

Literature study

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Which dye can you use.

- ruthenium complex dye [1]
- Artificial chlorin-type sensitizers
- D-A- π -A indoline dyes
- BODIPY series of dyes derived from C219
- Cyclometalated ruthenium sensitizers [2]

These materials are electron rich and have a good light absorption coefficient.

Is there an alternative to the graphite layer

Alternative to an graphite layer:

And alternative to graphite is platinum, it has low resistance and high electrocatalytic activity for iodide but it is more costly then graphite [3]

Do you have a proposal to improve the efficiency

- Combustion synthesized TiO_2 [4]
- Hollow SnO_2 as top layer for TiO_2 layer: gives a lower resistance and faster diffusion constant causing less recombination in the material and a lower FF value. [5]

Why exactly is TiO_2 used, and not ZnO or SnO_2 ?

TiO_2 accepts electrons quicker from the dye, allowing for a higher current, it's more chemically resistant, and cheaper.[6]

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[2] V. Sugathan, E. Jogn, et al, Recent improvements in dye sensitized solar cells: A review, Renewable and Sustainable Energy Reviews, 2015, Volume 52, 54-64

[3] P. Li, J. Wu, et al, High-performance and low platinum loading Pt/Carbon black counter electrode for dye-sensitized solar cells, Solar Energy, 2009, Volume 83, Issue 6, 845-849

[4] S. Umale, V. Sudhakar, et al, Improved efficiency of DSSC using combustion synthesized TiO_2 , Materials Research Bulletin, 2019, Volume 109, 222-226

[5] J. Chen, C. Li, et al, Hollow SnO_2 microspheres for high-efficiency bilayered dye sensitized solar cell, RSC Advances, 2012, Issue 19, 7384-7387

[6] P. Tiwana, P. Docampo, et al, Electron Mobility and Injection Dynamics in Mesoporous ZnO , SnO_2 , and TiO_2 Films Used in Dye-Sensitized Solar Cells, ACS Nano, 2011, 5(6), 5158-5166