Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Comparison of the photocatalytic activity of novel hybrid photocatalysts based on phthalocyanines, subphthalocyanines and porphyrins immobilized onto nanoporous gold

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ESI-1 Determination of immobilized photosensitizer on npAu:

For the determination of the quantity of immobilized photosensitizer, 10 mg of the as prepared hybrid material was dissolved in ultra pure *aqua regia* (2 mL) and subjected to ICP-MS measurements. The quantities of the immobilized photosensitzers were then calculated from the concentrations of the central ion (Zn or B, Table S1) determined by ICP-MS. From the obtained amounts, the fractions of irradiated photosensitizer were calculated according to a literature procedure based on the penetration depth of visible light into the npAu material of 300 nm (Table S1).[1]

The amounts of irradiated photosensitzer were used for further quantification of the photocatalytic activites by calculation of the corresponding turnover numbers (TON, [converted DPF] (mol) / [irradiated photosensitizer] (mol)) and turnover frequencies (TOF, slope of the plot TON vs. reaction time (min^{-1})).

Table. S1: Overview over the different hybrid systems prepared by immobilization of the photosensitizer onto npAu. Hybrid – abbreviation used in the text for the corresponding hybrid system, $Sensitizer_{npAu}$ – immobilized sensitizer content given as µg/g hybrid catalyst as determined by ICP-MS measurements, and $Sensitizer_{Irr.}$ – determined photosensitizer amount immobilized on npAu and irradiated during the photocatalytic measurements.

Hybrid (Sensitizer on npAu):	**H1** (ZnPc-3)	**H2** (ZnPc-6)	**H3** (ZnTPP-3)	**H6** (ZnTPP-6)	**H7** (BsubPc-3)	**H8** (BsubPc-6)	**H9** (BsubPc-11)
$Sensitizer_{npAu}$ [µg/g]:	165.9	156.7	100.7	117.6	601.1	406.2	394.3
$Sensitizer_{Irr.}$ [mol]:	1.5×10^{-10}	1.4×10^{-10}	1.0×10^{-10}	1.1×10^{-10}	5.5×10^{-10}	3.7×10^{-10}	3.6×10^{-10}

