Electronic Supplementary Material (ESI) for Nanoscale

Cold field emission dominated photoconductivity in ordered three-dimensional assemblies of octapod-shaped CdSe/CdS nanocrystals

Yang Zhang[a*], Karol Miszta[a], Liberato Manna[a], Enzo Di Fabrizio[b,c], and Roman Krahne[a*]

[a] Italian Institute of Technology (IIT), Via Morego 30, 16163 Genoa, Italy

[b] *King Abdullah University Science and Technology (KAUST), PSE and BESE Divisions, Thuwal, 23955 -6900, Kingdom of Saudi Arabia*

[c] BIONEM Lab, University of Magna Graecia, Campus Salvatore Venuta, Viale Europa 88100, Germaneto-Catanzaro, Italy

* Corresponding authors: yang.zhang@iit.it and roman.krahne@iit.it

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Supplementary information

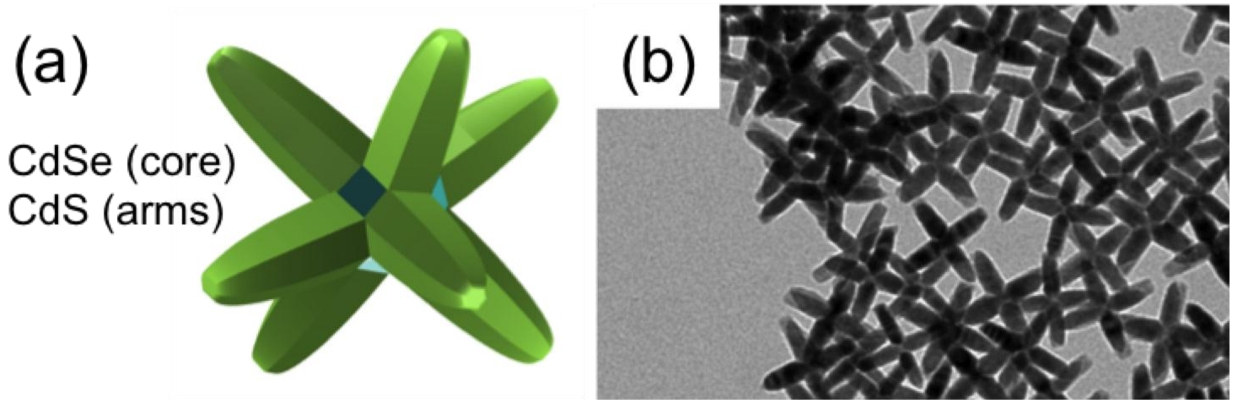

Figure S1. (a) Illustration of the core-shell architecture of the octapods. (b) Transmission electron microscope image of disordered octapods that were deposited onto a carbon coated grid.

