Excitation dynamics in perovskite solar cells probed by photocurrent detected 2D spectroscopy

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Over the last decade, perovskite-based solar cells have continued to break efficiency records, reaching over 25%.[1] On the other hand, the ultrafast dynamics that define the photophysics of these systems is not yet completely clear. In this work, we investigate the photophysics of highly efficient perovskite-based solar cells by using the action-detected 2D spectroscopy technique.[2] In this technique, the sample is excited by a series of 4 phase-modulated pulses which generates an incoherent signal (photocurrent) that is detected via a voltage readout card. We observed relaxation dynamics from high-energy band towards the band-edge of the system (Figure 1).

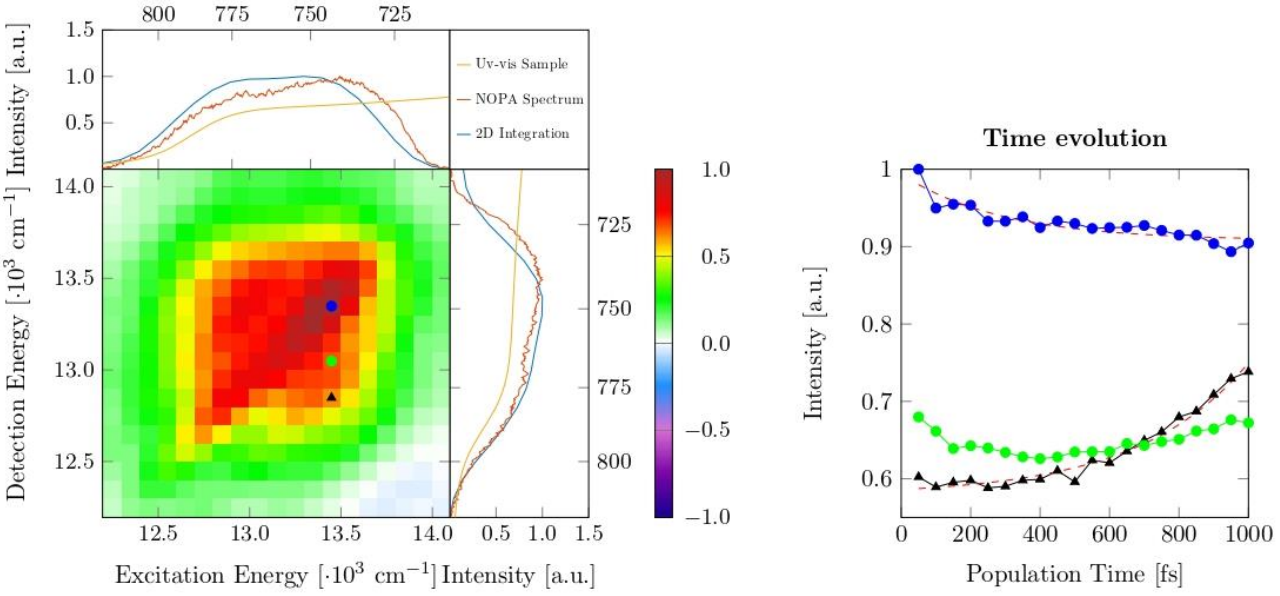

Figure 1: Left panel: 2D maps of perovskite-based solar cell sample. On the right (top) side are represented the sample absorption spectrum, the NOPA spectrum and the integration along the excitation (detection) energy axis. Right Panel: Time evolution of 2D map at specific coordinates and residuals after exponential fitting.

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