## **Supplementary Information**

## Ultrafast fluorescence studies of dye sensitized solar cells

Olivier Bräm,<sup>a</sup> Andrea Cannizzo<sup>a,b</sup> and Majed Chergui<sup>a</sup>\*

 <sup>a</sup> Laboratoire de Spectroscopie Ultrarapide, ISIC, FSB, Ecole Polytechnique Fédérale de Lausanne; EPFL SB ISIC LSU, Station 6, CH-1015 Lausanne-Dorigny, Switzerland.
<sup>b</sup> Institute of Applied Physics, University of Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland.
<sup>\*</sup>Corresponding author: <u>majed.chergui@epfl.ch</u> **Data analysis procedure :** The data were analyzed using singular value decomposition (SVD) and performing a global fit (GF) (see *Journal of the American Chemical Society* **130** (2008) 8967 for a detailed description of the GF-SVD analysis) of kinetic traces averaged over 5 nm steps using eq. 1:

$$I = \left\{ A_1 \cdot e^{(-t/\tau_1)} + A_2 \cdot e^{(-t/\tau_2)} \right\} \otimes e^{\left[ -\left(\frac{t-t_0}{\Delta_{IRF}/(2\sqrt{\ln 2})}\right)^2 \right]}$$
(1)

in which we assume two characteristic times  $(\tau_1, \tau_2)$  for the emission decay. The Gaussian term describes the convolution with the instrument response function (IRF), where  $\Delta_{IRF}$  and  $t_0$  are its fwhm and the time zero, respectively. In the GF procedure, the time constants have been considered as common kinetic parameters at all wavelengths, whereas the amplitudes A<sub>1</sub> and A<sub>2</sub> have been determined for each wavelength. In order to reconstruct the time-integrated spectrum associated to each time constant obtained, we multiplied the pre-exponential factors A<sub>1</sub> and A<sub>2</sub> by the respective decay times and plotted them as a function of wavelength.



**Figure S1:** Time-integrated reconstructed spectra (pre-exponential factor multiplied by time constant, plotted as a function of the emission wavelength) obtained with a global fit analysis of data for RuN719 in water reported in figure 4. The uncertainty on the lifetimes of the long component is estimated to be  $\pm 30$  fs.



**Figure S2:** Representative kinetic traces from emission time-wavelength plot of RuN719 in water and adsorbed on Al2O<sub>3</sub> and TiO<sub>2</sub>, along with their bi-exponential fit obtained with the global analysis (eq. 1)