Supporting Information

Charge Carrier Lifetimes in Cr-Fe-Al-O Thin Films

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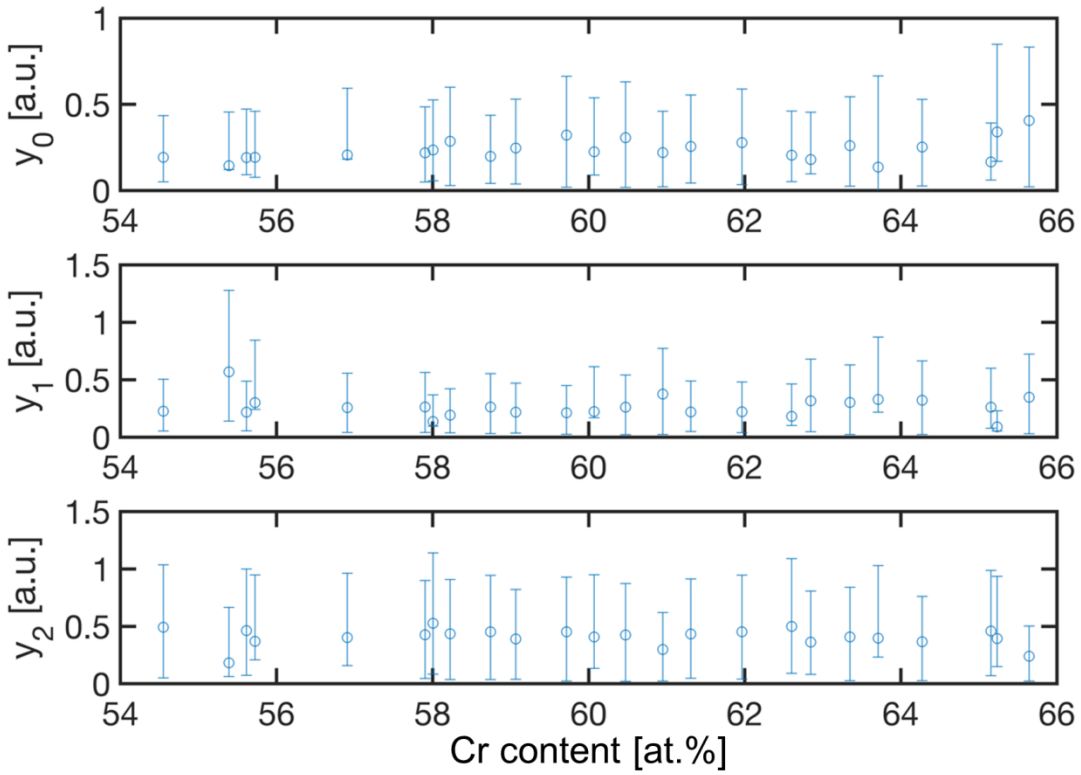

Figure S1: Amplitudes y_i of the fit results from Eq. 1. None of the amplitudes change significantly with composition so that solely the change in charge carrier lifetime is discussed.

