

Supporting Information

Determination of the Electrostatic Potential of Oil-in-Water Emulsion Droplets by Combined Use of Two Membrane Potential-Sensitive Dyes

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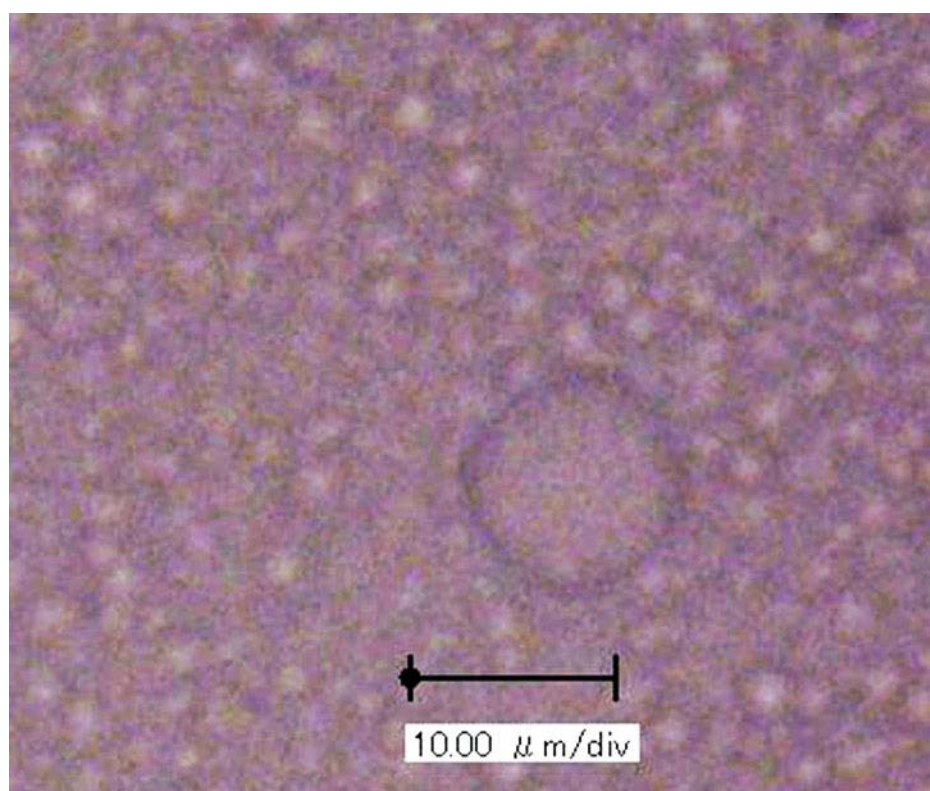


Fig. S1 Optical micrograph of the O/W emulsion prepared from 2 mL of DCE containing 0.005 M TEATCIPB and 50 mL of W containing 0.01 M SDS and 0.001 M TEACl.

