Electronic Supplementary Material (ESI) for Photochemical & Photobiological Sciences.

Electronic Supplementary Information

Stabilisation of lipid membrane-incorporated porphyrin derivative aqueous solutions and their photodynamic activities

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Table S1. Average hydrodynamic diameter D_{hy} (nm) of LMI**2** determined by dynamic light scattering at 25 °C.

Incubation time /days	Average D_{hy} /nm	PDI[a]
0	92.3	0.100
0.5	90.4	0.109
1	87.4	0.101
2	99.5	0.104
3	94.0	0.077
5	85.2	0.116
7	86.0	0.110

[a]PDI: Polydispersity index.

Table S2. Average hydrodynamic diameter D_{hy} (nm) of LMI**3** determined by dynamic light scattering at 25 °C.

Incubation time /days	Average D_{hy} /nm	PDI[a]
0	89.3	0.129
0.5	99.6	0.099
1	110	0.079
2	95.0	0.129
3	99.2	0.110
5	97.0	0.153
7	96.9	0.198

[a]PDI: Polydispersity index.

Table S3. Average hydrodynamic diameter D_{hy} (nm) of LMI**4** determined by dynamic light scattering at 25 °C.

Incubation time /days	Average D_{hy} /nm	PDI[a]
0	91.6	0.172
0.5	97.1	0.168
1	123	0.175
2	110	0.227
3	90.9	0.298
5	96.2	0.169
7	90.6	0.244

[a]PDI: Polydispersity index.

Table S4. Average hydrodynamic diameter D_{hy} (nm) of LMI**7** determined by dynamic light scattering at 25 °C.

Incubation time /days	Average D_{hy} /nm	PDI[a]
0	91.1	0.132
0.5	89.4	0.105
1	91.7	0.217
2	86.6	0.175
3	95.9	0.099
5	93.9	0.185
7	91.7	0.094

[a]PDI: Polydispersity index.

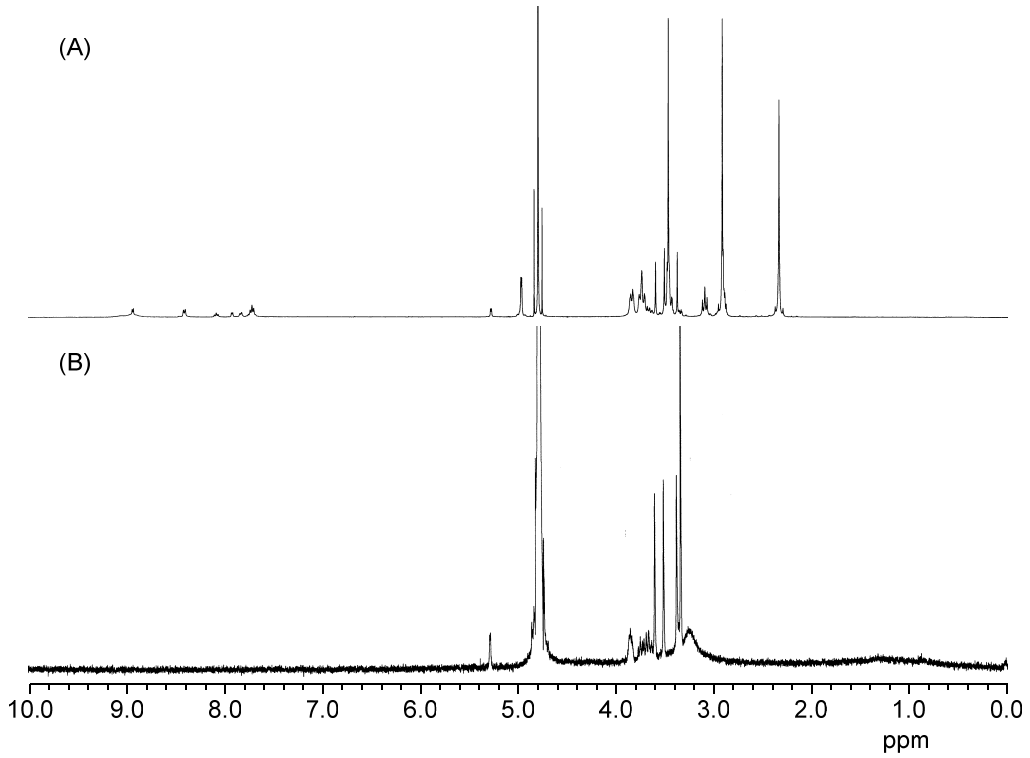

Fig. S1 Complete ^{1}H NMR spectra of the **3**•TMe-β-CDx complexes (A) before and (B) after the addition of DMPC liposomes ([**3**] = 25 μM, [**3**]/[DMPC] = 2.5 mol%).

