Temperature and magnetic field dependence of emission from colloidal $CsPbBr_3$ perovskite nanocrystals

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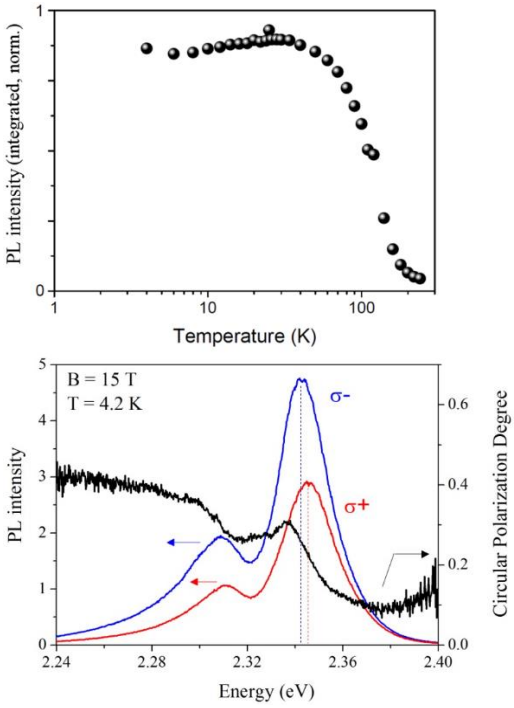

Temperature and magnetic field dependence of photoluminescence of colloidal perovskite nanocrystals in ensemble.

Colloidal cesium-lead-halide perovskite nanocrystals (PNCs) are a new class of nanostructures that are promising in various field ranging from photovoltaic applications to single photon source. The past few years, PNCs have demonstrated outstanding optical properties such as ultra-fast exciton radiative lifetime and high photoluminescence (PL) intensity at cryogenic temperatures. To date the study of the optical properties of PNCs have been restricted to the measurement of the PL spectra and the PL decay at room or cryogenic temperature[1]. The lack of measurements in between dramatically hinders the comprehensive knowledge on the exciton optical properties (thermal activation, interplay among exciton fine structure levels). Furthermore the unconventional fast PL decay at cryogenic temperature opens the question on the spin nature of the emitting states (dark, bright or charged exciton).

Here we show the results of the temperature (down to 4.2 K) and the magnetic field (up to 15 T) dependence on the optical properties of $CsPbBr_3$ PNCs. These experiments allowed us unveiling notably fundamental parameters such as the exciton g-factor, the degree of circular polarization. Since those objects are knew, lot of fundamental properties are still to be determined, like their band structure, and our study gives some important preliminary results to eventually determine such properties.

1. Makarov *et al.*, *Spectral and dynamical properties of single excitons, biexcitons, and trions in Cesium-Lead-Halide perovskite quantum dots*, Nano Lett. 16 (4), pp 2349–2362, 2016