ESI-2 Supplementary data for the photooxidation of DPF with ZnPc-3

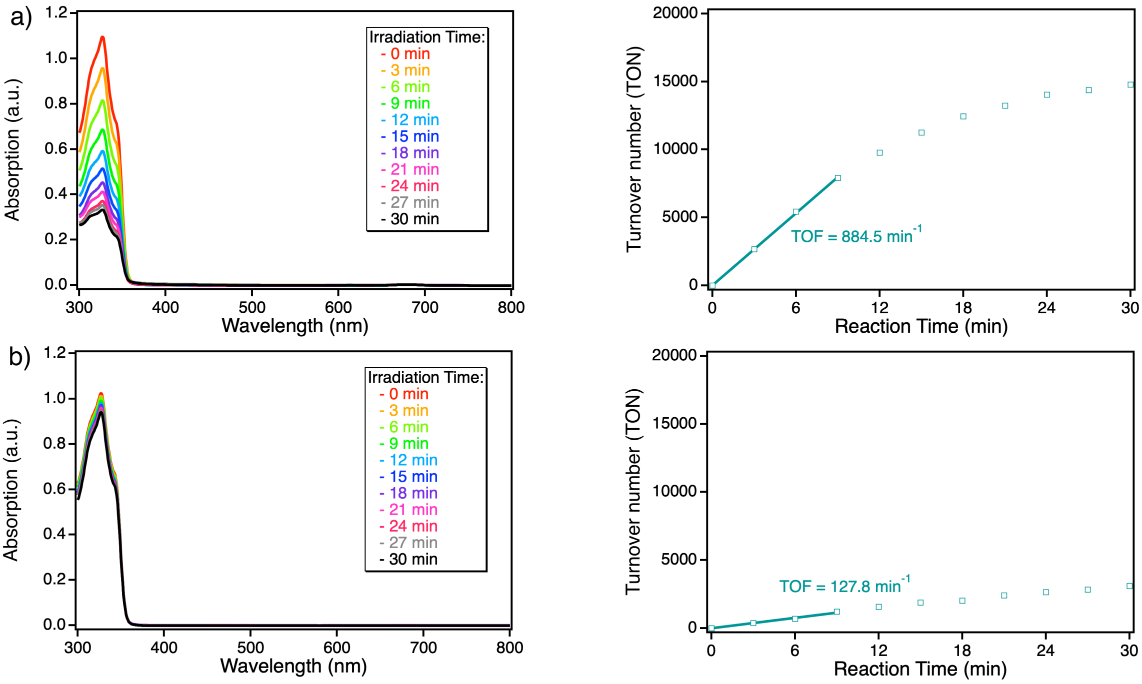

Fig. S1: UV-Vis spectra for the photooxidation of DPF with (a) **H1** as hybrid photocatalyst or (b) the photosensitizer ZnPc-3 (**1**, 1x10^{-10} mol) in solution.

ESI-3 Supplementary data for the photooxidation of DPF with ZnPc-6

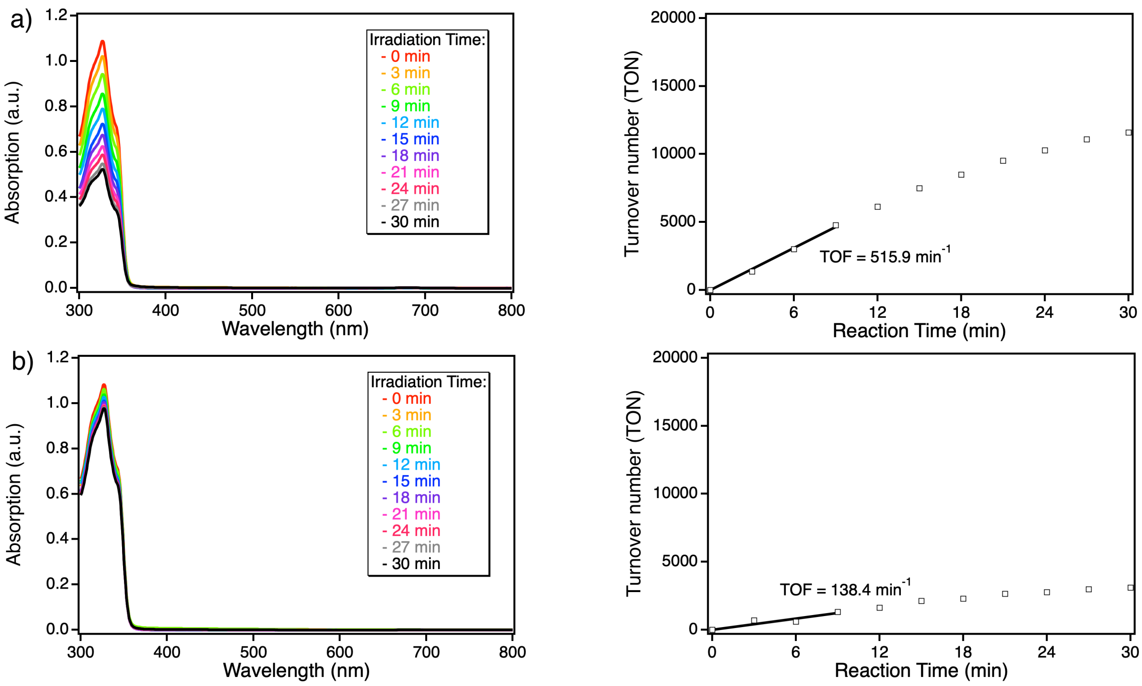

Fig. S2: UV-Vis spectra for the photooxidation of DPF with (a) **H2** as hybrid photocatalyst or (b) the photosensitizer ZnPc-6 (**2**, 1x10^{-10} mol) in solution.

