# Fluorescence Line Narrowing and ∆-FLN Spectra in the Presence of Excitation Energy Transfer between Weakly Coupled Chromophores

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**Supplemental Materials: FLN and Δ-FLN spectra calculated for a dimer of pigments with non-identical but overlapping SDF.** Calculated FLN spectra for non-identical dimer (two 200 cm$^{-1}$ wide SDF peaked at 15,000 and 14,900 cm$^{-1}$; $S_{phonon}$ = 0.8) are presented in Figure S1. Frames A, B and C depict spectra obtained for $V$ = 0, $V$ = 1 cm$^{-1}$ and $V$ = 5 cm$^{-1}$. Black, blue, red, green, magenta and orange curves correspond to excitation frequencies of 14750-15250 cm$^{-1}$, with 100 cm$^{-1}$ step. The grey curves in the background represent full SDF (solid curves) and partial SDF of the two pigments. Dashed curves are partial SDF of the pigments which are the lower-energy ones in their dimers; dotted curves represent the partial SDF of the higher-energy pigments. In both figures below the magenta arrows indicate the location of the weak ZPL at 15150 cm$^{-1}$, the orange arrows indicate the location of the weak ZPL at 15250 cm$^{-1}$. As can be seen, at the red edge of the combined band of the two pigments the FLN spectra do not depend on the inter-pigment coupling. Indeed, almost no higher-energy pigments of the pair can be found at these frequencies.

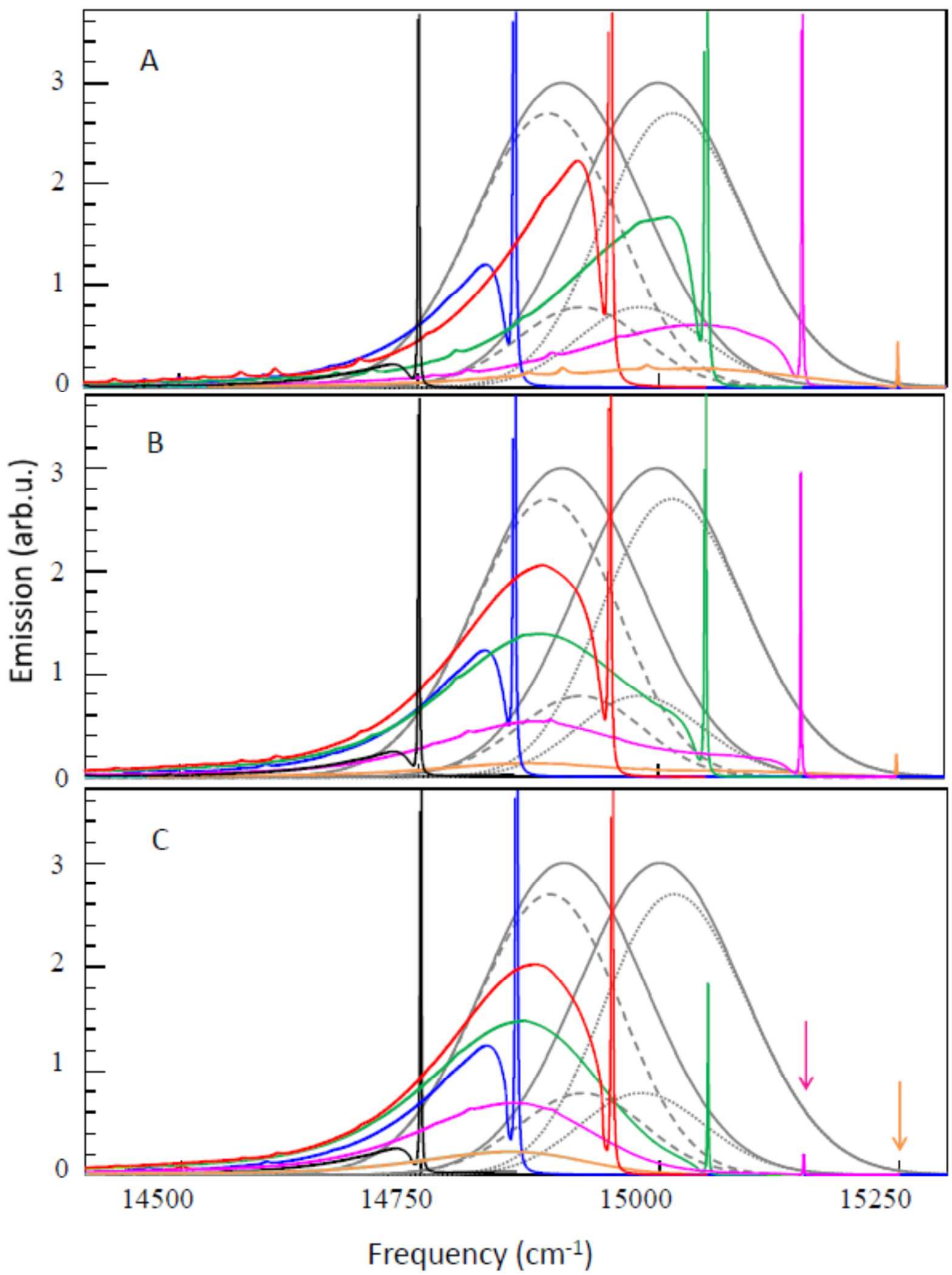


**Figure S1.** Frames A, B and C depict FLN spectra calculated for $V = 0.0$, 1.0 and 5.0 $cm^{-1}$, respectively in the case of non-identical dimer. Black, blue, red, green, magenta and orange curves correspond to excitation frequencies of 14750, 14850, 14950, 15050, 15150 and 15250 $cm^{-1}$, respectively. Solid grey curves are full SDF of the two pigments. Dashed grey curves are partial SDF of the lower-energy pigments, while dotted grey curves are partial SDF of the higher-energy pigments. Arrows (see text) indicate the locations of the ZPL that are too weak.

