Supplementary Information

Analytical data of SiPc oligomers

(a) SiPc dimer, $HO(SiPcO)_2H$:

Anal. Calcd for $C_{96}H_{98}N_{16}O_3Si_2$: C, 72.97; H, 6.25; N, 14.18. Found: C, 73.95; H, 6.75; N, 13.19. MALDI-TOF-mass m/z = 1579.1 (M^+), UV-vis (Toluene) λ/nm (logε) 639.5 (5.5), 342.0 (5.1)

(b) SiPc trimer, $HO(SiPcO)_3H$:

Anal. Calcd for $C_{144}H_{146}N_{24}O_4Si_3$: C, 73.25; H, 6.23; N, 14.24. Found: C, 73.32; H, 6.65; N, 13.24(4). MALDI-TOF-mass m/z = 2359.6 (M^+), UV-vis (Toluene) λ/nm (logε) 626.5 (5.5), 335.5 (5.4)

(c) SiPc tetramer, $HO(SiPcO)_4H$:

Anal. Calcd for $C_{192}H_{194}N_{32}O_5Si_4$: C, 73.39; H, 6.22; N, 14.26. Found: C, 74.06; H, 6.27; N, 13.32. MALDI-TOF-mass m/z = 3139.1 (M^+), UV-vis (Toluene) λ/nm (logε) 621.5 (5.6), 330.5 (5.3)

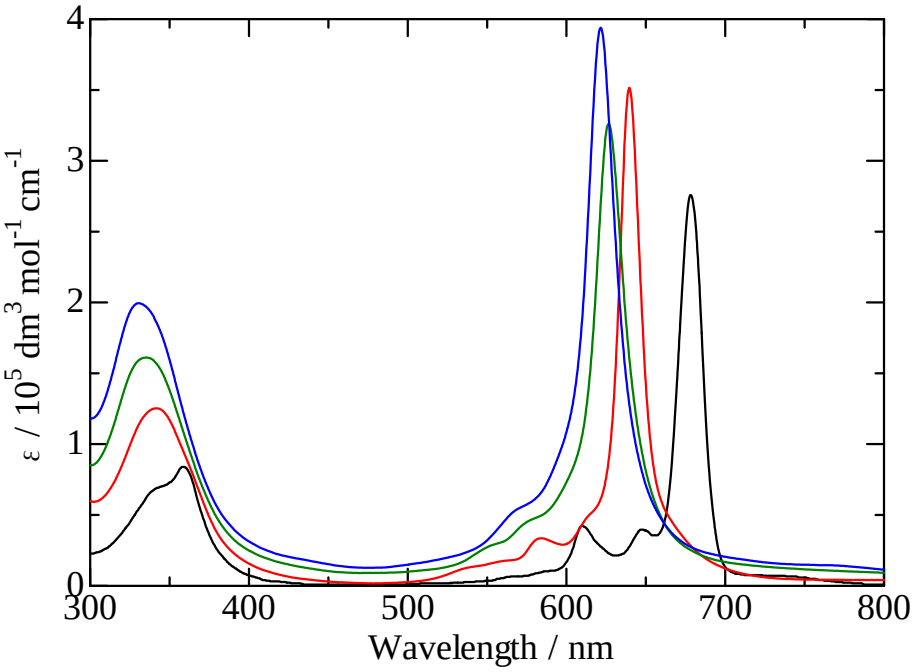

Fig. S1 Ground-state absorption spectra of SiPc oligomers (dimer: red line, trimer: green line, tetramer: blue line) in toluene in addition to a spectrum of the corresponding monomer (black line). The Q band peak (monomer: 678 nm, dimer: 639.5 nm, trimer: 626.5 nm, tetramer: 621.5 nm) shifts to the blue-side with increasing the number of SiPc units, which is explained by the exciton interaction. The ε values of the Soret and Q band increase due to oligomerization reflecting an increase in the number of SiPc units, whereas the ε value of the Q band is slightly smaller in the trimer than the dimer because of the broad bandwidth of the trimer.