ESI-4 Supplementary data for the photooxidation of DPF with ZnTPP-3

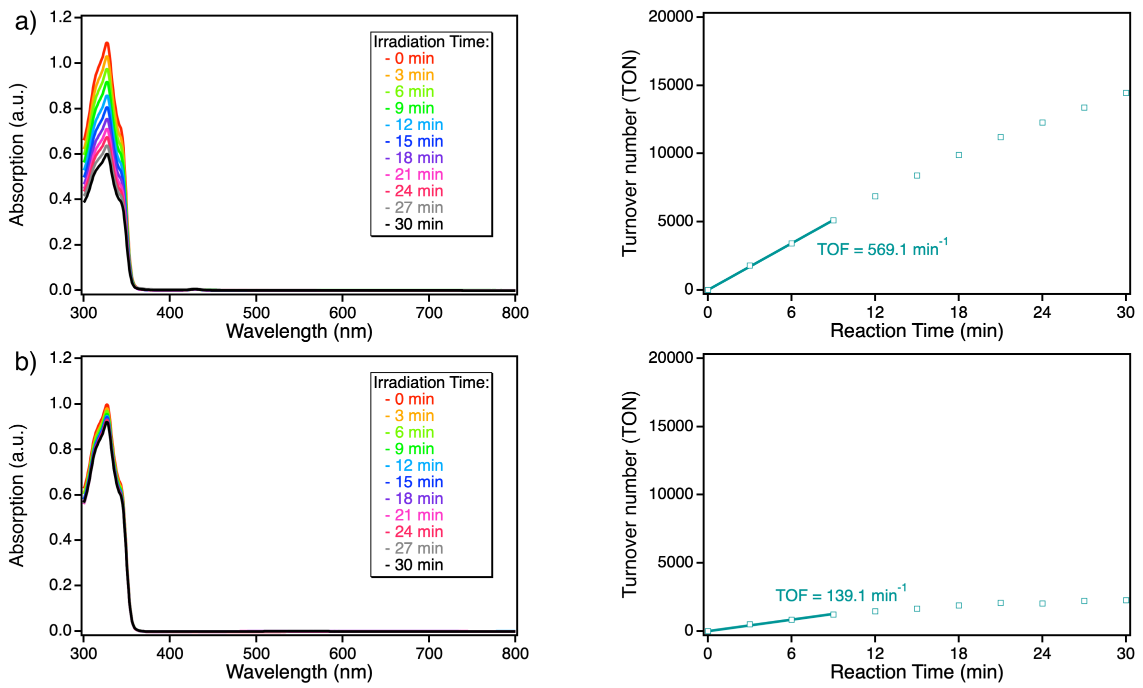

Fig. S3: UV-Vis spectra for the photooxidation of DPF with (a) **H3** as hybrid photocatalyst or (b) the photosensitizer ZnTPP-3 (**3**, 1x10^{-10} mol) in solution.