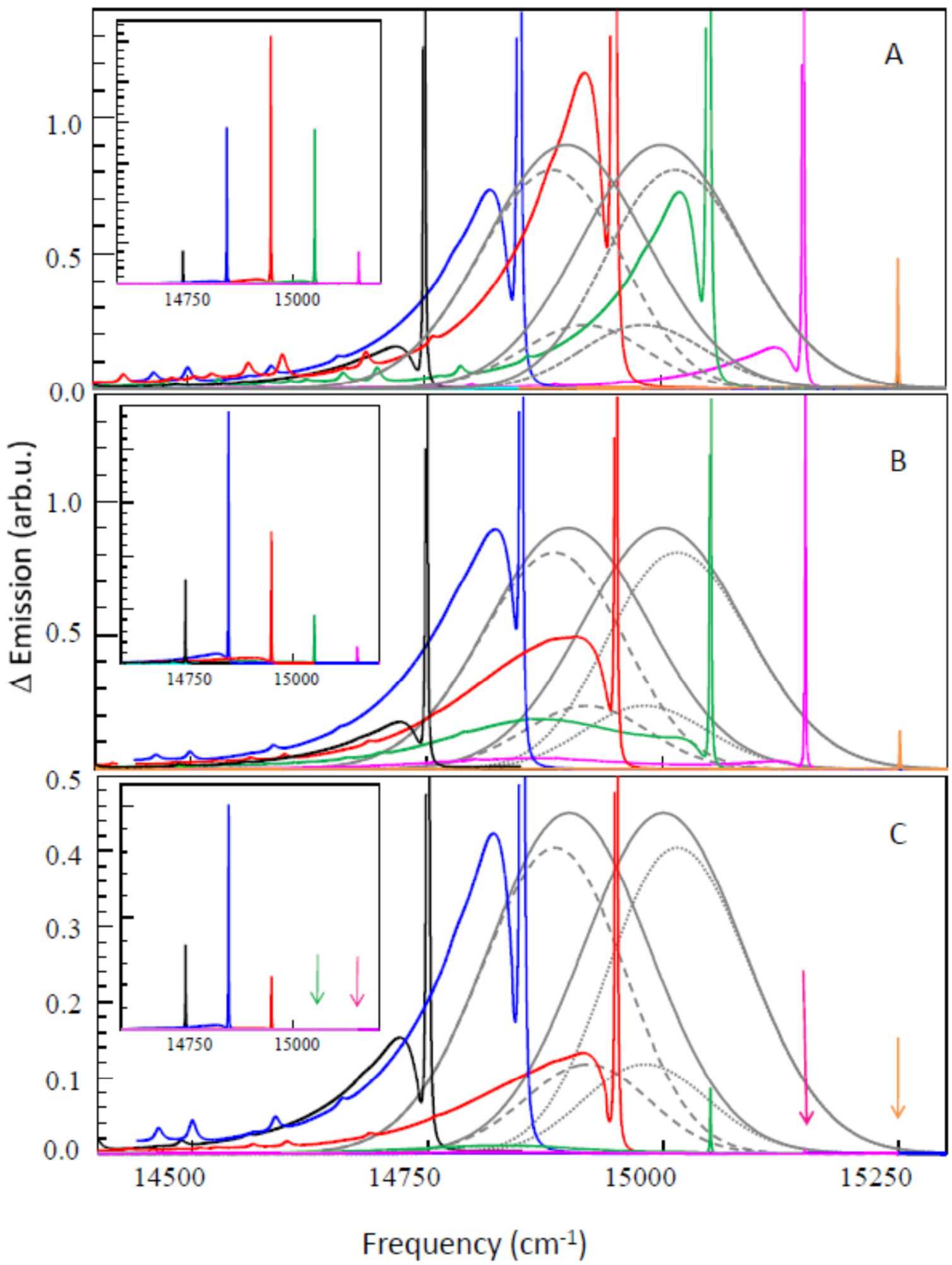


**Figure S2.** Frames A, B and C depict Δ-FLN spectra calculated for $V = 0.0$, 1.0 and 5.0 cm$^{-1}$, respectively. Black, blue, red, green, magenta and orange curves correspond to excitation frequencies of 14750, 14850, 14950, 15050, 15150 and 15250 cm$^{-1}$, respectively. Solid grey curves are full SDF of two pigments. Dashed grey curves are partial SDF of the lower-energy pigments, while dotted grey curves are partial SDF of the higher-energy pigments. Inserts depict the full Δ-emission range and allow judging relative intensities of ZPL contributions. Color-coded arrows indicate the locations of the ZPL that are too weak.

Figure S2 depicts matching Δ-FLN spectra, obtained for shallow, several percent deep, burns. The longest-wavelength spectra do not depend on inter-pigment coupling. For larger inter-pigment coupling $V$ the shorter-wavelength Δ-FLN spectra are suppressed, note that vertical scale in Frame C is different from that in Frames A and B. The inserts depict full vertical range, allowing the reader to assess relative intensities of the ZPL contributions to the Δ-FLN spectra. As can be seen, and in agreement with the results for identical dimer and trimer, for high excitation frequencies increase of inter-pigment-coupling results not only in suppression of the ZPL contribution to the Δ-FLN spectra, but also in suppression of the apparent non-resonant contribution. As discussed in the main text, this can be explained by the total number of lower-energy pigments to the red of the excitation frequency remaining practically unchanged (since the hole burning is non-photochemical).