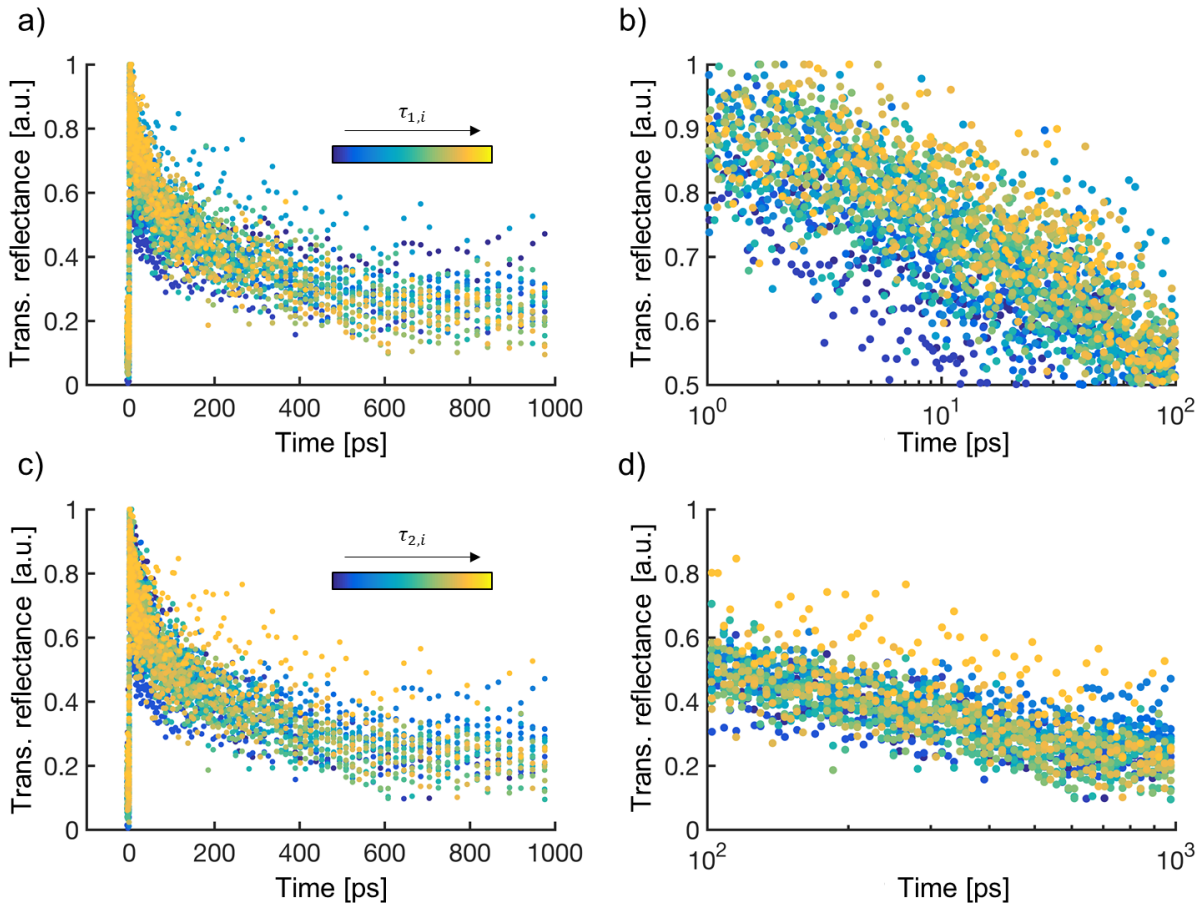

Figure S2: Transient reflectance curves color coded according to their lifetimes as denoted in the legend a) color code for the shorter lifetime with b) a zoom in onto the 1-100 ps range. Transient reflectance curves with a higher lifetime $\tau_{1,i}$ should appear at the top of the graph, those with shorter $\tau_{1,i}$ at the bottom which is indeed the case. As all amplitudes y_2 obtained from fitting are in the range of 0.4-0.6 the photoconductivity after 100 ps should be mainly governed by y_2 and y_0 which is the case. In c) the transient reflectance curves are color coded according to their longer lifetime $\tau_{2,i}$ that appeared to be relatively constant across all compositions as shown in d). If there is no variation across the compositions all transient curves should lay on top of each other with no visible structure, which is indeed what we observe.

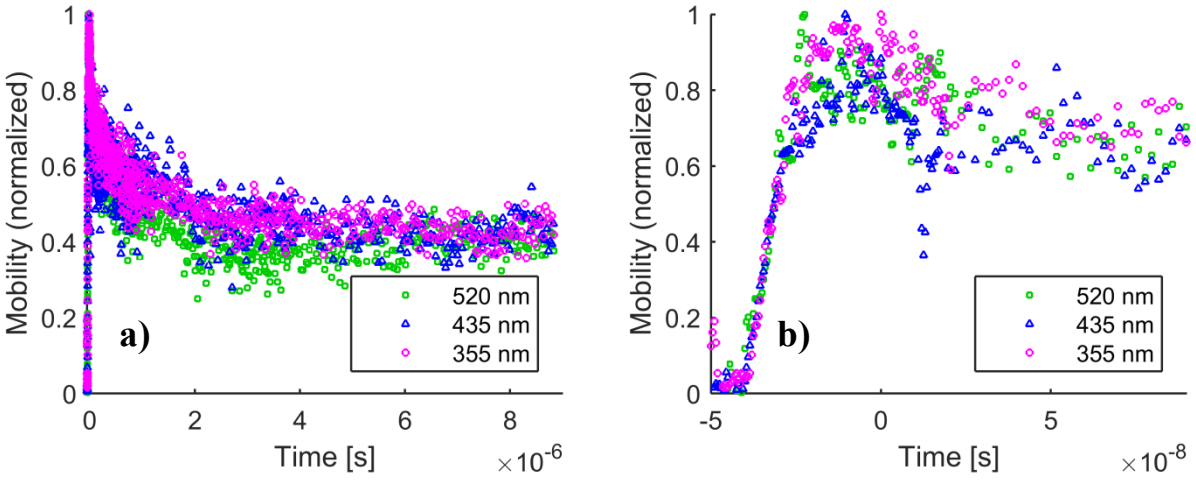

Figure S3: Normalized time-resolved microwave conductivity measurements at different initial charge carrier distributions caused by a variation of the excitation wavelength under similar incident photon densities of ~4 10^{13}/cm^2. Absorption lengths for excitation with 355 nm, 435 nm and 520 nm are 120 nm, 260 nm and 350 nm, respectively. In a) the full time range of the measurement is shown, while in b) a zoom-in on the first 90 ns of the same data is plotted.