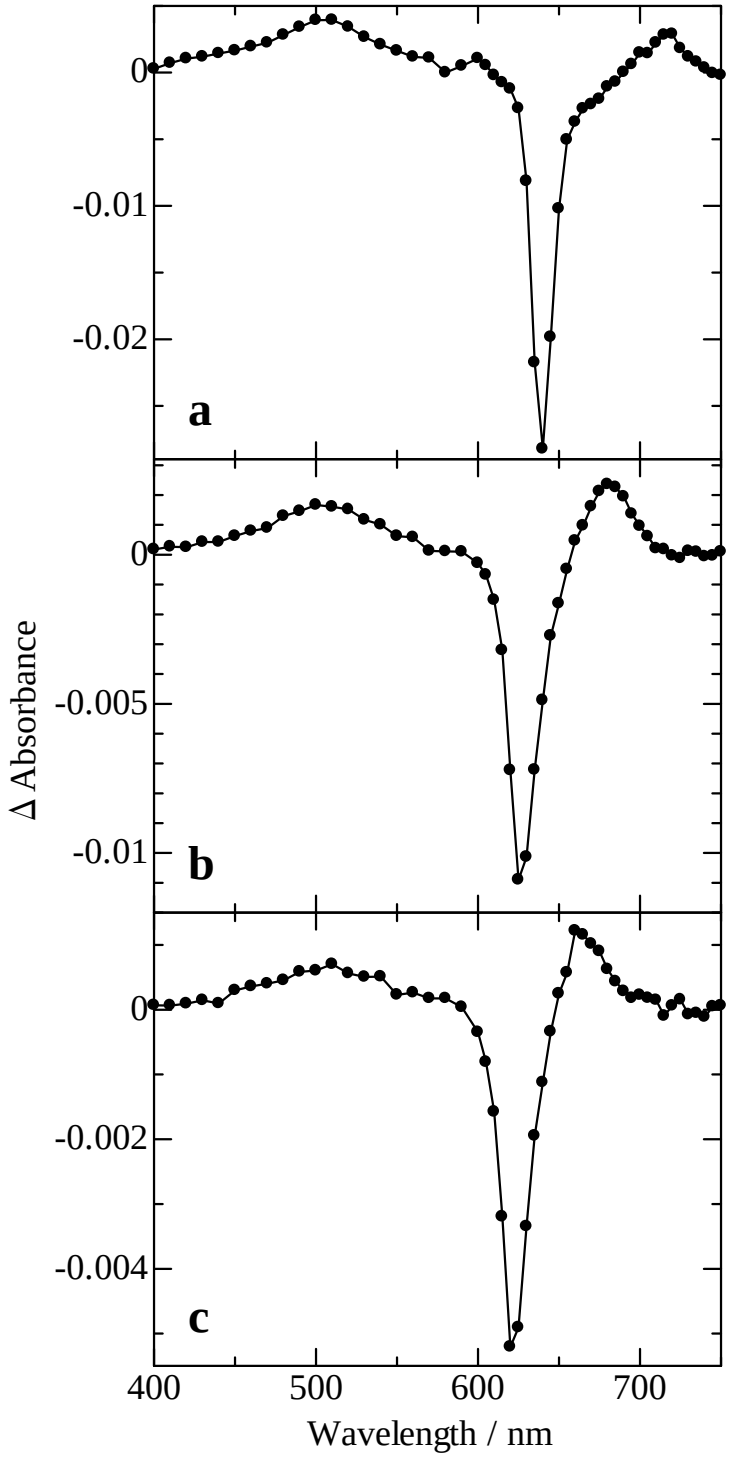

Fig. S2 Transient difference absorption spectra of SiPc oligomers (**a**: dimer, **b**: trimer, **c**: tetramer) in toluene.

