Supporting Information

Impact of photosensitizer orientation on the distance dependent photocatalytic activity in zinc phthalocyanine – nanoporous gold hybrid systems

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ESI-1 Supplementary data for the photooxidation of DPBF with H1-3 using different irradiation wavelengths

Fig. S1: UV Vis spectra for the photooxidation of DPBF with H1-3 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.4 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
**ESI-2 Supplementary data for the photooxidation of DPBF with H2-3 using different irradiation wavelengths**

**Fig. S2:** UV Vis spectra for the photooxidation of DPBF with H2-3 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.4 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
Fig. S3: UV Vis spectra for the photooxidation of DPBF with H1-4 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 2.1 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-4 Supplementary data for the photooxidation of DPBF with H2-4 using different irradiation wavelengths

**Fig. S4:** UV Vis spectra for the photooxidation of DPBF with H2-4 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.8 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
**ESI-5 Supplementary data for the photooxidation of DPBF with H1-5 using different irradiation wavelengths**

**Fig. S5:** UV Vis spectra for the photooxidation of DPBF with H1-5 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.5 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
Fig. S6: UV Vis spectra for the photooxidation of DPBF with H2-5 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol⁻¹ at λ = 415 nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.5 x 10⁻¹⁰ mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-7 Supplementary data for the photooxidation of DPBF with H1-6 using different irradiation wavelengths

Fig. S7: UV Vis spectra for the photooxidation of DPBF with H1-6 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of \(1.5 \times 10^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-8 Supplementary data for the photooxidation of DPBF with H2-6 using different irradiation wavelengths

Fig. S8: UV Vis spectra for the photooxidation of DPBF with H2-6 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of \(1.7 \times 10^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-9 Supplementary data for the photooxidation of DPBF with H1-7 using different irradiation wavelengths

Fig. S9: UV Vis spectra for the photooxidation of DPBF with H1-7 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.6 \(\times\) 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-10 Supplementary data for the photooxidation of DPBF with H2-7 using different irradiation wavelengths

Fig. S10: UV Vis spectra for the photooxidation of DPBF with H2-7 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using the Beer-Lambert law and the extinction coefficient of 23000 L mol⁻¹ at λ = 415 nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.4 x 10⁻¹⁰ mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-11 Supplementary data for the photooxidation of DPBF with H1-8 using different irradiation wavelengths

Fig. S11: UV Vis spectra for the photooxidation of DPBF with H1-8 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficinet of 23000 L mol$^{-1}$ at $\lambda = 415$ nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.3 x $10^{-10}$ mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-12 Supplementary data for the photooxidation of DPBF with H2-8 using different irradiation wavelengths

Fig. S12: UV Vis spectra for the photooxidation of DPBF with H2-8 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol⁻¹ at λ = 415 nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.2 x 10⁻¹⁰ mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
UV Vis spectra for the photooxidation of DPBF with H1-9 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol⁻¹ at λ = 415 nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.4 x 10⁻¹⁰ mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
UV Vis spectra for the photooxidation of DPBF with H2-9 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.7 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.

Fig. S14:
Supplementary data for the photooxidation of DPBF with H1-10 using different irradiation wavelengths

**Fig. S15:** UV Vis spectra for the photooxidation of DPBF with H1-10 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol$^{-1}$ at $\lambda = 415$ nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of $1.4 \times 10^{-10}$ mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-16 Supplementary data for the photooxidation of DPBF with H2-10 using different irradiation wavelengths

Fig. S16: UV Vis spectra for the photooxidation of DPBF with H2-10 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.6 \(\times\) 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-17 Supplementary data for the photooxidation of DPBF with H1-11 using different irradiation wavelengths

**Fig. S17:** UV Vis spectra for the photooxidation of DPBF with H1-11 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.5 x 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-18 Supplementary data for the photooxidation of DPBF with H2-11 using different irradiation wavelengths

**Fig. S18:** UV Vis spectra for the photooxidation of DPBF with H2-11 as hybrid photocatalyst employing either a 550 nm cut-on filter (a), a 700 nm bandpass filter (b) or a 550 nm bandpass filter (c) for irradiation. The amount of converted DPBF was determined using Labert Beers law and the extinction coefficient of 23000 L mol\(^{-1}\) at \(\lambda = 415\) nm. Turnover numbers (TON) were calculated from the amount of converted DPBF and the illuminated photosensitizer amount of 1.7 \(\times\) 10\(^{-10}\) mol as determined from ICP-MS. Turnover frequencies (TOF) were obtained by linear regression from the plots of TON vs. reaction time in the linear regime before saturation effects become dominant.
ESI-19 Supplementary data for the synthesis of the ZnPc derivatives 1 and 2

Scheme S1: Synthesis scheme for the photosensitizers 2,9,16,23-tetrakis(2-propyn-1-yloxy)phthalocyanine zinc(II) (1) and 2,9,16,23-tetrakis(5-hexyn-1-yloxy)phthalocyanine zinc(II) (2).

ESI-20 Supplementary data for the synthesis of azidoalkylethioacetates 3 - 11

Scheme S2: General synthesis scheme for the azidoalkylethioacetate SAM precursors 3-11 from the corresponding n-bromo-1-alkanol via n-azidoalkan-1-ol and n-azidoalkyl methanesulfonate.