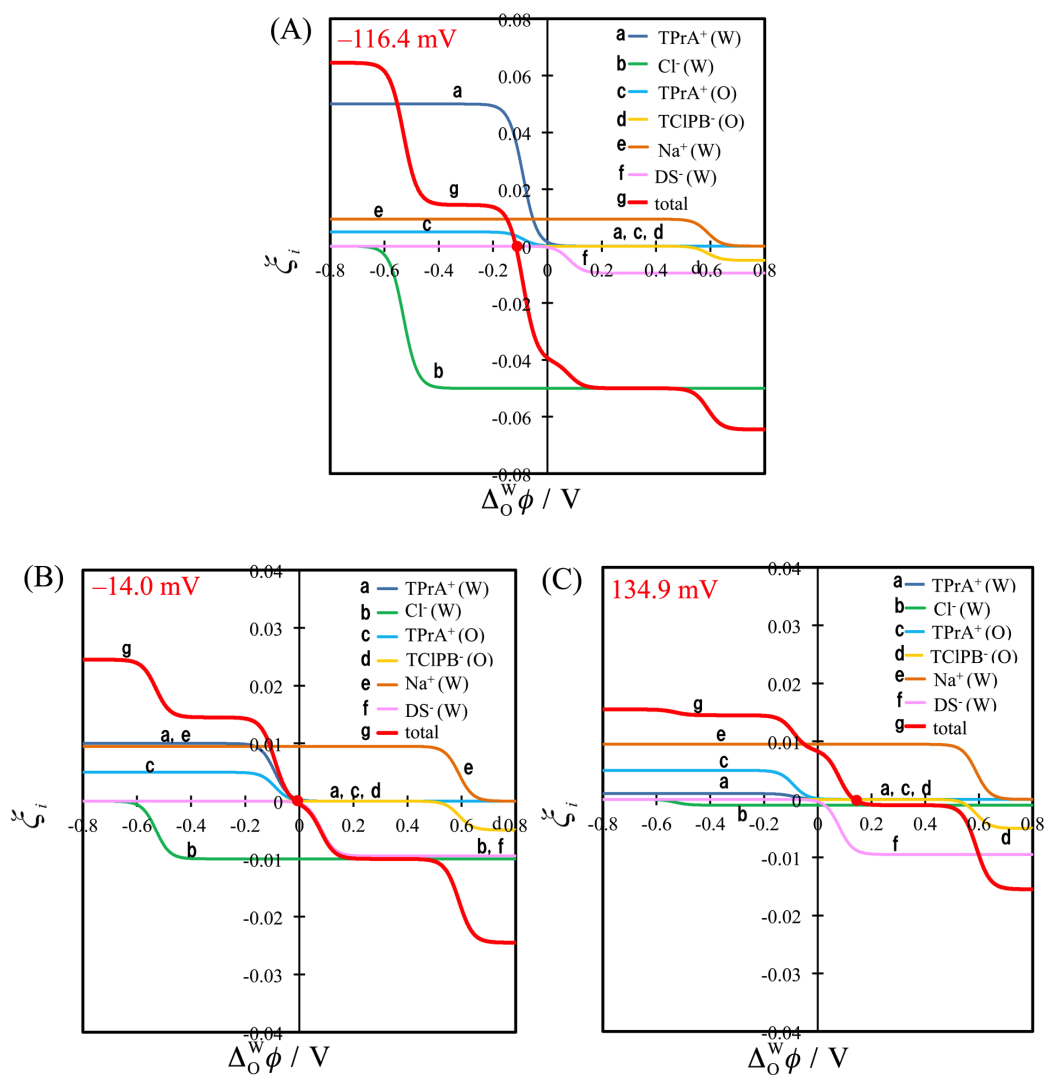


Fig. S2 Dependences of ξ_i^W or ξ_i^O on $\Delta_O^W \phi$ in the TPrA⁺ system (with $r = 1$). [TPrACl] = (A) 50; (B) 10; (C) 1 mM; [TPrATCIPB] = 5 mM; [SDS] = 10 mM (it is assumed that 5% of SDS is adsorbed at the O-droplet surfaces). In each panel, $i =$ (a) TPrA⁺(W), (b) Cl⁻(W), (c) TPrA⁺(O), (d) TCIPB⁻(O), (e) Na⁺(W), (f) DS⁻(W), (g) for all ions, i.e., ξ_{total} being given by Eq. (4); the value of $\Delta_O^W \phi_{\text{eq}}$ is indicated in red at the top left corner.