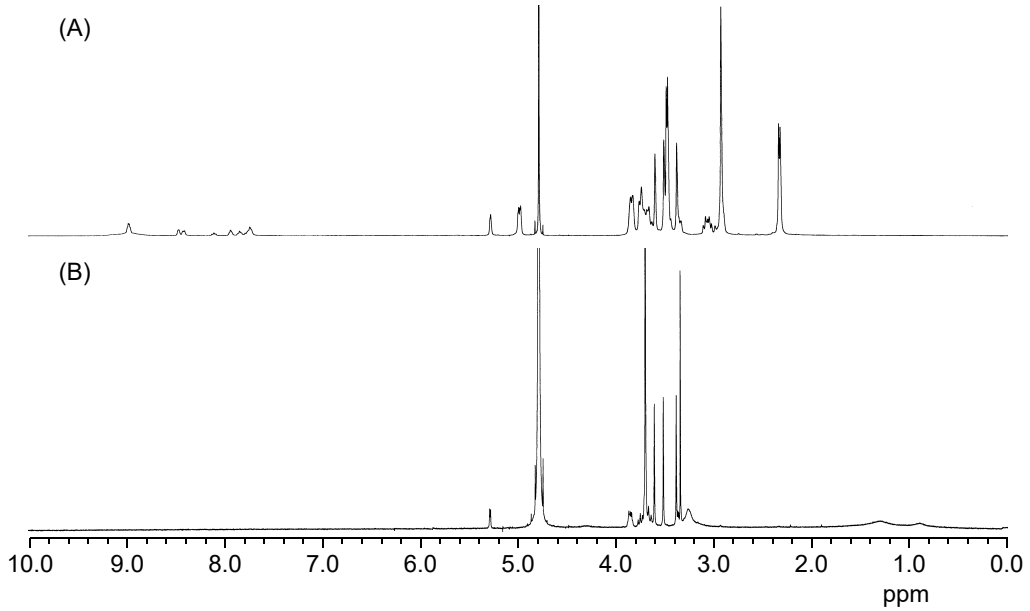

Fig. S2 Complete ^{1}H NMR spectra of the **4**•TMe-β-CDx complexes (A) before and (B) after the addition of DMPC liposomes ([**4**] = 25 μM, [**4**]/[DMPC] = 2.5 mol%).

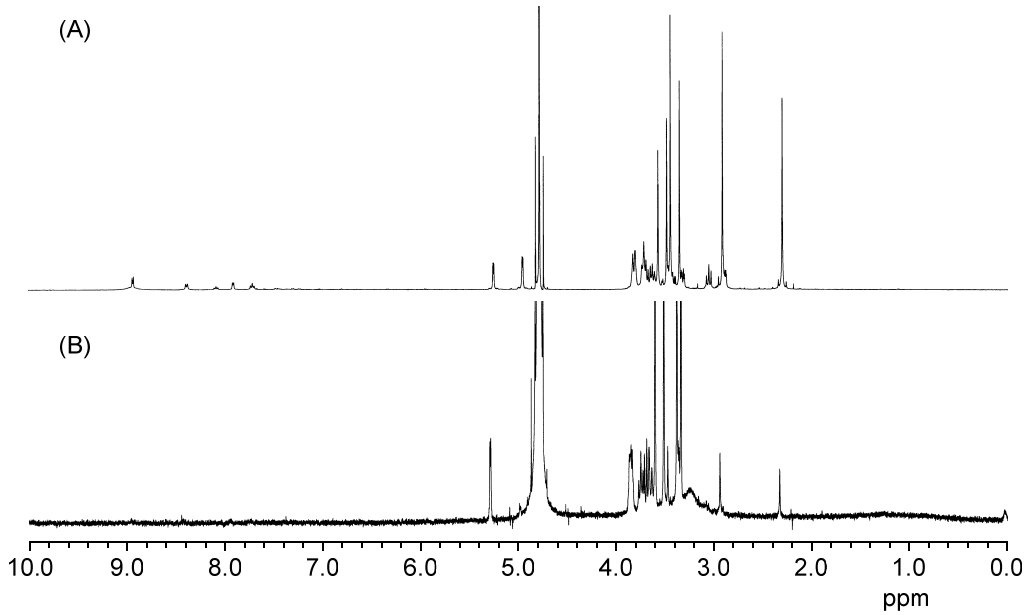

Fig. S3 Complete ^{1}H NMR spectra of the **5**•TMe-β-CDx complexes (A) before and (B) after the addition of DMPC liposomes ([**5**] = 25 μM, [**5**]/[DMPC] = 2.5 mol%).

