Supporting Information

for

Polyvinylpyrolidone-Passivated Fluorescent Iron Oxide Quantum Dots for Turn-off Detection of Tetracycline in Biological Fluids

Sri Sudewi,[a,b] Lutfi Chabib,[c] Muhammad Zulfajri,[d] Gangaraju Gedda[e] and Genin Gary Huang,[a,f,g]*

[a] *Department of Medicinal and Applied Chemistry, Kaohsiung Medical University, Kaohsiung 80708, Taiwan*

[b] *Department of Pharmacy, Faculty of Mathematics and Natural Science, Universitas Sam Ratulangi, Manado 95115, Indonesia*

[c] *Pharmacy Study Program, Faculty of Mathematics and Science, Universitas Islam Indonesia, Yogyakarta 55584, Indonesia*

[d] *Department of Chemistry Education, Universitas Serambi Mekkah, Banda Aceh, Aceh 23245, Indonesia*

[e] *Department of Basic Science, Vishnu Institute of Technology, Visnupur, Bhimavaram, 534202, A.P, India*

[f] *Department of Medical Research, Kaohsiung Medical University Hospital, Kaohsiung 80708, Taiwan*

[g] *Department of Chemistry, National Sun Yat-sen University, Kaohsiung 80424, Taiwan*

*To whom correspondence should be addressed.