ESI-5 Supplementary data for the photooxidation of DPF with H_2TPP-6

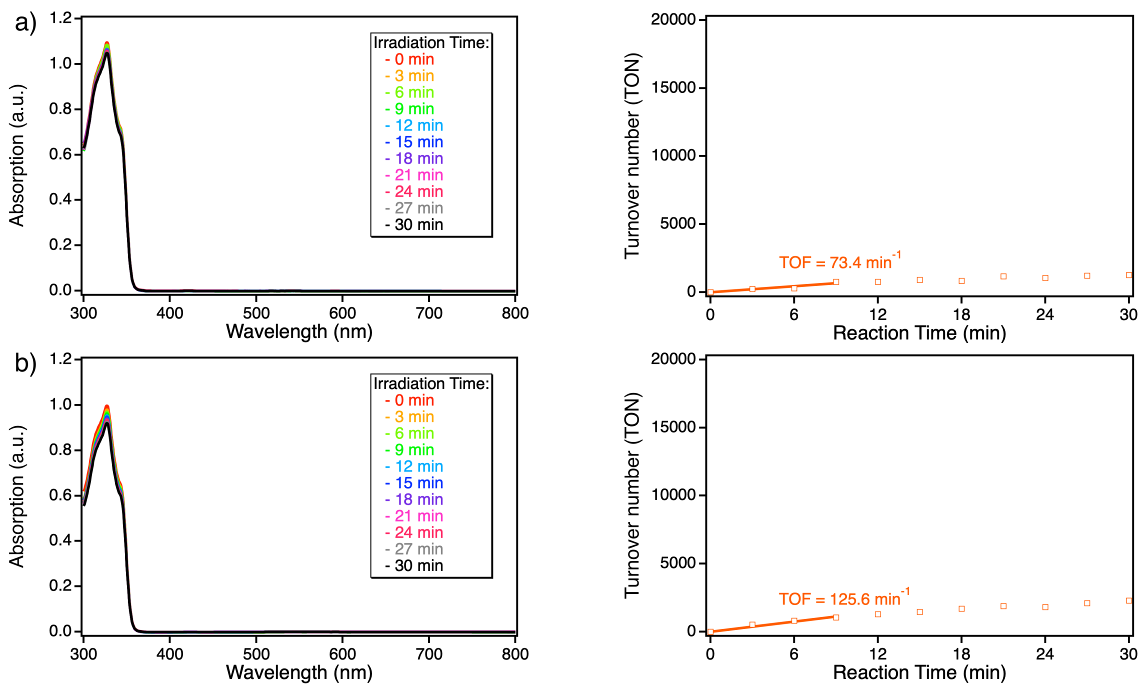

Fig. S4: UV-Vis spectra for the photooxidation of DPF with (a) **H4** as hybrid photocatalyst or (b) the photosensitizer H_2TPP-6 (**4**, 1x10^{-10} mol) in solution.

ESI-6 Supplementary data for the photooxidation of DPF with MgTPP-6

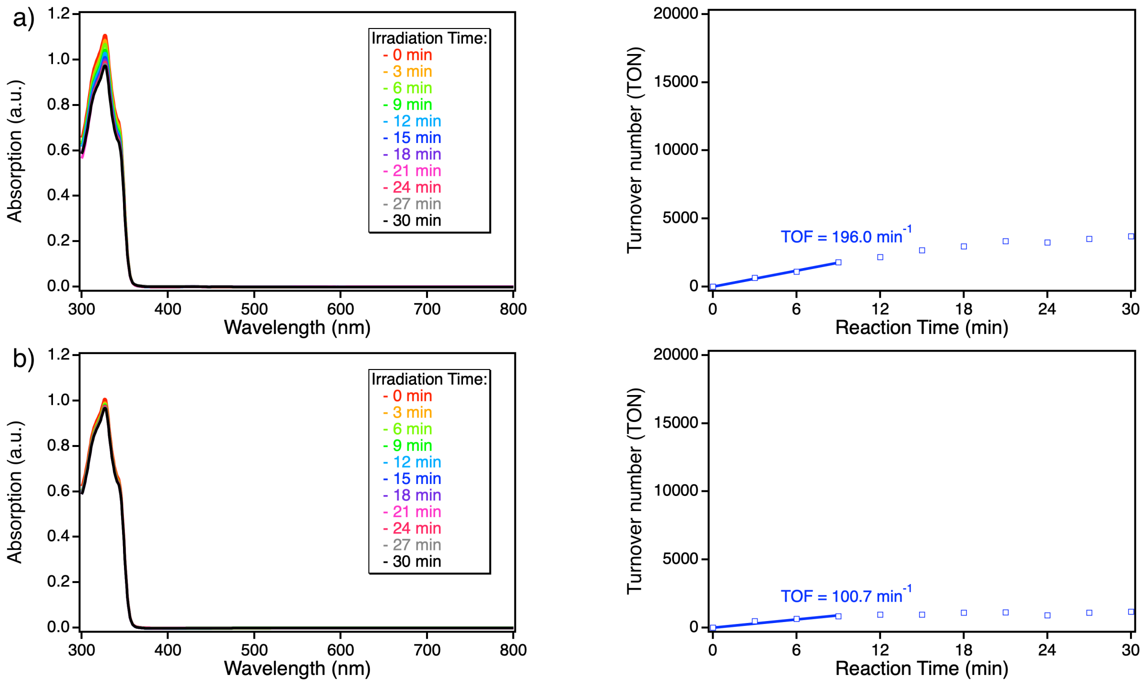

Fig. S5: UV-Vis spectra for the photooxidation of DPF with (a) **H5** as hybrid photocatalyst or (b) the photosensitizer MgTPP-6 (**5**, 1×10^{-10} mol) in solution.

