

Author's Accepted Manuscript

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PII: S2211-2855(18)30631-1
DOI: <https://doi.org/10.1016/j.nanoen.2018.08.068>
Reference: NANOEN2998

To appear in: *Nano Energy*

Received date: 31 May 2018
Revised date: 29 August 2018
Accepted date: 30 August 2018

Cite this article as: Xiaoliang Zhang, Donglin Jia, Carl Hägglund, Viktor A. Öberg, Juan Du, Jianhua Liu and Erik M.J. Johansson, Highly Photostable and Efficient Semitransparent Quantum Dot Solar Cells by Using Solution-Phase Ligand Exchange, *Nano Energy*, <https://doi.org/10.1016/j.nanoen.2018.08.068>

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Highly Photostable and Efficient Semitransparent Quantum Dot Solar Cells by Using Solution-Phase Ligand Exchange

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ABSTRACT

For semitransparent solar cells (SSCs) the photovoltaic efficiency and the transparency are the two primary objectives for utilization in for example building integrated photovoltaics. Solution-processed PbS colloidal quantum dot (CQD) has strong light absorption in the ultraviolet region and possess the advantages of tunable bandgap in the visible and infrared region. Herein we report a PbS CQD-SSC with tunable infrared light absorption and high photostability by combining experimental studies and numerical theoretical simulations. Through fine-controlling the electro-optics in the CQD-SSC and by using a solution-phase ligand exchange for the CQD solid film deposition, the power loss in the device is significantly decreased, yielding a CQD-

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