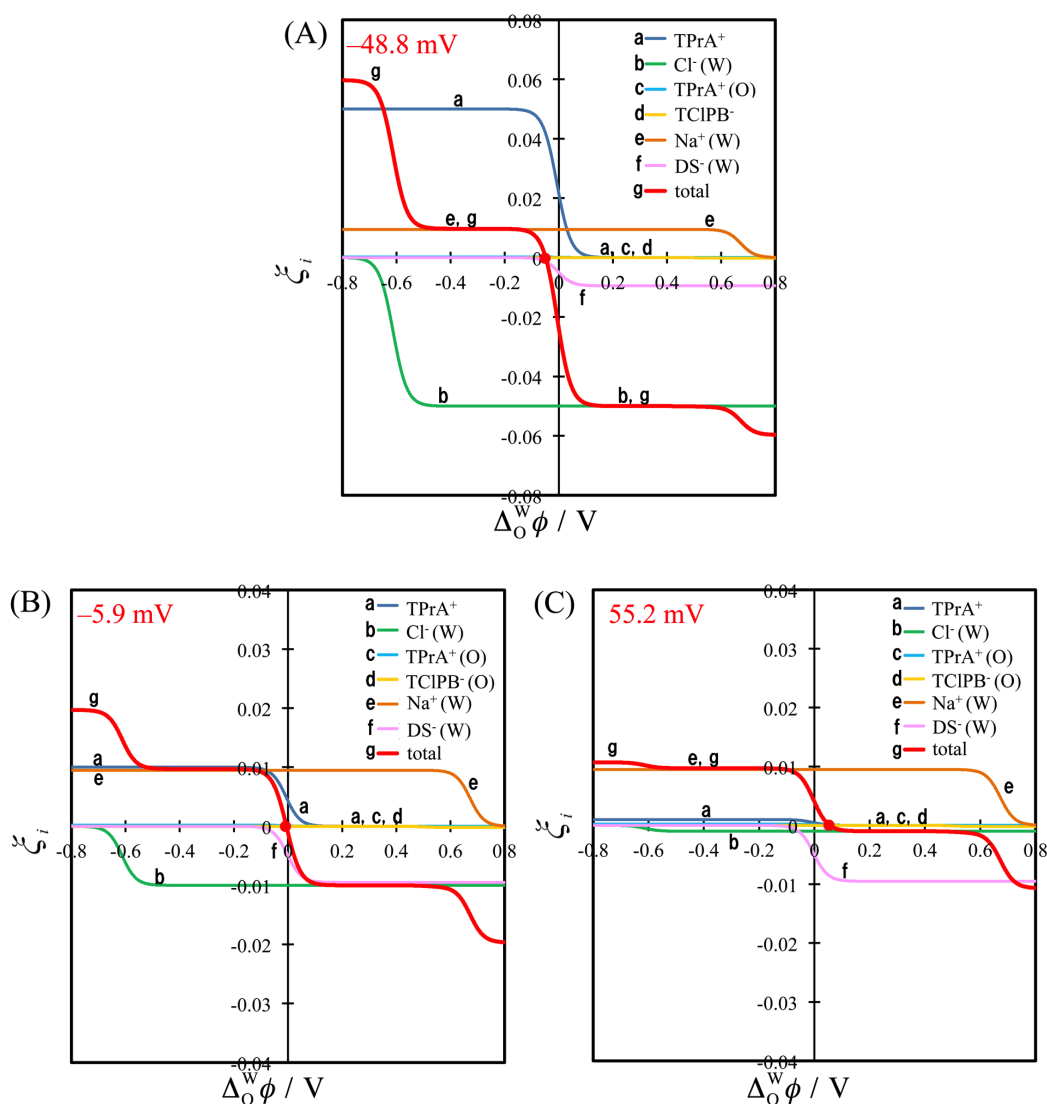


Fig. S3 Dependences of ξ_i^W or ξ_i^O on $\Delta_O^W \phi$ in the TPrA⁺ system (with $r = 0.04$). [TPrA⁺Cl⁻] = (A) 50; (B) 10; (C) 1 mM; [TPrA⁺TCIPB⁻] = 5 mM; [SDS] = 10 mM (it is assumed that 5% of SDS is adsorbed at the O-droplet surfaces). In each panel, $i =$ (a) TPrA⁺ (W), (b) Cl⁻ (W), (c) TPrA⁺ (O), (d) TCIPB⁻ (O), (e) Na⁺ (W), (f) DS⁻ (W), (g) for all ions, i.e., ξ_{total} being given by Eq. (4); the value of $\Delta_O^W \phi_{\text{eq}}$ is indicated in red at the top left corner.