E-mail : genin@kmu.edu.tw

Phone: +886-7-3121101#2810, Fax: +886-7-3125339

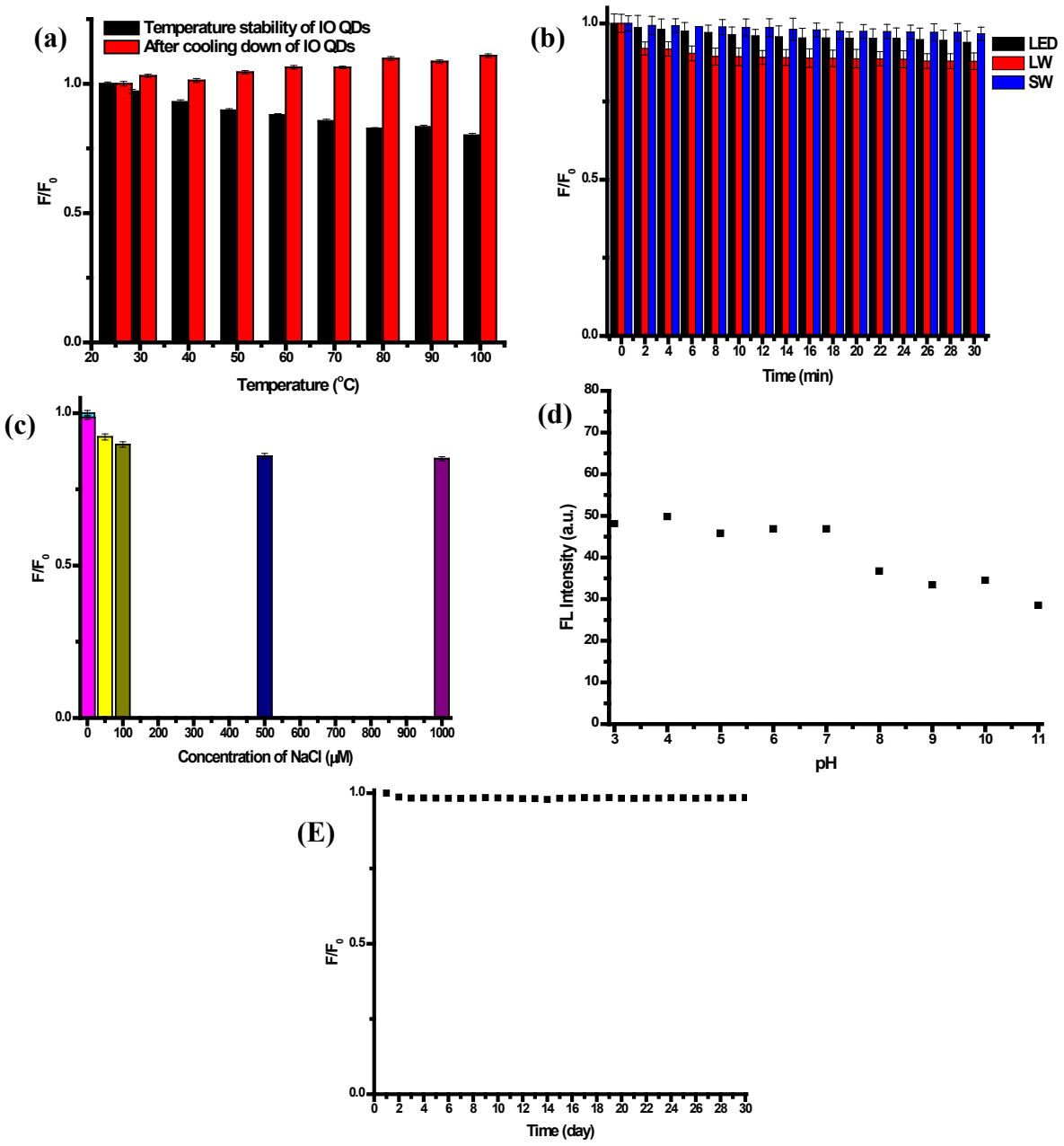

Fig. S1. (a) temperature stability of IO QDs. (b) photostability of IO QDs (LED: Light-emitting diode, LW: Long wavelength (λ=365 nm), SW: Short wavelength (λ=265 nm). (c) Ionic strength effects on IO QDs. (d) pH stability of IO QDs. and (e) storage time stability of IO QDs.

