Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information for

1. Estimation of the photon flux

Integrated AM1.5g sun spectrum:

From 380 to 850 nm $4.8 \cdot 10^{16}$ /cm^{2}s

From 380 to 900 nm $5.1 \cdot 10^{16}$ /cm^{2}s

For our set-up:

We determined the equivalent cw power of the pump light on the sample for selected wavelengths:

Wavelength / nm	cw-power / µW
532	140
630	565
680	772
720	960
760	790
810	540

1 mW output power, 200 µm spot radius, 78 MHz repetition rate, 800 nm emission, pulse length 2 ps

Energy per pulse: 12.8 pJ

Pulse energy density on sample: ~10 nJ/cm^2

Photon flux per pulse: ~$2 \cdot 10^{22}$ /cm^{2}s

For a typical kHz Ti:sapphire set-up:

5 µJ/cm^2, 800 nm, 100 fs, 1 kHz

Photon flux per pulse: ~$2 \cdot 10^{26}$ /cm^{2}s

2. Time resolution of the set-up

Figure S1 reports the spectral distribution of the laser emission for selected wavelengths. The FWHM of the spectral intensity for emission around 800 nm amounts to 3.9 meV. The factory specification for the pulse duration (FWHM) at the same wavelength, is about 2 ps. Assuming a pulse temporal shape described by a squared hyperbolic secant function (sech^2), the expected spectral width, for a 2

ps long pulse, is around 0.7 meV.[1] The aforementioned spectral width from Figure S1 indicates that our pulses are not transform limited and the extent of the measured spectral width is related to the pulse extraction system.

The time resolution of the overall set-up can be assessed from the transient absorption spectra reported in Figure 5. From this figure a resolution of at least 20 ps can be derived from the transient signals rise time (10%-90%).

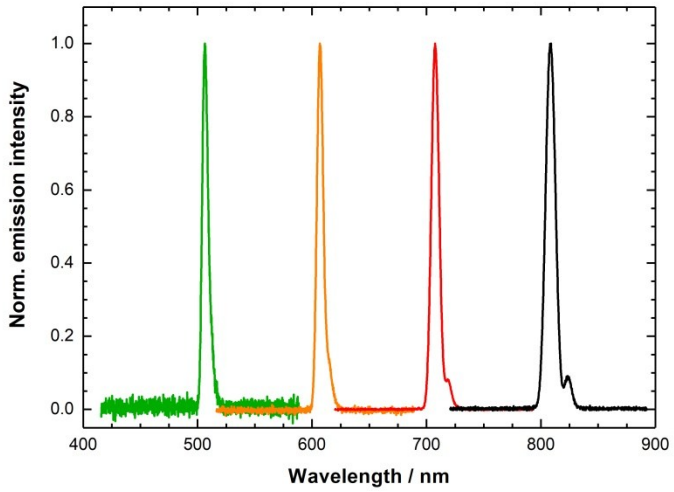

Figure S1: NKT SuperK Extreme laser spectral emission for a set of selected wavelengths.

References:

[1] C. Rullière, Femtosecond Laser Pulses: principles and experiments, Springer Science+ Business Media Inc., (2005).