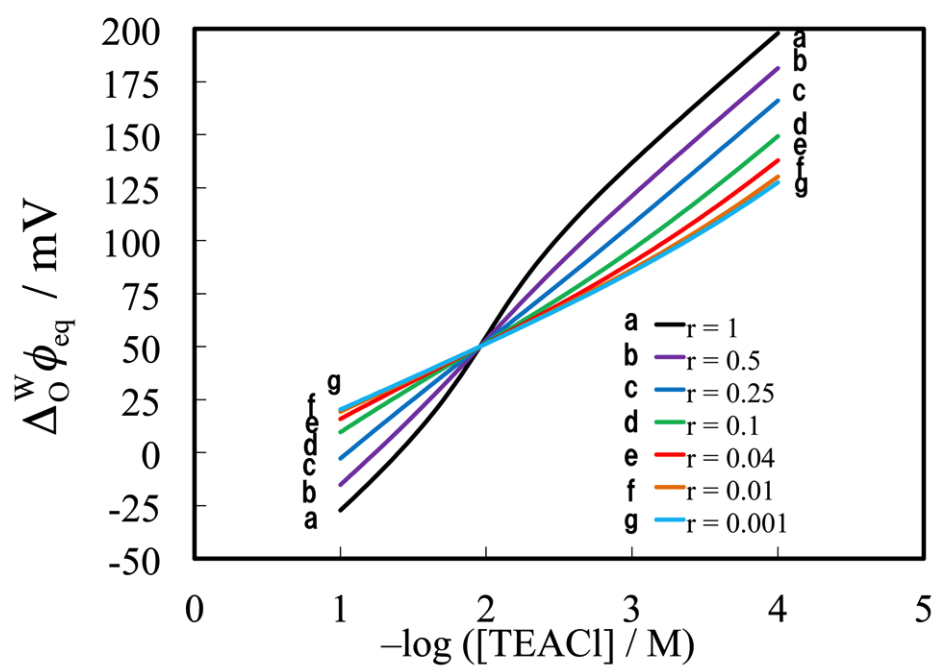


Fig. S4 Change of $\Delta_0^W \phi_{eq}$ with $-\log([TEACl]/M)$ for the TEA^+ system with $[TEACIPB] = 5$ mM and $[SDS] = 10$ mM. $r =$ (a) 1, (b) 0.5, (c) 0.25, (d) 0.1, (e) 0.04, (f) 0.01, (g) 0.001. It is assumed that 5% of SDS is adsorbed at the O-droplet surfaces.

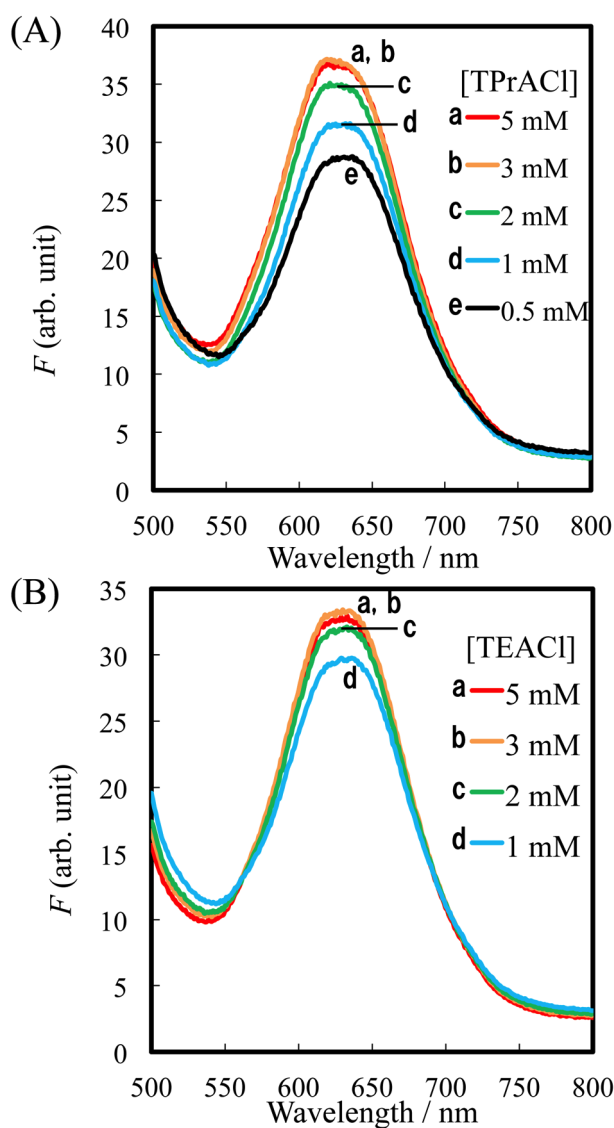


Fig. S5 Fluorescence spectra of O/W emulsions containing only dye **B** (added initially at 30 μ M to DCE). [SDS] = 10 mM; r = 0.040. (A): [TPrATCIPB] = 5.0 mM; [TPrACl] = 0.5, 1.0, 2.0, 3.0, and 5.0 mM; (B): [TEATCIPB] = 5.0 mM; [TEACl] = 0.5, 1.0, 2.0, 3.0, and 5.0 mM. Excitation wavelength = 473 nm.

