Supporting Information for

Ultrafast Carrier Recombination and Transient Lattice Temperature Changes in 25 nm Thin Hydrogenated Amorphous Silicon Films

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1 Species Contributions to the Kinetic Traces of a-Si:H

Figure S1. Contributions of the species $S_1$ (red), $S_2$ (orange), $S_3$ (magenta), $S_4$ (green), $S_5$ (blue) and $S_0$ (violet) to the total fit (cyan) of the experimental kinetics (open circles) at short times up to 2.5 ps. Pump wavelength: 400 nm.

Figure S2. Same as in Figure S1 but magnified to highlight the total fit (cyan) to the experimental points (open circles) at the respective probe wavelengths.
Figure S3. Contributions of the species $S_1$ (red), $S_2$ (orange), $S_3$ (magenta), $S_4$ (green), $S_5$ (blue) and $S_0$ (violet) to the total fit (cyan) of the experimental kinetics (open circles) up to 1500 ps. Pump wavelength: 400 nm.

Figure S4. Same as in Figure S3 but magnified to highlight the total fit (cyan) to the experimental points (open circles) at the respective probe wavelengths.
2 Internal Quantum Efficiency of the a-Si:H Thin Film

Figure S5. Wavelength-dependent internal quantum efficiency of a 25 nm thick a-Si:H layer in contact with ITO employing an interdigitated electrode arrangement. Green line: Average of sixteen step-scan FTPS experiments at 17 Hz. Magenta line: Average of two step-scan FTPS experiments at 60 Hz. Blue points: Measurements using a xenon lamp / monochromator combination for device illumination. Red points: Same as the blue points, but measured with an additional neutral density filter (Schott NG5, 2 mm) with an average transmission of 30.5% over the wavelength range 400–750 nm. The results of the FTPS measurements were scaled in order to overlap with the data from the xenon lamp / monochromator experiments employing the additional filter (red points).