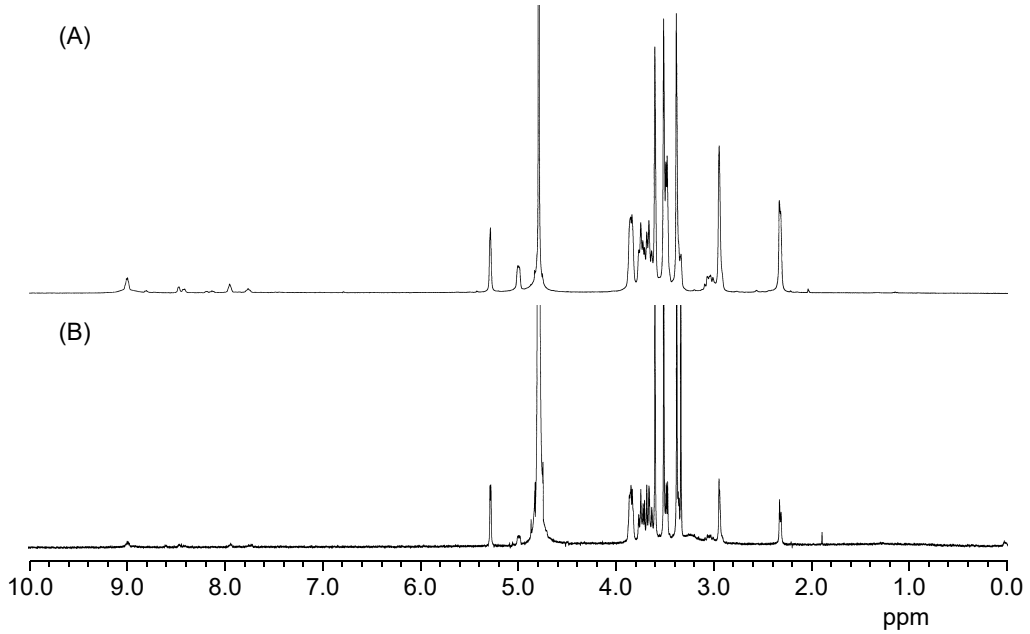

Fig. S4 Complete ^{1}H NMR spectra of the **6**•TMe-β-CDx complexes (A) before and (B) after the addition of DMPC liposomes ([**6**] = 25 μM, [**6**]/[DMPC] = 2.5 mol%).