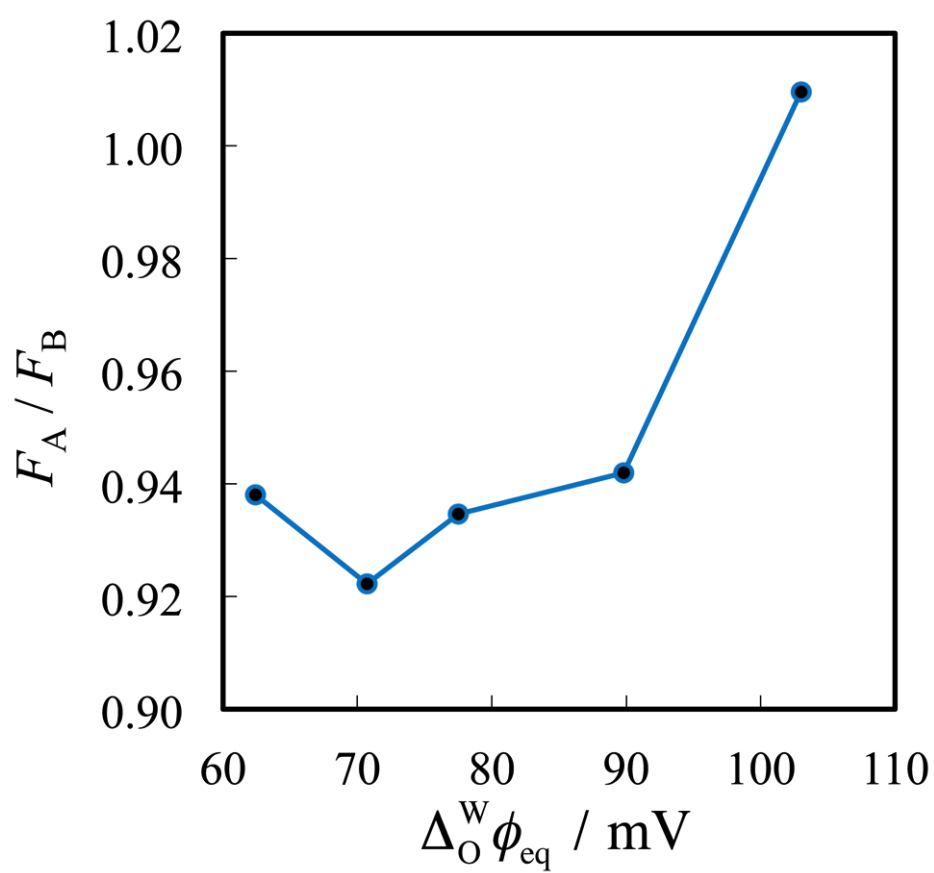


Fig. S6 The F_A/F_B vs. $\Delta_O^W \phi_{eq}$ plot of O/W emulsions containing both dyes **A** and **B** for the TEA^+ system.

