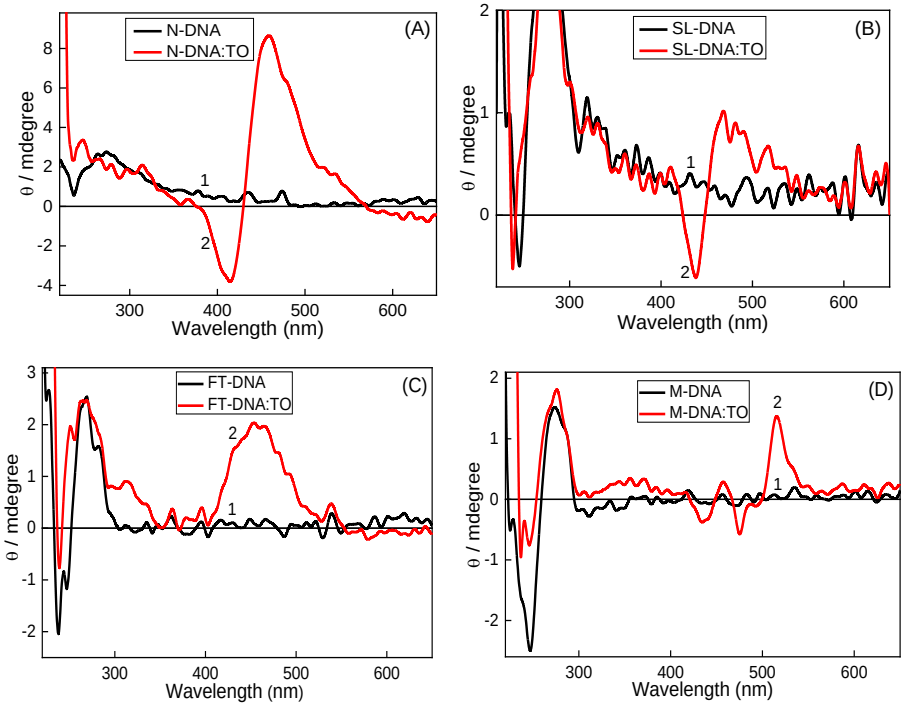

Fig. S9 Circular Dichroism spectra of **(A)** (1) N-DNA (200 μM), (2) N-DNA (200 μM):TO (100 μM), **(B)** (1) SL-DNA (200 μM), (2) SL-DNA (200 μM):TO (100 μM); **(C)** (1) FT-DNA (200 μM), (2) FT-DNA (200 μM):TO (100 μM), **(D)** (1) M-DNA (200 μM), (2) M-DNA (200 μM):TO (100 μM); The above data set is the representative of the individual mouse of C57BL/6J and Swiss albino strain.

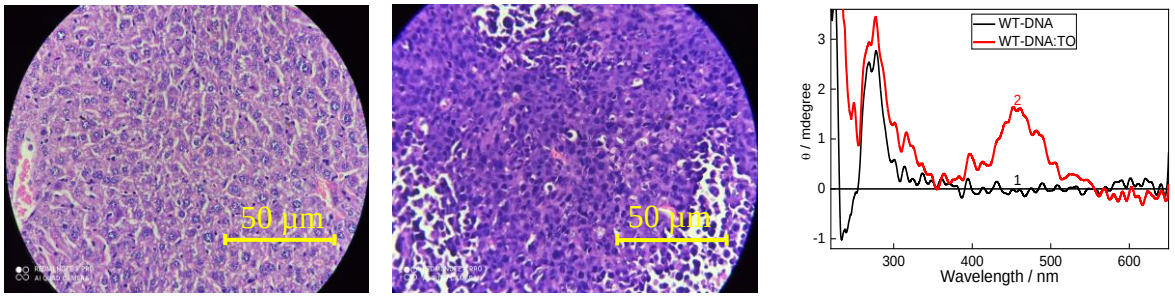

Fig. S10 Representative images of H&E stained tissue section of non-cancerous liver (A) and fibrosarcoma (B) tissues of BALB/c mice. (C) is the CD spectrum recorded from corresponding cancerous DNA-TO complex.

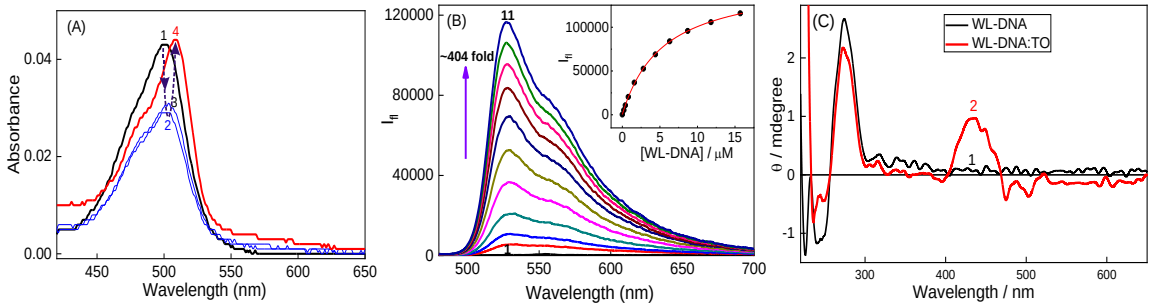

Fig. S11 (A) Absorption of TO with [WL-DNA]/µM: (1) 0, (2) 0.4, (3) 0.8 and (4) 16.; (B) Fluorescence of TO with [WL-DNA]/µM, (1) 0, (2) 0.2, (3) 0.4, (4) 0.8, (5) 2, (6) 3, (7) 4, (8) 6, (9) 9, (10) 12 and (11) 16; (C) CD spectra of TO with (1) WL-DNA (200 µM), (2) WL-DNA (200 µM):TO (100 µM). Inset in (B) shows the binding isotherm of TO with the WL-DNA. The above data set is the representative of the individual mouse of BALB/c strain.

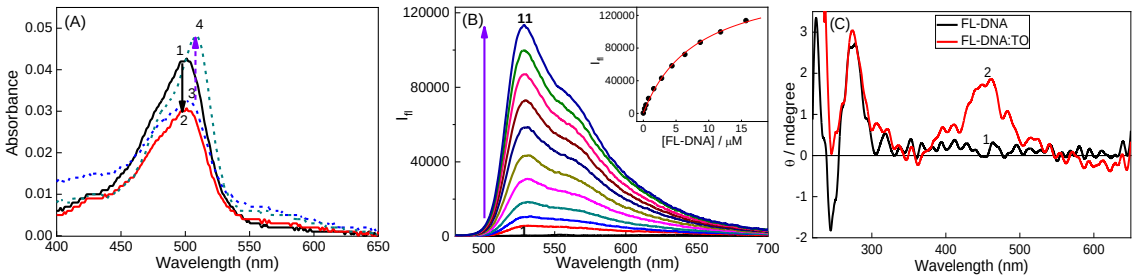

Fig. S12 (A) Absorption of TO with [FL-DNA]/µM: (1) 0, (2) 0.2, (3) 0.4, 4) 16.; (B) Fluorescence of TO with [FL-DNA]/µM, (1) 0, (2) 0.2, (3) 0.4, (4) 0.8, (5) 2, (6) 3, (7) 4, (8) 6, (9) 9, (10) 12, (11) 16; (C) CD spectra of TO with (1) FL-DNA (200 µM), (2) FL-DNA (200 µM):TO (100 µM). Inset in (B) shows the binding isotherm of TO with the FL-DNA. The above data set is the representative of the individual mouse of Swiss albino strain.