Supplementary Information

Ultrafast fluorescence studies of dye sensitized solar cells

Olivier Bräm, Andrea Cannizzo, and Majed Chergui*

a Laboratoire de Spectroscopie Ultrarapide, ISIC, FSB, Ecole Polytechnique Fédérale de
Lausanne; EPFL SB ISIC LSU, Station 6, CH-1015 Lausanne-Dorigny, Switzerland.
b Institute of Applied Physics, University of Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland.
*Corresponding author: majed.chergui@epfl.ch

Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics
This journal is © The Owner Societies 2012
**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:

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

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 \( A_1 \) and \( A_2 \) 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 \( A_1 \) and \( A_2 \) 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 ±30fs.
Figure S2: Representative kinetic traces from emission time-wavelength plot of RuN719 in water and adsorbed on Al2O3 and TiO2, along with their bi-exponential fit obtained with the global analysis (eq. 1)