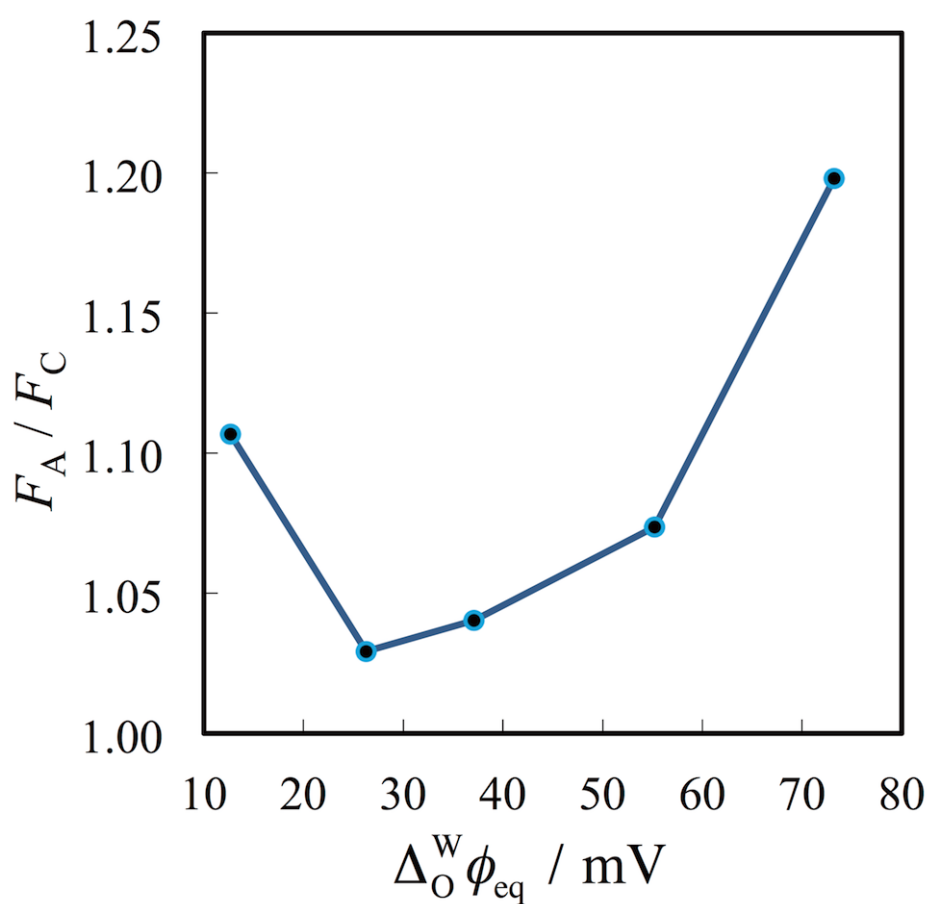


Fig. S7 The $F_{\text{A}}/F_{\text{C}}$ vs. $\Delta_{\text{O}}^{\text{W}} \phi_{\text{eq}}$ plot of O/W emulsions containing both dyes **A** and **C** for the TPrA⁺ system.

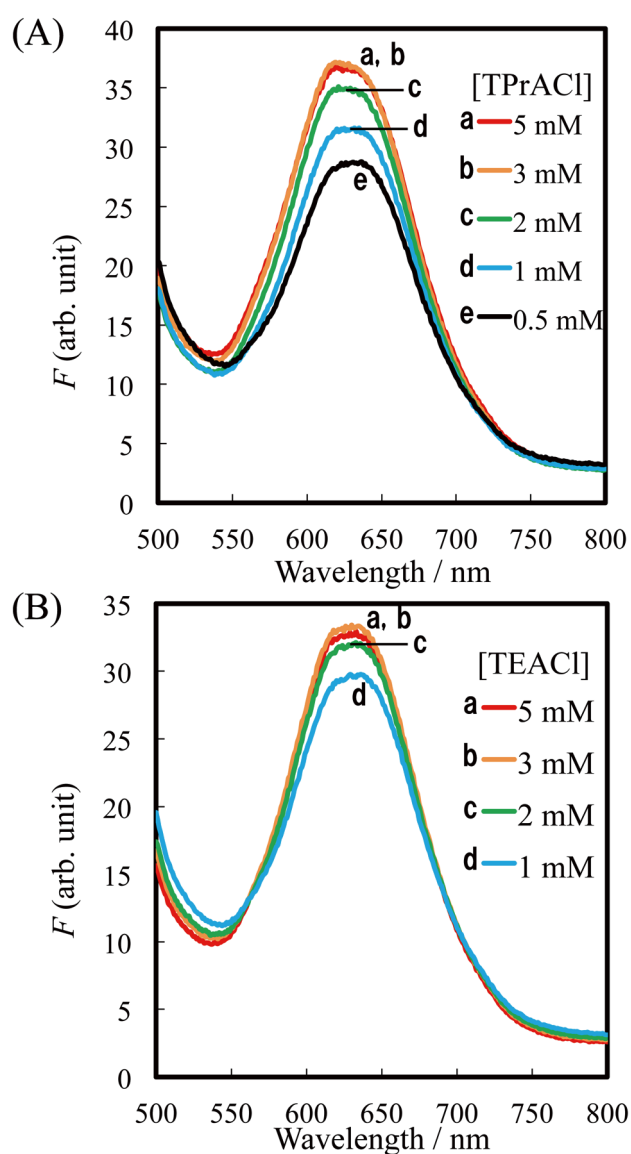


Fig. S8 Fluorescence spectra of O/W emulsions containing only dye C (added initially at $40 \mu\text{M}$ to DCE). $[\text{SDS}] = 10 \text{ mM}$; $r = 0.040$. (A): $[\text{TPrATCIPB}] = 5.0 \text{ mM}$; $[\text{TPrACl}] = 0.5, 1.0, 2.0, 3.0, \text{ and } 5.0 \text{ mM}$; (B): $[\text{TEATCIPB}] = 5.0 \text{ mM}$; $[\text{TEACl}] = 1.0, 2.0, 3.0, \text{ and } 5.0 \text{ mM}$. There is no plot for $[\text{TEACl}] = 0.5 \text{ mM}$, because the O/W emulsion was unstable on this condition. Excitation wavelength = 473 nm .