# Electronic Supplementary Information (ESI) for

# Effect of Co-Sensitization Sequence on the Performance of Dye-Sensitized Solar Cells with Porphyrin and Organic Dyes

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**Table S1.** Fluorescence lifetimes of **FNE57**, **FNE59** and **FNE46** in a THF solution and adsorbed on a nanocrystalline $TiO_2$ film, respectively.

| Dye | Lifetime/ns |
|---|---|
| **FNE57** in THF solution / on $TiO_2$ film | 1.08 / 0.18 |
| **FNE59** in THF solution / on $TiO_2$ film | 0.96 / 0.18 |
| **FNE46** in THF solution / on $TiO_2$ film | 0.45 / 0.29 |

**Table S2.** Photovoltaic parameters of the cocktail-type DSSCs fabricated with the sensitizers FNE46 and FNE59 with different molar ratios

| Molar ratio of FNE46/FNE59 | $V_{oc}$/mV | $J_{sc}$/mA cm$^{-2}$ | *FF* | *PCE*/% |
|---|---|---|---|---|
| 1/0 | 661 ± 3 | 15.99 ± 0.21 | 0.65 ± 0.02 | 6.87 ± 0.05 |
| 3.5/1 | 671 ± 6 | 16.32 ± 0.15 | 0.69 ± 0.01 | 7.56 ± 0.11 |
| 2/1 | 679 ± 5 | 16.06 ± 0.27 | 0.68 ± 0.01 | 7.42 ± 0.08 |
| 1/1 | 679 ± 4 | 15.24 ± 0.18 | 0.70 ± 0.01 | 7.24 ± 0.09 |
| 0/1 | 703 ± 8 | 12.06 ± 0.22 | 0.71 ± 0.01 | 6.02 ± 0.12 |

**Table S3.** Absorbed amounts of dye molecules on $TiO_2$ dipped in various dye baths

| Dye | Adsorbed amount of porphyrin (mol cm$^{-2}$) | Adsorbed amount of organic dye (mol cm$^{-2}$) | Total adsorbed amount (mol cm$^{-2}$) |
|---|---|---|---|
| 18 h in **FNE57** | $1.48 \times 10^{-7}$ | / | $1.48 \times 10^{-7}$ |
| 18 h in **FNE59** | $1.23 \times 10^{-7}$ | / | $1.23 \times 10^{-7}$ |
| 18 h in **FNE46** | / | $1.62 \times 10^{-7}$ | $1.62 \times 10^{-7}$ |
| 6 h in **FNE57** + 12 h in **FNE46** | $3.53 \times 10^{-8}$ | $1.18 \times 10^{-7}$ | $1.53 \times 10^{-7}$ |
| **A** (6 h in **FNE59** + 12 h in **FNE46)** | $2.77 \times 10^{-8}$ | $1.13 \times 10^{-7}$ | $1.41 \times 10^{-7}$ |
| **B** (12 h in **FNE46** + 6 h in **FNE59)** | $1.96 \times 10^{-8}$ | $1.19 \times 10^{-7}$ | $1.39 \times 10^{-7}$ |
| **C** [12 h in (**FNE46** + **FNE59**, 3.5:1)] | $1.78 \times 10^{-8}$ | $8.97 \times 10^{-8}$ | $1.08 \times 10^{-7}$ |

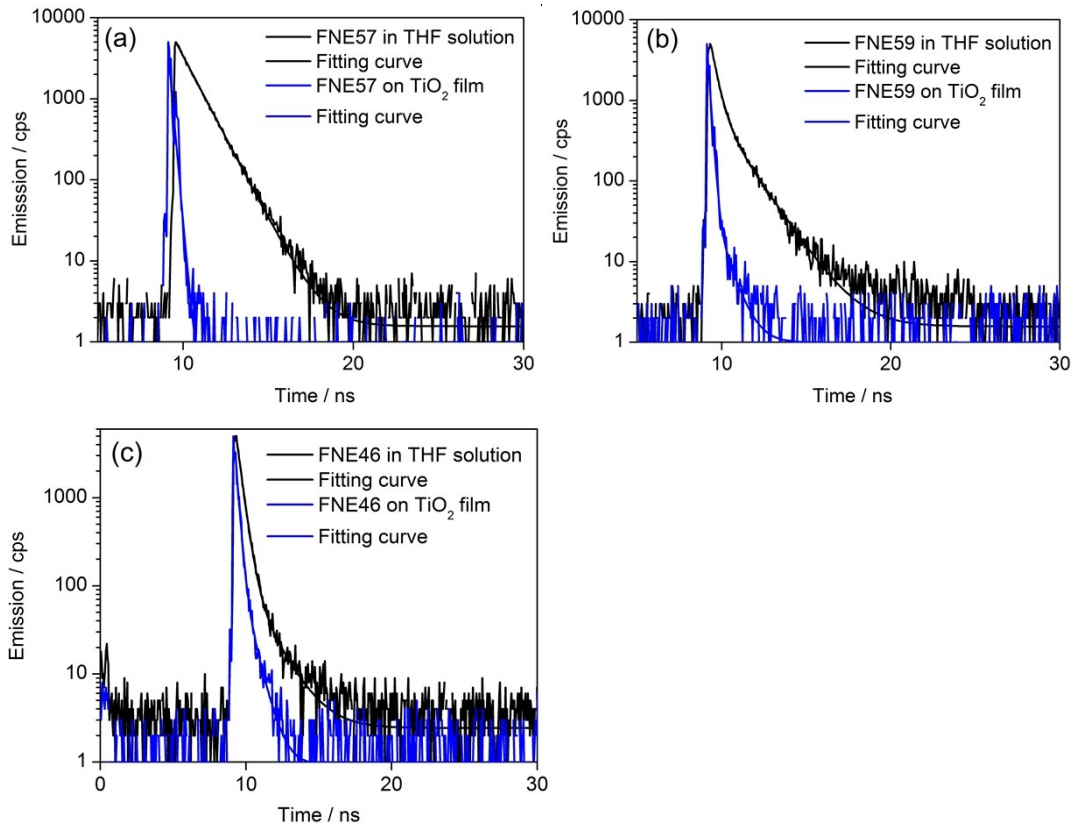


**Figure S1.** Time-resolved luminescence of FNE46, FNE57, and FNE59 in THF solution and adsorbed on a nanocrystalline $TiO_2$ film.

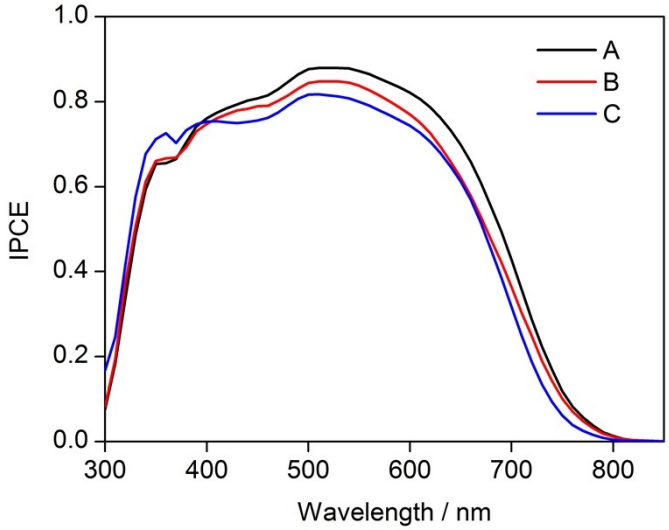


**Figure S2.** IPCE action spectra of devices **A**, **B**, and **C**.