Multiple Exciton Generation

Due to their high absorbance, low cost, and tunable bandgap, perovskites show great potential in addressing the growing demand for renewable energy. They are considered a promising candidate to replace silicon as the absorber material in photovoltaic technologies. By decreasing the crystal size within the film below 10 nm, the so-called quantum confinement regime is reached.

This leads to discrete energy states within the valence and conduction band instead of continuous ones. Therefore, the theoretical maximum efficiency of a solar cell can be exceeded by so-called multiple exciton generation, meaning that one incoming photon might create more than one exciton.

The advertised Master's thesis includes manufacturing and optimizing perovskite nanocrystal layers within solar cells using a wide range of optical, electrical, and scattering characterization techniques. The possibility of generating multiple excitons should be utilized by reducing the energy band gap through the addition of zinc.