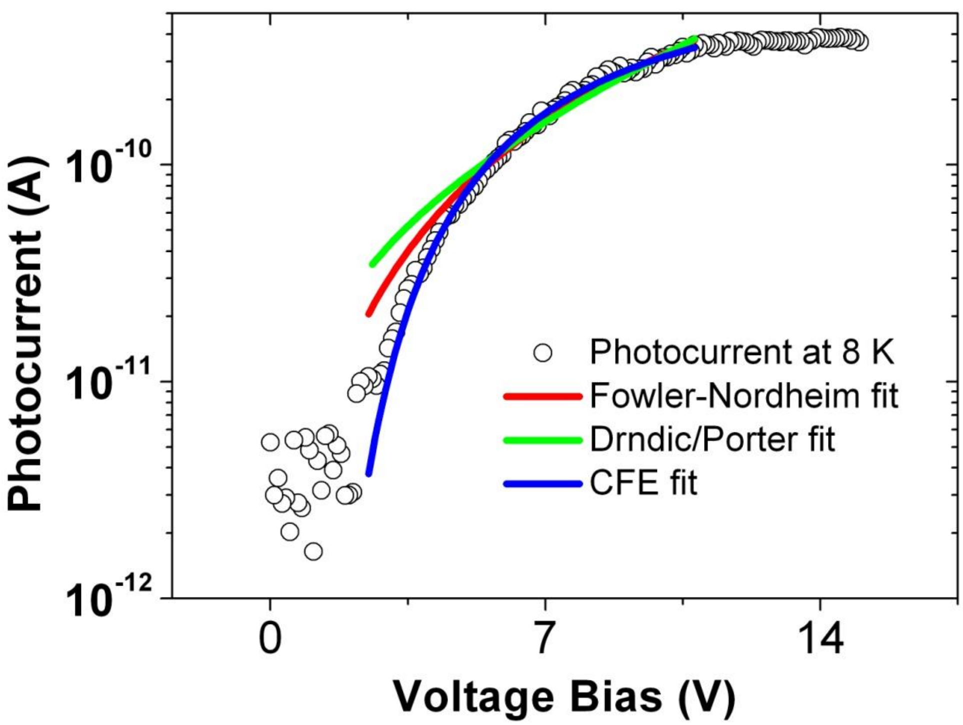

Figure S2. Fitting of the photocurrent-voltage curve displayed in Fig. 2 with different models that could be relevant to describe photocurrent of an assembly of nanocrystals. We tried Fowler-Nordheim fits that apply to charge transport through triangular tunnel barriers, and the phenomenological model proposed by Drndic/Porter [1, 2] that successfully described photocurrent in disordered 2D nanocrystal films.

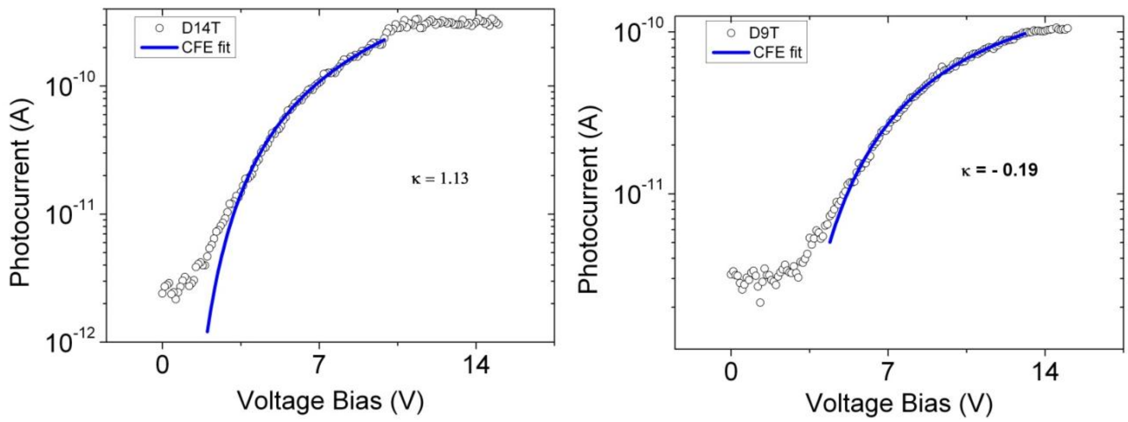

Figure S3. CFE fits to the low-temperature photocurrent-voltage curves on two more devices.

