Halide Perovskite Nanocrystals: from platelets to supercrystals

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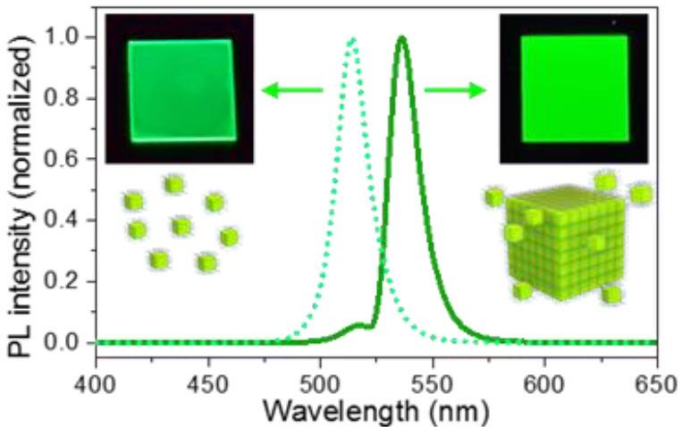
The optical properties of colloidal metal halide perovskite nano-platelets are dominated by quantum size and Coulomb effects giving rise to pronounced 2D excitonic phenomena even at room temperature. We have performed a variety of time-resolved optical experiments in order to address energy and spin relaxation processes as well as recombination scenarios in nano-platelets with thicknesses down to single monolayers. Reduced screening effects of the Coulomb interaction not only leads to huge excitonic binding energies but also to modified scattering rates. Finally, assembling halide perovskite nanocubes into supercrystals leads to surprising nonlinear optical properties. We find resonantly enhanced photoluminescence when below band-gap multiple photon absorption processes energetically equal multiple exciton energies.



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