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**Ultrafast spatially-resolved carrier dynamics in single CdSSe nanobelts** LARS GUNDLACH, PIOTR PIOTROWIAK, Department of Chemistry, Rutgers University-Newark, 73 Warren St, Newark, NJ, 07102 — A recently constructed Kerr-gated microscope was applied to spatially, temporally, and spectrally resolve the ultrafast non-linear excitation relaxation dynamics in single CdSSe nanobelts. Luminescence movies with a 100 fs frame resolution were constructed. The ability to spatially resolve the femtosecond dynamics in a single emitting object gives insights which would be impossible to obtain in an ensemble measurement. By applying the Kerr-gated microscope we are able to monitor the dynamics in a single nanobelt with a sufficient time resolution to reveal the different pathways that compete with the dissociation of multiple excitons. We will show that ensemble averaging methods give results that are complicated because of ensemble inhomogeneities. Indeed, already a different orientation of the nanoparticles with respect to the light-field leads to different dynamic response and difficult to interpret results. The onset of nonlinear behavior and the subsequent dynamics are particularly sensitive to even the most subtle inhomogeneities in composition and morphology and hence most difficult to study under the condition of ensemble averaging making time-resolved wide-field fluorescence microscopy a perfect aid in disentangling the complex response.

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