ESI-7 Supplementary data for the photooxidation of DPF with ZnTPP-6

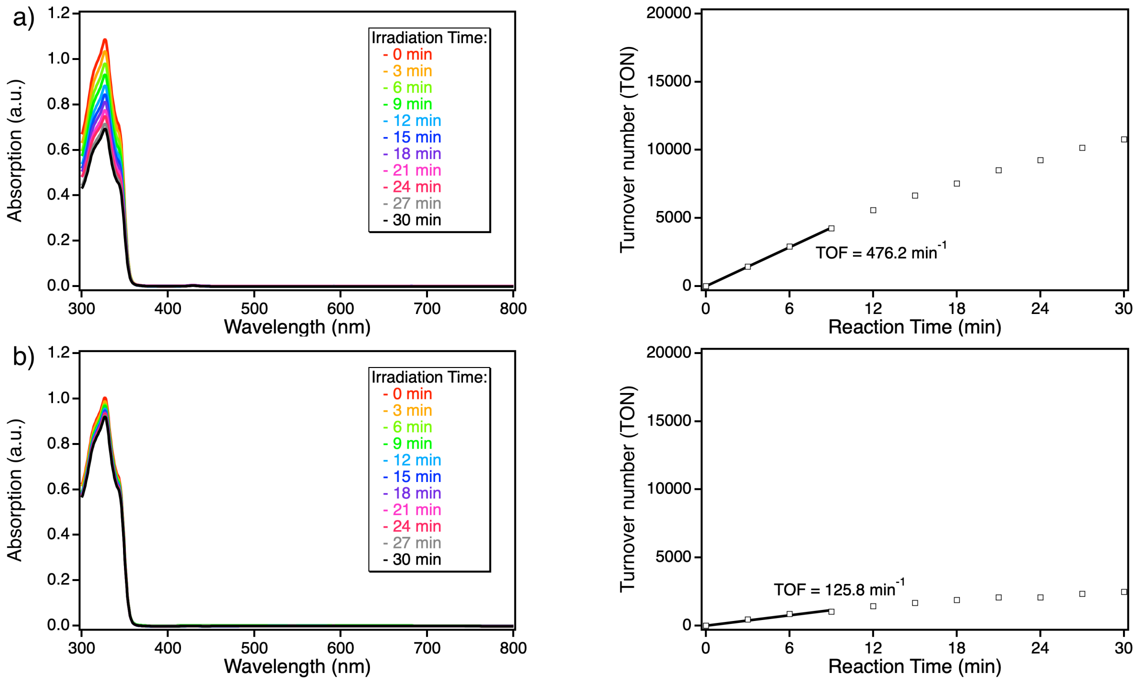

Fig. S6: UV-Vis spectra for the photooxidation of DPF with (a) **H6** as hybrid photocatalyst or (b) the photosensitizer ZnTPP-6 (**6**, 1×10^{-10} mol) in solution.

