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Supplementary Information

Quantum Confinement in PbI_2 Nanodisks Prepared with Cucurbit[7]uril

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On lead iodide exciton band

The exciton band of lead iodide does not appear always as a sharp and intense peak. Its shape and intensity may vary with crystal form, polytype, temperature, light polarization, synthetic procedure, crystallite size and especially with the purity of the material.[1] Many authors have reported similar spectra, for which the absorption edge is associated with the excitonic level, separated from gap transitions by few meV, since the binding energy is very small. The presence of electron donors in solution also affects exciton absorption bands, as demonstrated in other papers.[2-5] It is well described in the literature that the first excitonic band may undergo blue shifts when extremely small particles are obtained.[1,6-8] In the present work, a set of optical fibers and a light source essentially designed for Vis-NIR region were used in the first attempts to obtain absorption spectra. This could be the reason for the lack of spectral resolution. Furthermore, the Kubelka-Munk function could not be used since no information about the powder size of the samples after drying the colloid was known. The UV-Vis absorption measurements were repeated at room temperature (Figure S1), using another set of optical fibers designed for working in the UV region. This time the bands clearly appear. Using the Tauc equation, the E_g value was calculated, being 2.34 and 2.80 eV (diff = 0.46 eV) for bulk PbI_2 and the nanodisks, respectively.

For pure lead iodide, the exciton band is located at the absorption edge (499 nm), which is coherent with the literature (490-500 nm). For the nanodisks, it is blue-shifted to 387 nm and a small shoulder is observable at 499 nm, which could be assigned to larger aggregates or to hetero-nuclear excitons.[3] As mentioned before, these new values were obtained at room temperature, but the onset absorption energies do not vary considerably from our previous measurements at 77 K (see Figure 2 in the main text), and would not affect the presented conclusions from the effective mass model. Probably, the problem is related to our experimental apparatus.

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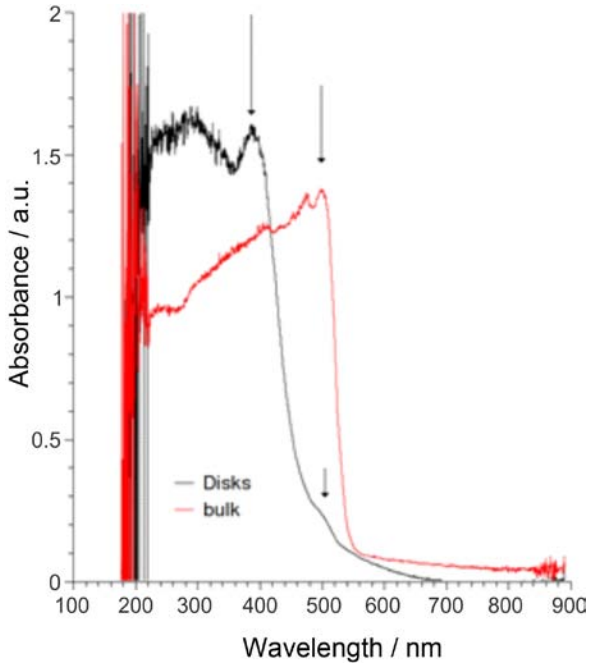

Figure S1. Absorption spectra of solid PbI_2 and PbI_2 nanodisks at room temperature.

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