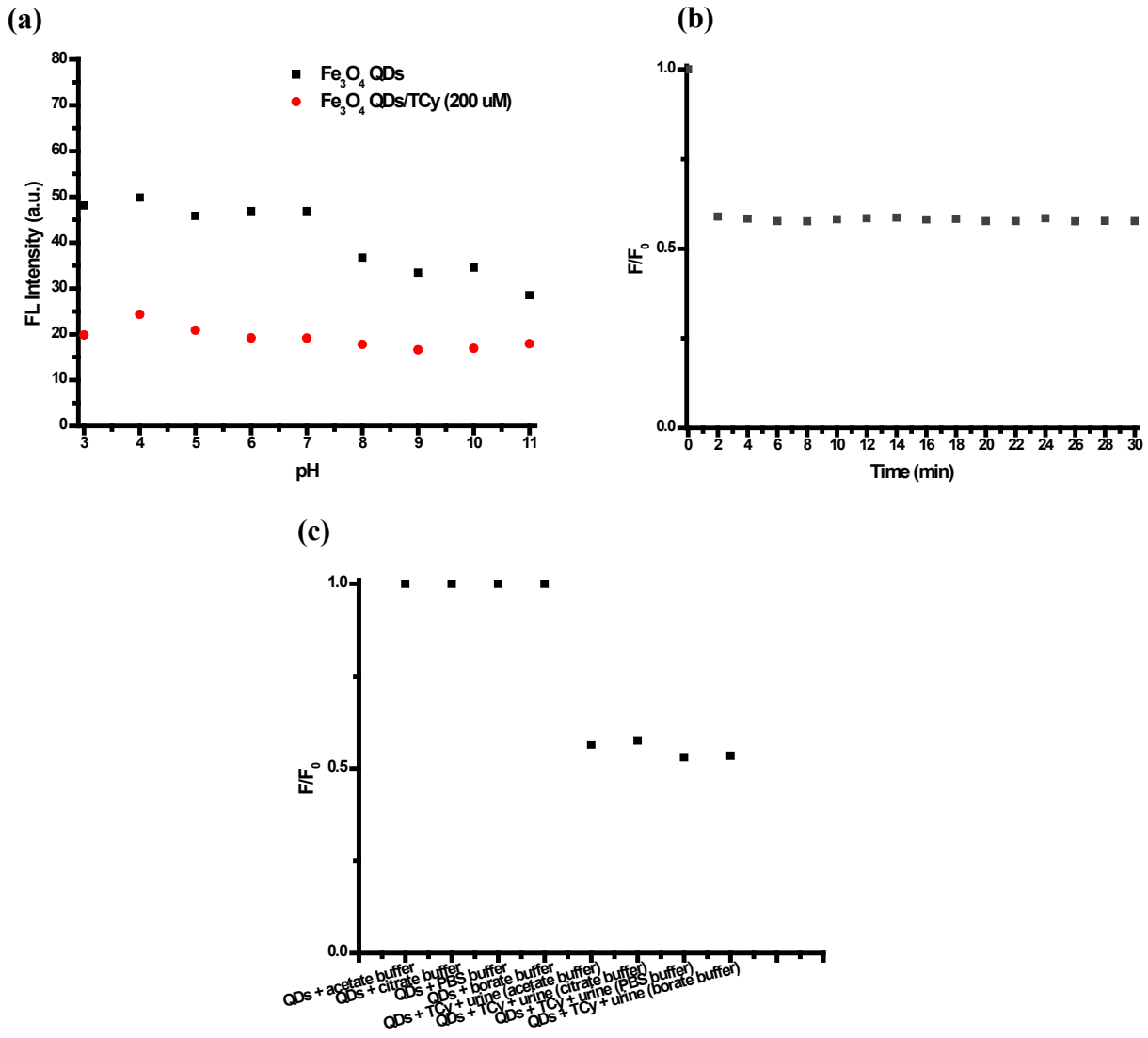

Fig. S2. Effect of (a) pH value (3-11) of IO QDs and IO QDs/TCy system on FL intensity. (b) time reaction (0-30 min) after adding TCy. (c) various buffers before and after adding TCy on FL quenching ratio (F/F_0)

(a)

(b)

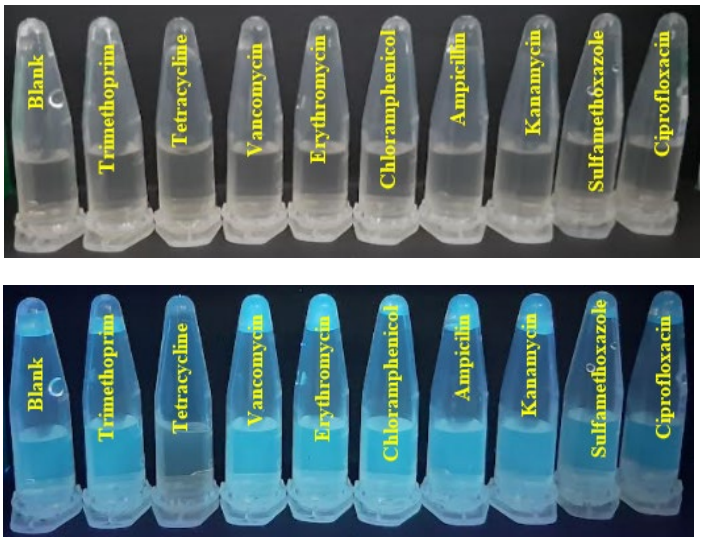

Fig. S3. Luminescence of IO QDs in the presence of various antibiotics under (a) daylight and (b) UV light

A possible mechanism for FRET fluorescence quenching:

The type of quenching and the quenching behaviors were investigated by ratio F_0/F and the quenching constant K_{SV} as determined by the Stern-Volmer plot following the equation [1].

$$F_0/F = K_{sv}[Q] + 1 = K_q\tau_0[Q] + 1 \quad \textbf{(1)}$$

Where F_0 is the fluorescence intensity at a specified emission wavelength in the absence of a TCy, F denotes the fluorescence intensity at emission wavelength, and [Q] is TCy concentration. K_{SV} represents the Stern-Volmer quenching constant at emission wavelength, K_q is the quenching rate constant, and τ_0 means fluorophore lifetime.

It was found that the Kq was measured to be $3.4x10^{11}$ $M^{-1}s^{-1}$ and it was higher than the maximum value of the dynamic quenching effect ($2.0x10^{10}$ $M^{-1}s^{-1}$)[2] by calculation. This result further proved that the static quenching effect dominated the fluorescence quenching.

The Förster distance between the donor and the acceptor was calculated to be 2.1 nm (<10 nm for an effective FRET) [3]. Förster distance was calculated using the formula [4]:

$$R_0=0.02108(k^2\phi_D\eta^{-4}J)^{1/6} \text{ nm} \quad \textbf{(2)}$$

Where R_0 is the Förster distance (in nm), k_2 denotes dipole orientation factor (2/3) [5] , ϕ_D denotes fluorescence quanrum yield of IO QDs, η denotes refractive index of the solvent, and J denotes the overlap integral.

Reference

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2. Tang, Y., et al., *A thiadiazole-based covalent triazine framework nanosheet for highly selective and sensitive primary aromatic amine detection among various amines.* Journal of Materials Chemistry A, 2020. **8**(32): p. 16542-16550.
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