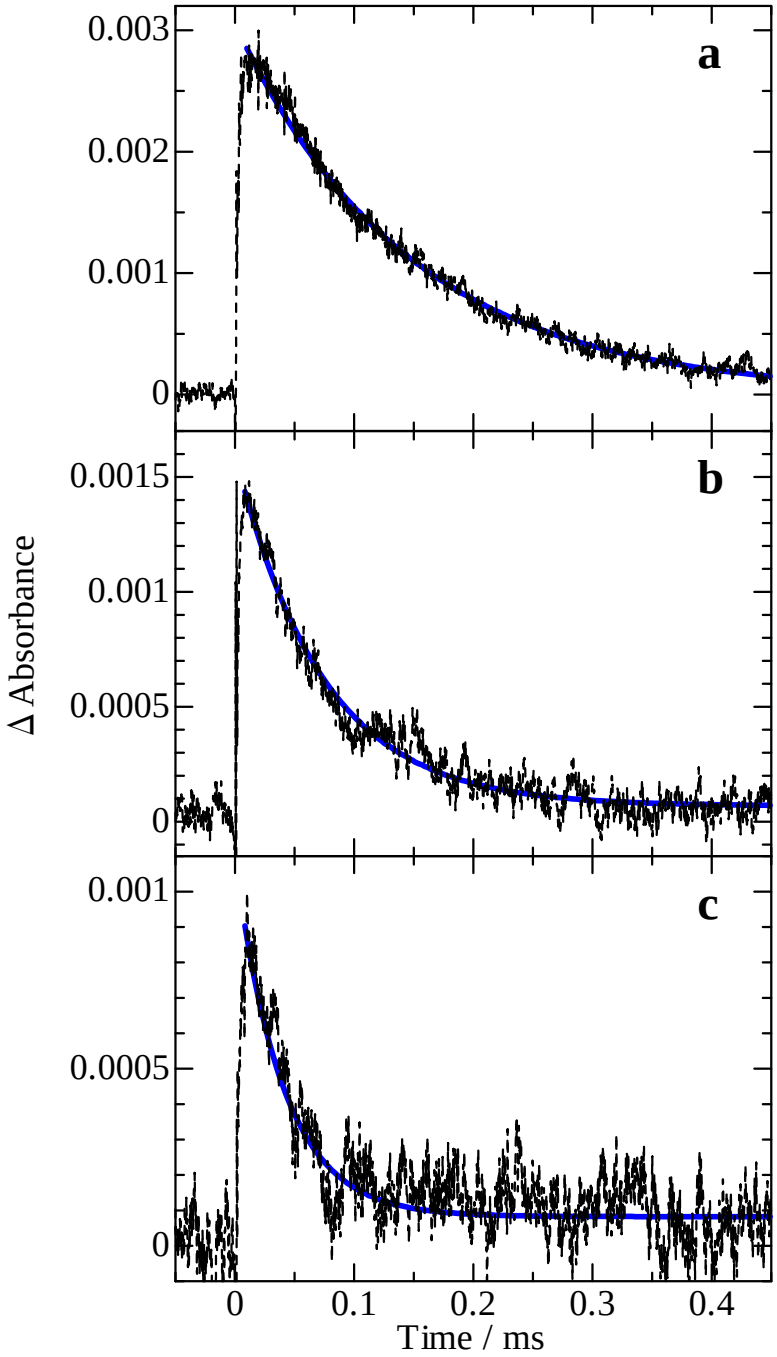

Fig. S3 Time-profiles of transient absorption signals of the dimer (**a**), trimer (**c**), and tetramer (**d**), respectively. The T_1 lifetime decreases in the order monomer (500 μs) > dimer (150 μs) > trimer (73 μs) > tetramer (40 μs).

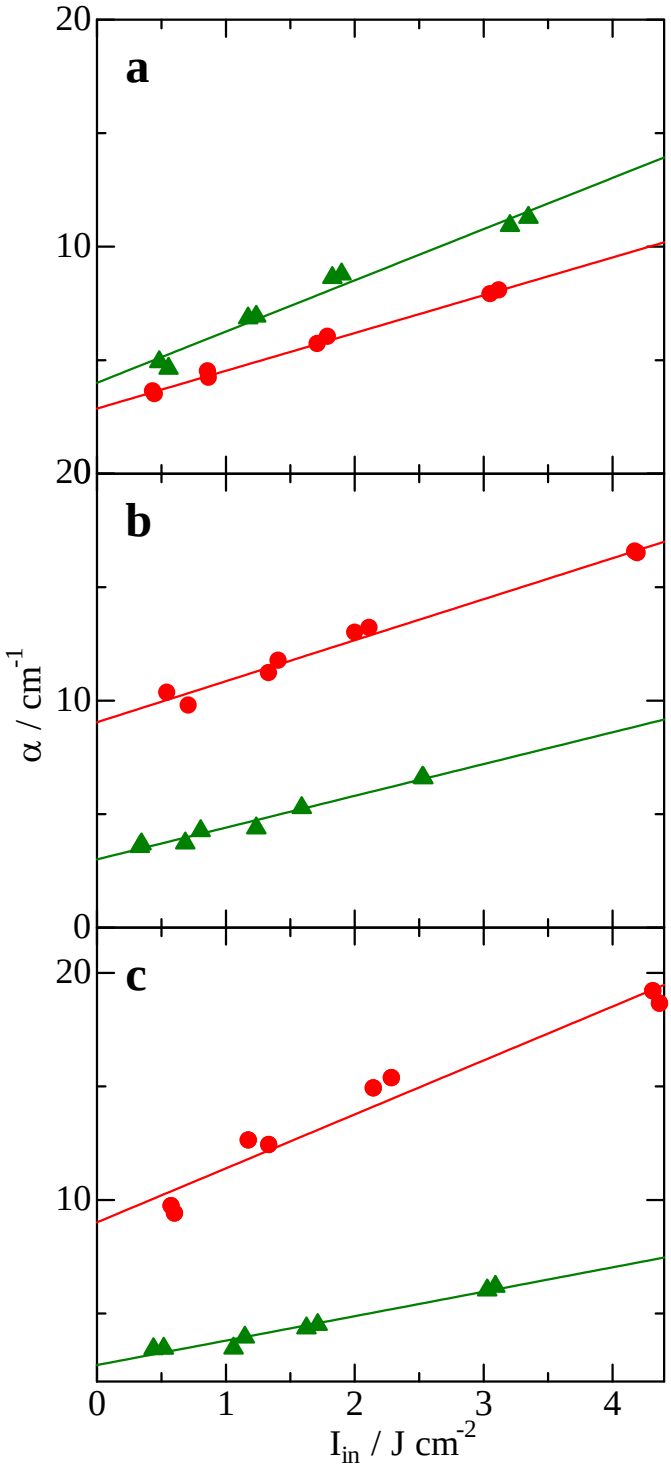

Fig. S4 Relationships between the incident light (I_{in}) and α (= $\alpha_0 + \beta I_{in}$) at 532 nm (▲) and for the excited-state Q band (●: 720nm, 670nm, and 660nm for the dimer, trimer, and tetramer, respectively). The linear (α_0) and non-linear absorption (β) coefficients were evaluated from the gradients and y-intercepts in these figures, respectively.