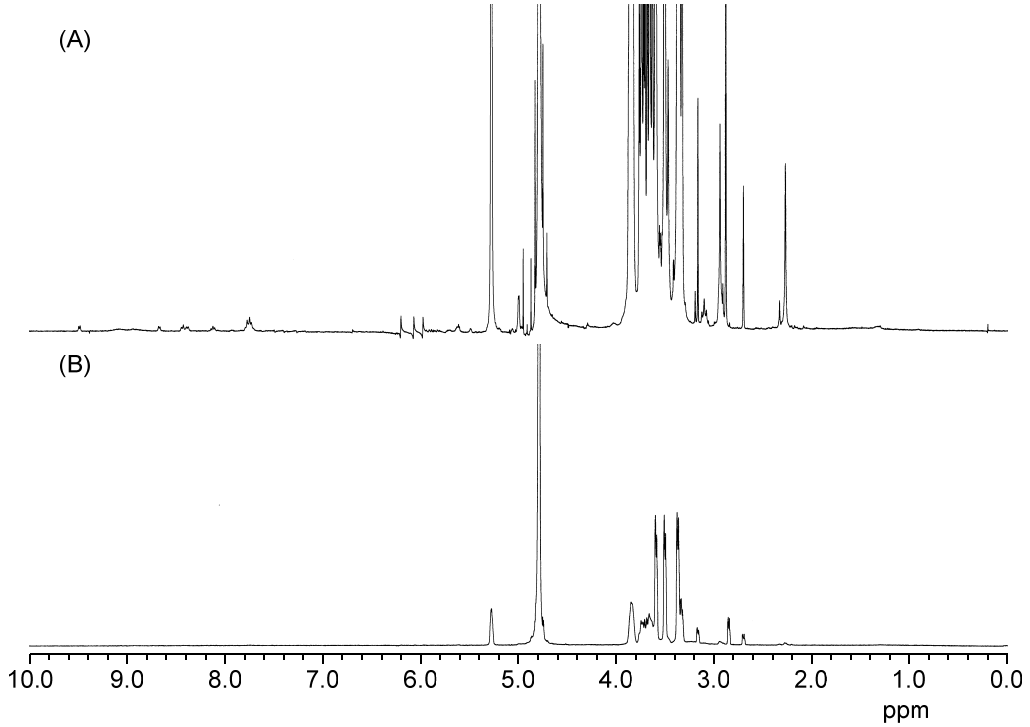

Fig. S5 Complete ^{1}H NMR spectra of the **7**•TMe-β-CDx complexes (A) before and (B) after the addition of DMPC liposomes ([**7**] = 25 μM, [**7**]/[DMPC] = 2.5 mol%).