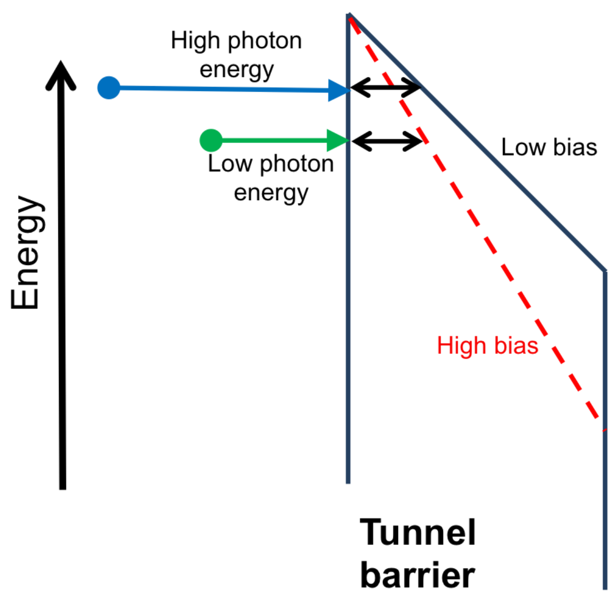

Figure S4. Photo-generated electrons at high/low excitation energies facing potential profiles of tunnel barrier at high/low biases. At higher photon energy, electrons can be excited further above the bottom of conduction band, i.e., closer to the top of the triangular potential barrier and therefore, smaller bias voltage (and hence less tilt of the energy band) is needed to achieve the same effective width of the tunnel barrier, which, roughly speaking, determines the photocurrent in this case.

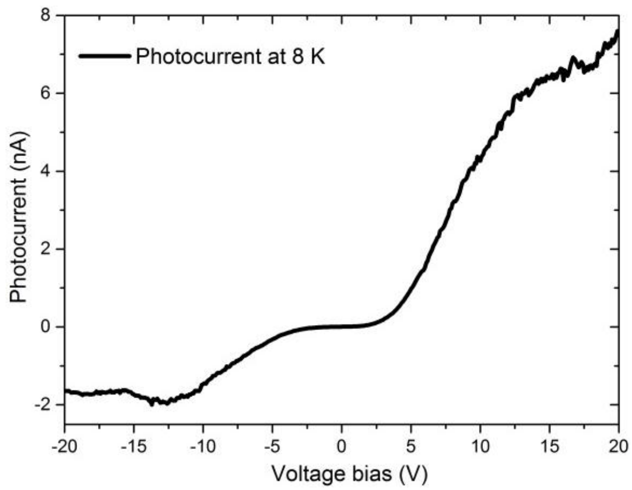

Figure S5. Photocurrent-voltage characteristics of a device showing photocurrent decrease at high voltage bias at 8 K.

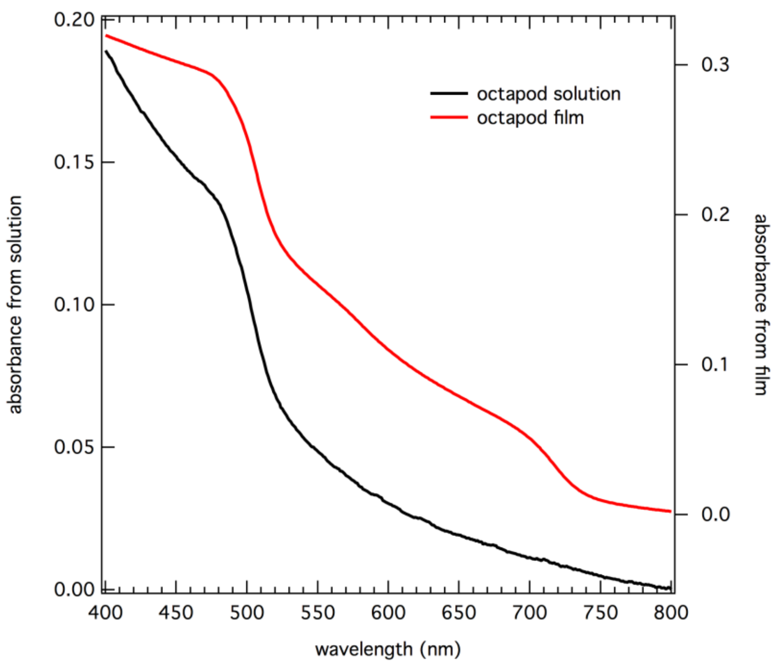

Figure S6. Optical absorption spectra recorded from octapod film on glass and from octapods in solution.

REFERENCES

1. M. Drndic, M. V. Jarosz, N. Y. Morgan, M. A. Kastner and M. G. Bawendi, *Journal of Applied Physics*, 2002, **92**, 7498-7503.
2. V. J. Porter, T. Mentzel, S. Charpentier, M. A. Kastner and M. G. Bawendi, *Physical Review B*, 2006, **73**.