ESI-8 Supplementary data for the photooxidation of DPF with BsubPc-3

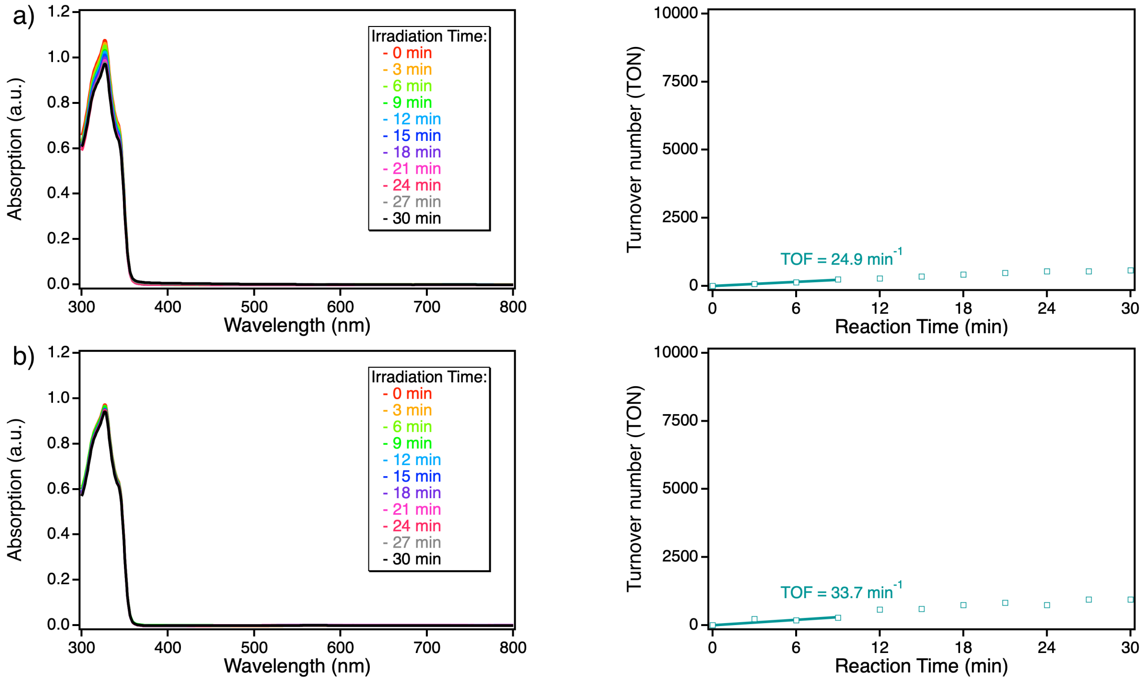

Fig. S7: UV-Vis spectra for the photooxidation of DPF with (a) **H7** as hybrid photocatalyst or (b) the photosensitizer BsubPc-3 (**7**, $1x10^{-10}$ mol) in solution.