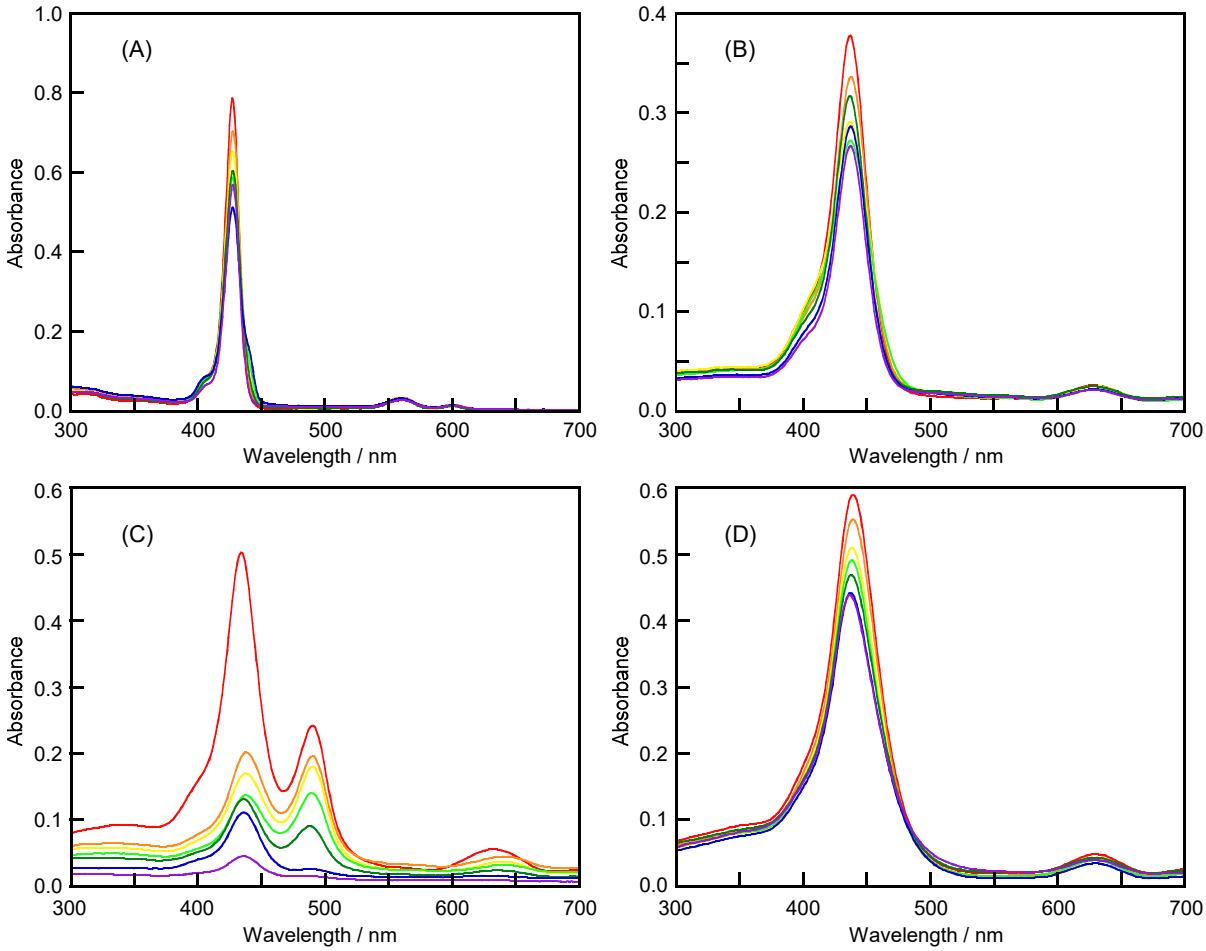

Fig. S6 UV-vis absorption spectra of (A) LMI**2**, (B) LMI**3**, (C) LMI**4** and (D) LMI**7** in aqueous solution kept at ambient temperature with incubation times of 0 (red), 0.5 (orange), 1 (yellow), 2 (light green), 3 (green), 5 (blue) and 7 (purple) days. [**2**, **3**, **4** or **7**]/[DMPC] = 2.5 mol%.

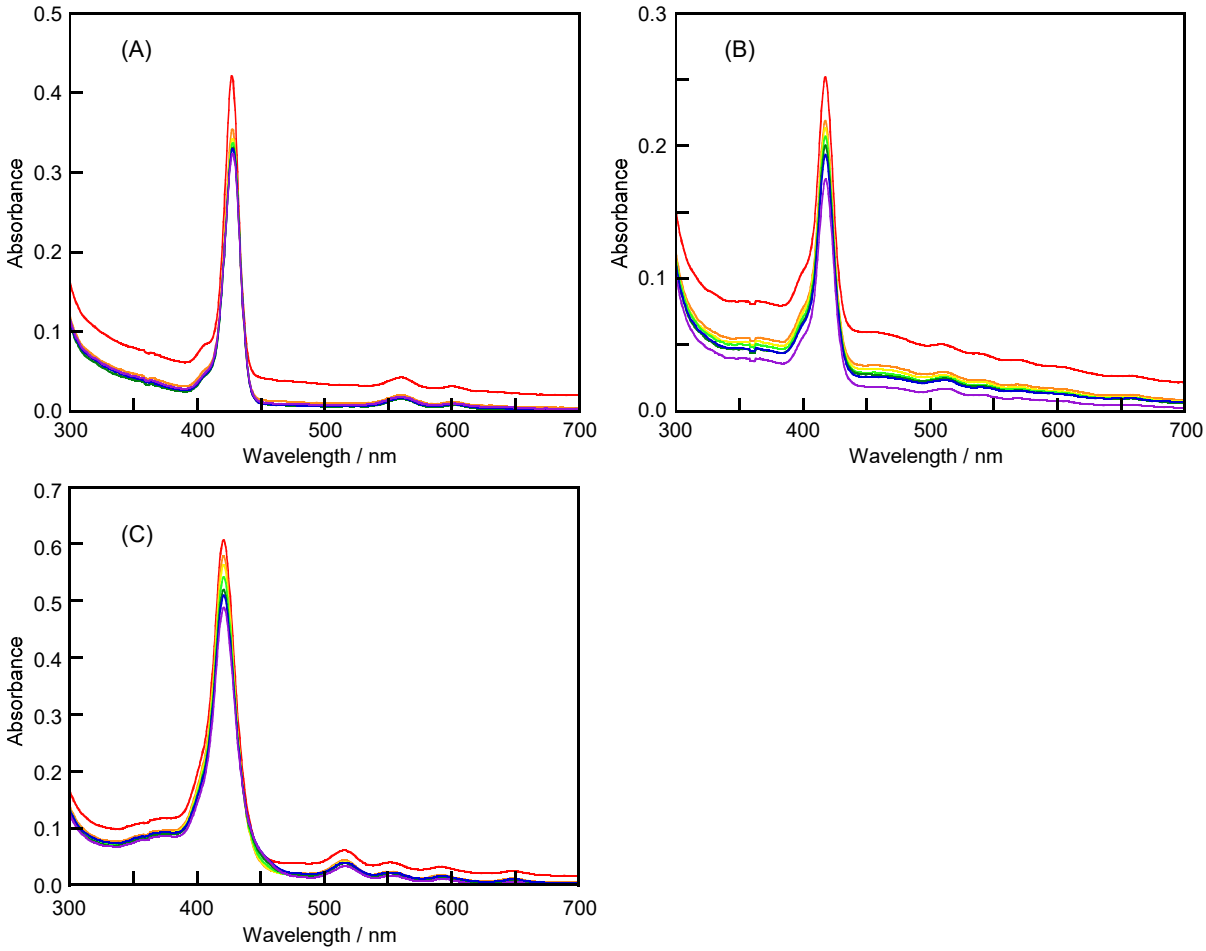

Fig. S7 UV-vis absorption spectra of (A) LMI**2**, (B) LMI**3** and (D) LMI**7** in DMEM containing calf serum kept at ambient temperature with incubation times of 0 (red), 0.5 (orange), 1 (yellow), 2 (light green), 3 (green), 5 (blue) and 7 (purple) days. [**2**, **3**, **4** or **7**]/[DMPC] = 2.5 mol%.

