# **Electronic supplementary information**

# Color tuning of chlorophyll *a* and *b* pigments revealed from gas-phase spectroscopy

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#### Power dependence measurements

#### Chla·HCOO<sup>-</sup>



**Figure 1.** Photoinduced signal *versus* laser pulse energy of **Chla·HCOO**<sup>-</sup> in the Soret band (excitation wavelength: 430 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure. Due to saturation, the data points above 1.9 mJ are not included in the fit in case of prompt action (top).

Chla·HCOO-



**Figure 2.** Photoinduced signal *versus* laser pulse energy of **Chl***a***·HCOO**<sup>-</sup> in the Q band (excitation wavelength: 660 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure. In case of delayed action (bottom), a linear curve fits the data and thus n = 1.

## Chlb·HCOO<sup>-</sup>



**Figure 3.** Photoinduced signal *versus* laser pulse energy of **Chlb·HCOO**<sup>-</sup> in the Soret band (excitation wavelength: 430 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure. Due to saturation, the data points above 2.0 mJ are not included in the fit in case of prompt action (top).

## Chlb·HCOO<sup>-</sup>



**Figure 4.** Photoinduced signal *versus* laser pulse energy of **Chlb·HCOO**<sup>-</sup> in the Q band (excitation wavelength: 640 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure.

(Chla)<sub>2</sub>·TMA<sup>+</sup>



**Figure 5.** Photoinduced signal *versus* laser pulse energy of (**Chla**)<sub>2</sub>**·TMA**<sup>+</sup> in the Soret band (excitation wavelength: 420 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure. Due to saturation, the data points above 3.3 mJ are not included in the fit in case of prompt action (top), and not above 2.5 mJ in case of delayed action. In the latter, a linear curve fits the data and thus n = 1.

(Chla)₂·TMA⁺



**Figure 6.** Photoinduced signal *versus* laser pulse energy of  $(Chla)_2 \cdot TMA^+$  in the Q band (excitation wavelength: 650 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure.

### (Chla)<sub>2</sub>·HCOO<sup>-</sup>



**Figure 7.** Photoinduced signal *versus* laser pulse energy of  $(Chla)_2 \cdot HCOO^-$  in the Soret band (excitation wavelength: 430 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure. In case of delayed action, a linear curve fits the data and thus n = 1.

### (Chlb)<sub>2</sub>·HCOO<sup>-</sup>



**Figure 8.** Photoinduced signal *versus* laser pulse energy of  $(Chlb)_2 \cdot HCOO^-$  in the Soret band (excitation wavelength: 450 nm). The photon number (*n*) obtained from the fitted curve (red) is indicated in the figure. In case of delayed action, a linear curve fits the data and thus n = 1. Due to saturation, data points above 2.8 mJ are not included in the fits.



### Action spectra of Chla/b·HCOO<sup>-</sup> shown for different n

**Figure 9.** Dissociation action spectra of **Chla**·**HCOO**<sup>-</sup> are shown in blue (a, b); those **Chlb**·**HCOO**<sup>-</sup> of in red (c, d). Action spectra based on prompt fragmentation are shown in panels a and c, and those based on delayed fragmentation in b and d. In a and c, Q bands (>500 nm) have been multiplied by a factor of three to better see spectral features. Vertical bars indicate the band mazima. *n* indicates the used photon number and the spectra are shown for both *n*=1.5 and *n*=2.0 to show that the band maxima are independent of *n*, and only the relative height of the Soret and Q band is affected by *n*.