

Supporting information for “Evidence of excited state localization and static disorder in LH2 measured by 2D-polarization single-molecule imaging at room temperature”

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I. SETUP CALIBRATION

In order to check the setup for depolarization artifacts we used the method proposed before.^[1]

The light from the laser is linearly polarized, but optical elements in the excitation path can introduce ellipticity of the polarization in the sample plane. To compensate for that we use a Berek compensator in the excitation beam path. Note that it is important to check the polarization degree of the light for all polarization angles in the sample plane, because depolarization effects depend on the angle of the incident linear polarization.

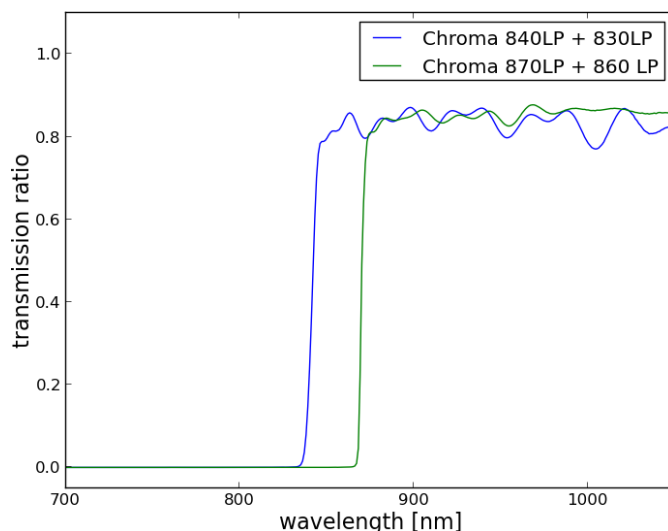
Secondly, we perform a 2D-POLIM measurement on a so-called “artificial molecule” (AM)^[1]. The AM consists of a bulk LH2 sample solution and a polarizer (wire-grid, Edmund optics) placed between the microscope objective and the sample solution. The AM thus has spectral properties similar to an individual LH2 complex, and - most importantly- it has polarization modulation depths $M_{\text{ex}} = M_{\text{em}} = 1$, together with zero luminescence shift. 2D-POLIM was carried out for several orientations of the AM-polarizer in the sample plane. This allows us to infer the relative orientations of the $\lambda/2$ -plate in excitation and the emission analyser (since the luminescence shift must be zero for the AM). More importantly, it allows us to test for depolarization artifacts in the emission path (where one cannot use a Berek compensator since the emission of single LH2s is not monochromatic).

In the absence of experimental depolarization artifacts, the obtained modulation depths for the AM should be unity and the luminescence shift should be zero. Experimentally, we determined modulation depths for the AM in the range of 0.9–1.0. The luminescence phase shift deflected from zero by not more than ± 4 degrees.

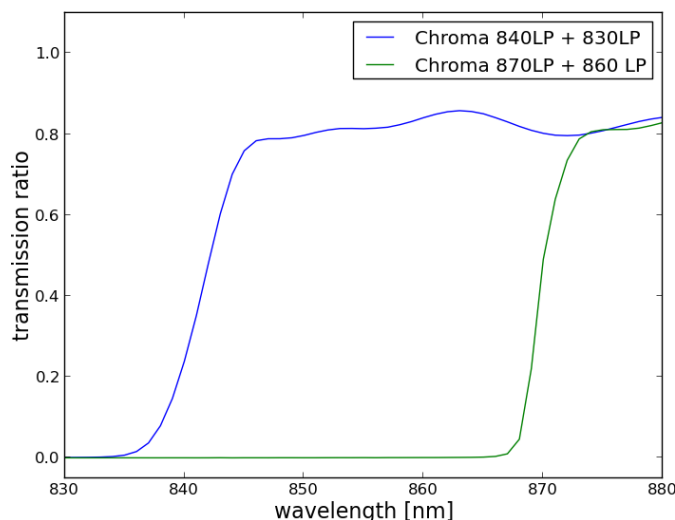
II. FILTER SPECTRA

The spectra of the two filter assemblies used to clean plasma lines from the laser and to separate excitation

light from the detection pathway are shown below:



Zoom into the edge region:



[1] R. Camacho, D. Thomsson, D. Yadav, and I.G. Scheblykin. Quantitative characterization of light-harvesting efficiency in single molecules and nanoparticles

by 2D polarization microscopy: Experimental and theoretical challenges. *Chemical Physics*, 406(0):30–40, 2012.