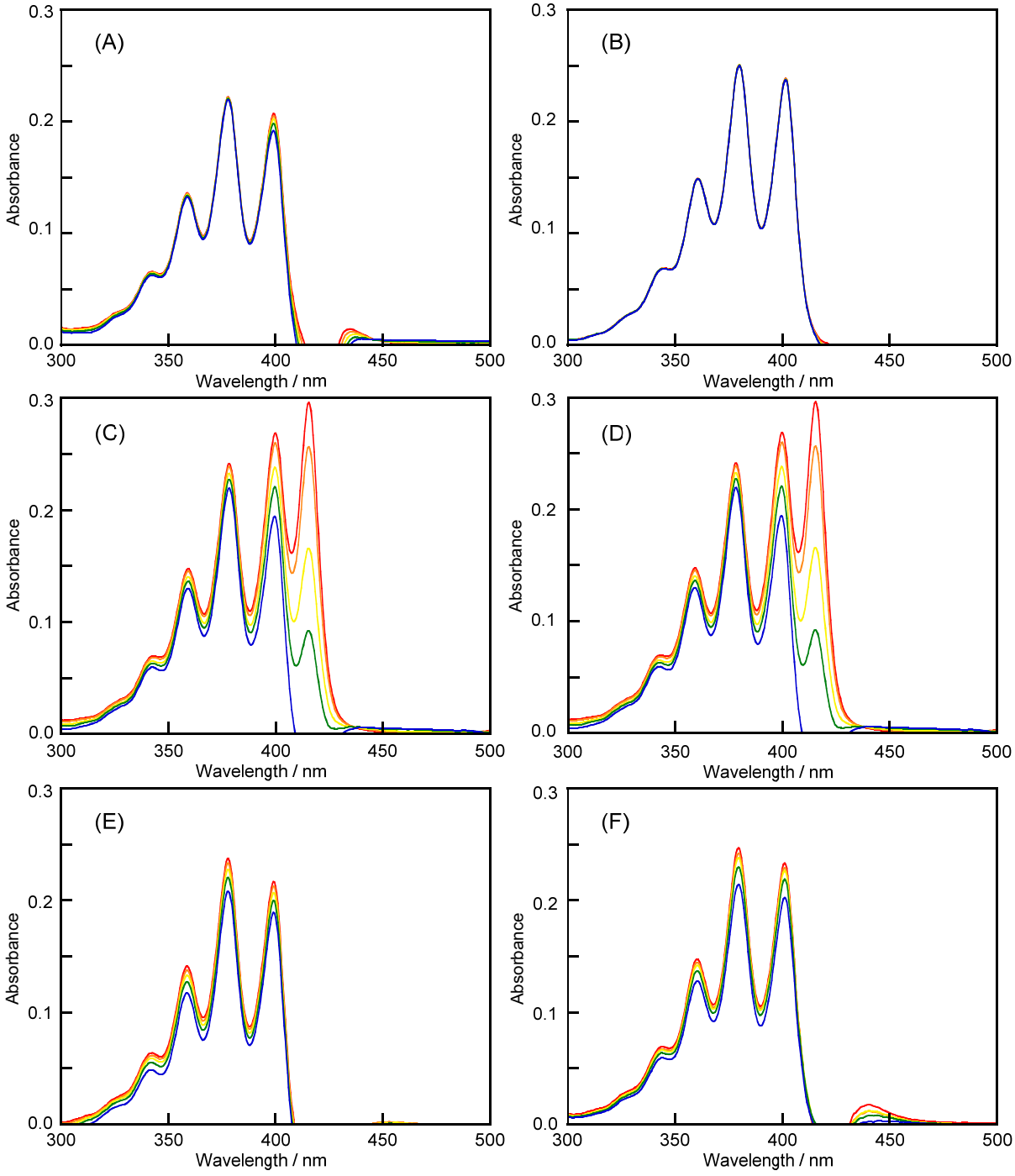

Fig. S8 UV-vis absorption spectral change of ABDA in the presence of the (A, C, E) TMe-β-CDx-complexed with (A) **2**, (C) **3**, and (E) **7** and (B, D, F) liposome-incorporated (B) **2**, (D) **3** and (F) **7** after photoirradiation at a wavelength greater than 620 nm for 0 (red), 5 (orange), 15 (yellow), 30 (green), and 60 (blue) min. These absorption spectra were obtained by subtracting the absorption spectra of the TMe-β-CDx-complexed with **2**, **3** or **7** or liposome-incorporated **2**, **3** or **7** and were measured at 25 °C (1 cm cell).