ESI-9 Supplementary data for the photooxidation of DPF with BsubPc-6

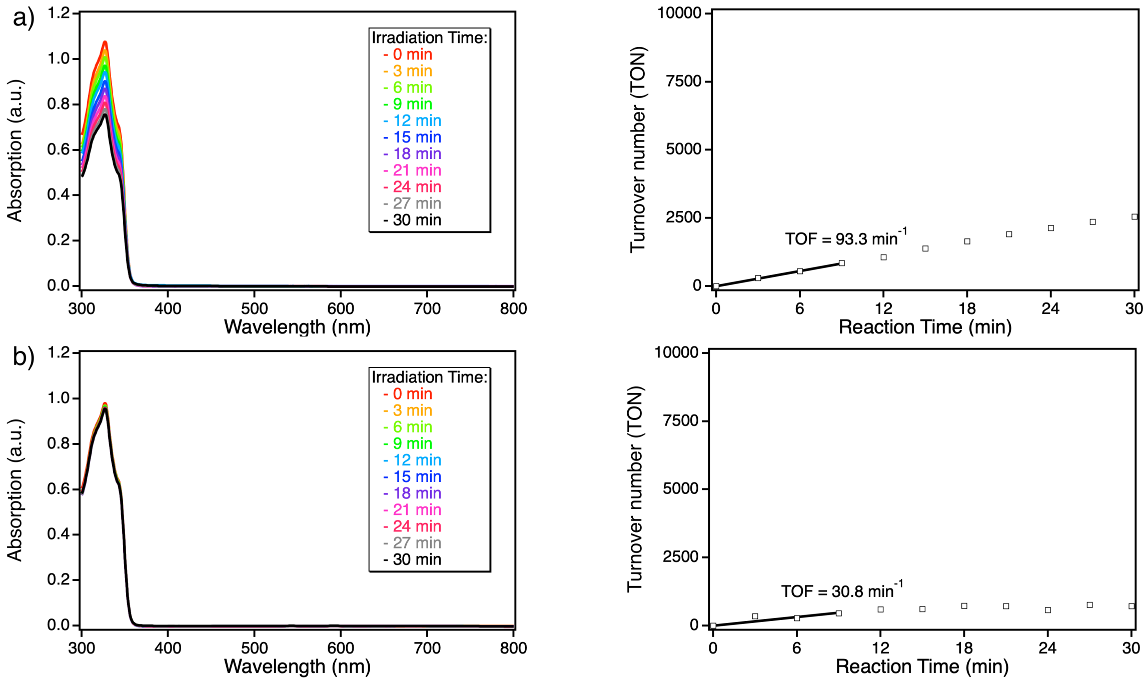

Fig. S8: UV-Vis spectra for the photooxidation of DPF with (a) **H8** as hybrid photocatalyst or (b) the photosensitizer BsubPc-6 (**8**, $1x10^{-10}$ mol) in solution.

ESI-10 Supplementary data for the photooxidation of DPF with BsubPc-11

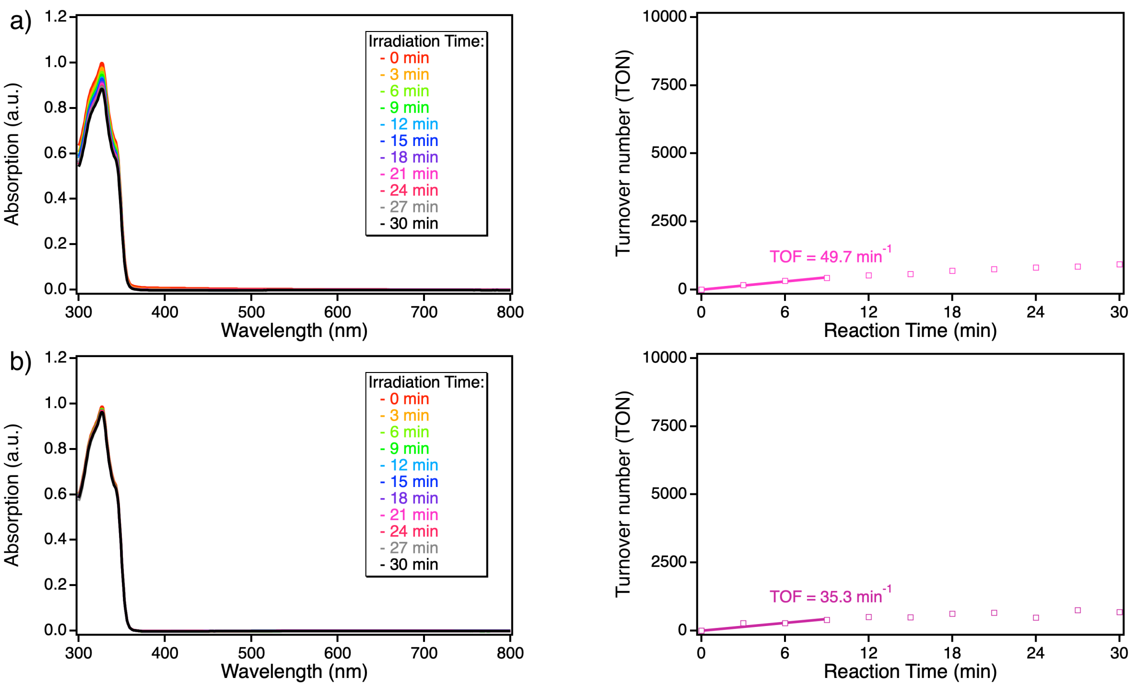

Fig. S9: UV-Vis spectra for the photooxidation of DPF with (a) **H9** as hybrid photocatalyst or (b) the photosensitizer BsubPc-11 (**9**, 1x10^{-10} mol) in solution.

References:

[1] D. Steinebrunner, G. Schnurpfeil, A. Wichmann, D. Wöhrle and A. Wittstock, Synergistic Effect in Zinc Phthalocyanine – Nanoporous Gold Hybrid Materials for Enhanced Photocatalytic Oxidations, *Catalysts*, 2019, **9**, 555.