Supporting Information

Krüger et al. 10.1073/pnas.1714656115

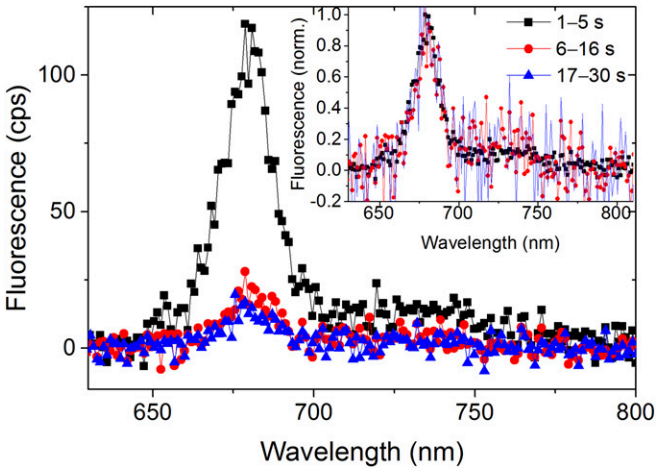

Fig. S1. Three-step bleaching of an FCPb complex exhibiting broad emission but no spectral dynamics. Spectra are averaged over the time indicated in the legend and proceed from black to red to blue before becoming indistinguishable from the background. The *Inset* shows the normalized spectra.

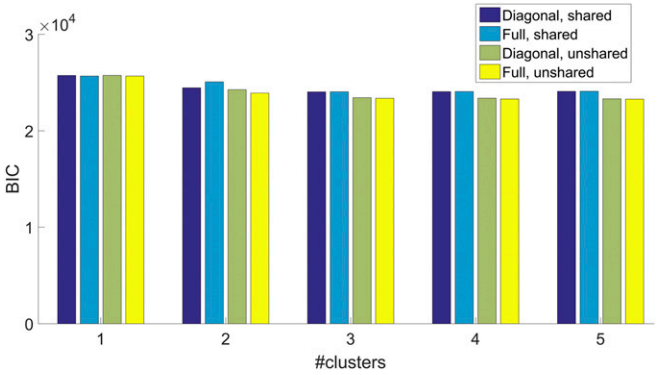

Fig. S2. Bayesian information criterion (BIC) calculated for different Gaussian mixture models and for up to five data clusters. The properties of the covariance matrix are indicated in the legend. The lowest BIC value is given by a full, unshared covariance matrix (yellow bars) for three, four, and five data clusters. Following Occam's razor, we employed the model corresponding to three clusters.

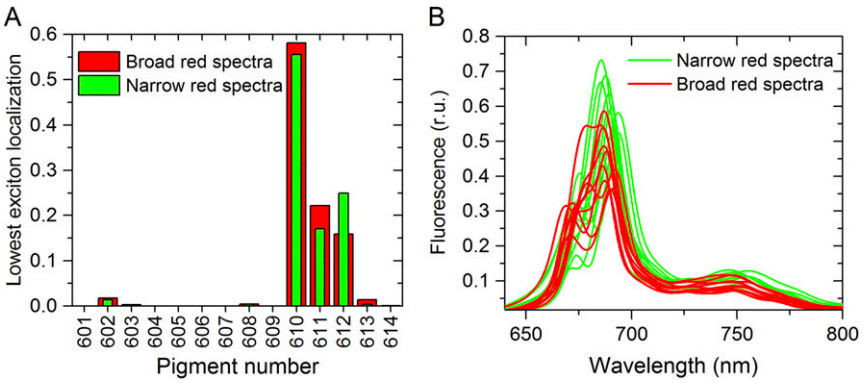

Fig. S3. Properties of the two types of red spectra for our model representing zero coupling between Chls *a*611 and *a*612. Spectra with $\lambda_{max} > 685$ nm were considered, and a FWHM of 22 nm was the threshold between "narrow" and "broad" spectra (Fig. 6*E*). (*A*) Fraction of realizations of the disorder for which the lowest exciton state was localized on a single pigment. The 14 Chls in a monomeric subunit of LHCII correspond to the nomenclature used in ref. 23. (*B*) Examples of calculated fluorescence spectra for the two types of red emission states.