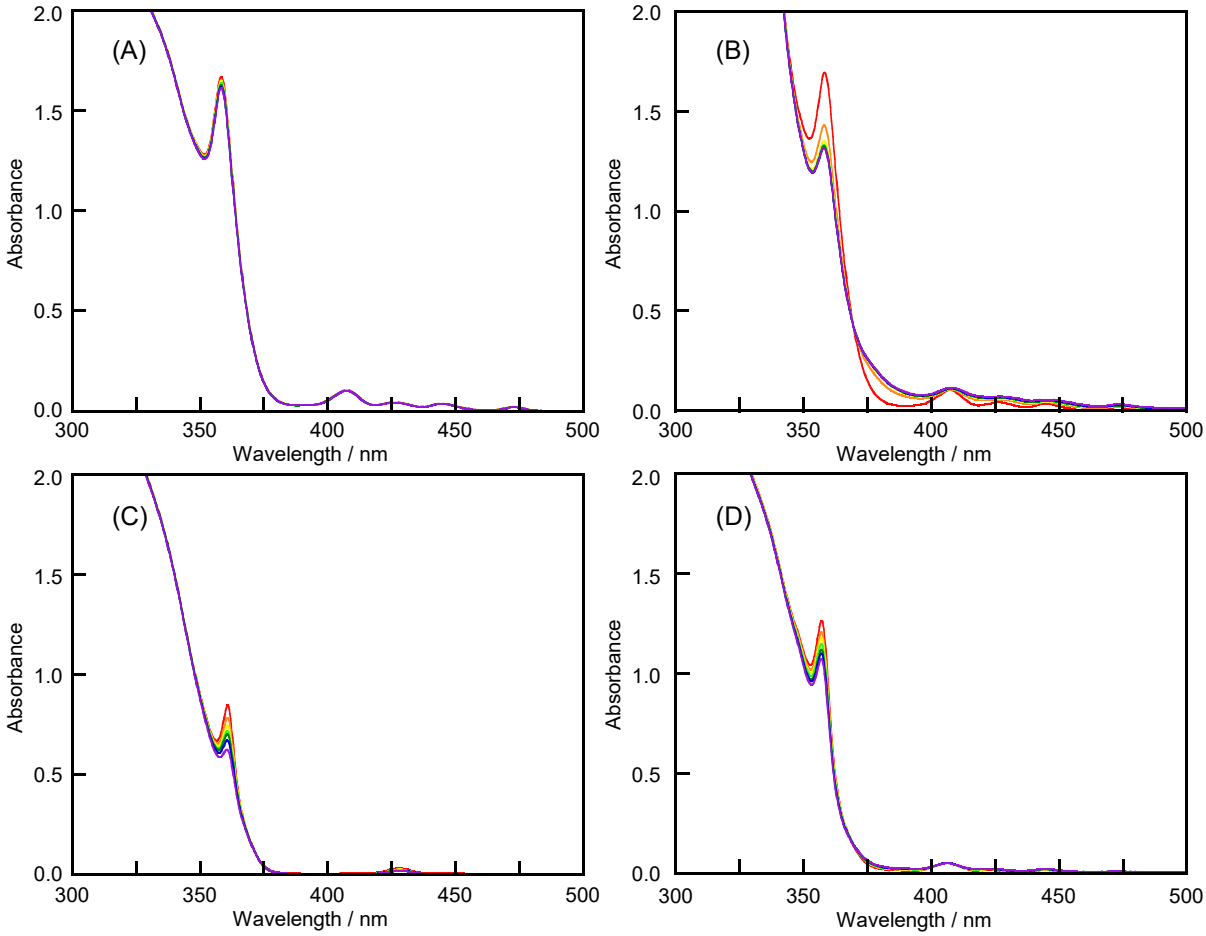

Fig. S9 UV-vis absorption spectral change of NBT in the presence of the TMe-β-CDx-complexed with (A) **2**, (B) **3**, and (C) **7** without NADH and (D) **7** with NADH after photoirradiation at a wavelength greater than 620 nm for 0 (red), 10 (orange), 20 (yellow), 30 (yellow green), 40 (green), 50 (blue), and 60 (purple) min. These absorption spectra were were measured at 25 °C (1 cm cell).

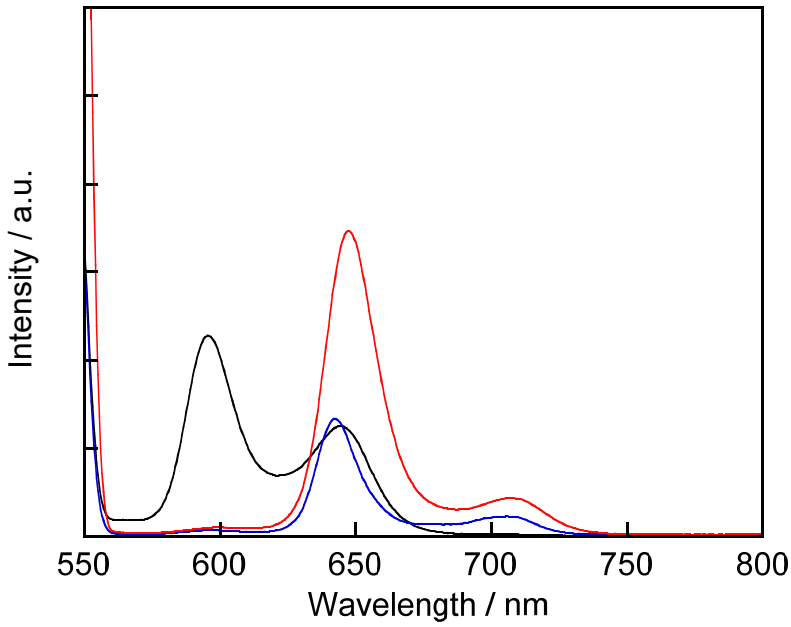

Fig. S10 Fluorescence spectra of LMI**2** (black line), LMI**3** (blue line) and LMI**7** (red line) in water with excitation at 540 nm ([**2**, **3**, **4** or **7**] = 2.5 μM, [**2**, **3**, **4** or **7**]/[DMPC] = 2.5 mol%).

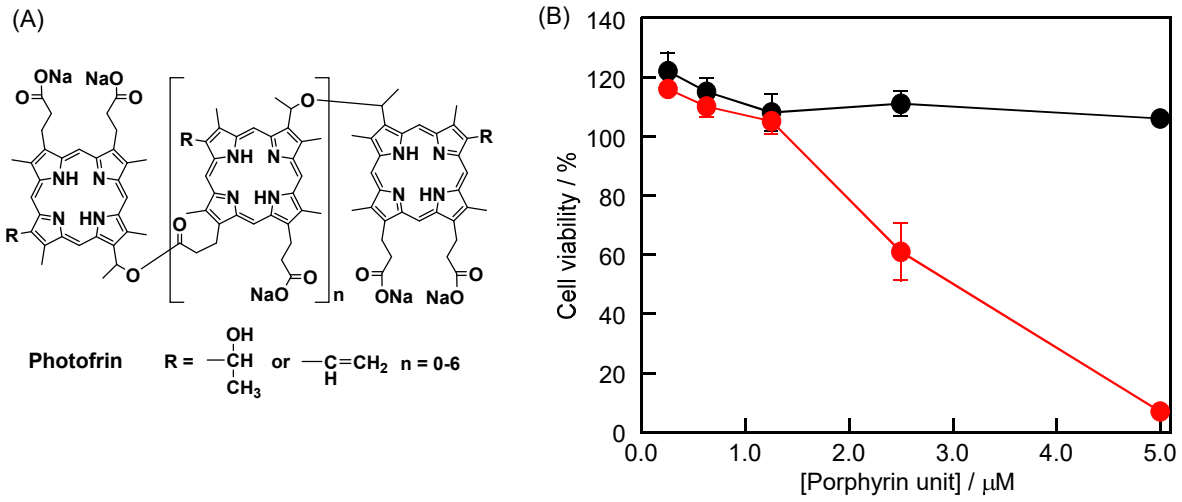

Fig. S11 (A) Structure of photofrin and (B) the cytotoxicity of photofrin in the absence (black) and presence (red) of light irradiation (610–740 nm, 30 min). Cell viability was evaluated according to the WST-8 method. These experiments were carried out under the same conditions of Fig. 6. Each value represents the mean ± standard deviation (SD) of three experiments (*n* = 3).