Solid State p-Type Dye Sensitized Solar Cells

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P-type dye sensitized solar cells has been intensively investigated due to its potential application in tandem solar cells and solar fuel devices [1,2,3]. The efficiency of p-type DSC is limited by all the unsatisfying photovoltaic parameters, photocurrent, photovoltage and fill factor. Molecular engineering is an effective strategy to improve the photocurrent of p-type DSCs [4, 5]. In order to increase the photovoltage of this kind of device, new materials including p-type semiconductors with more positive Fermi Level or redox mediators with more negative redox potentials are required. So far, all p-type DSCs reported were constructed on the basis of liquid electrolytes. The fundamental concept proposed in our recent work is to investigate the potential of solid state p-type DSCs based on mesoporous NiO with an electron transport material as mediator undertaking the electron transport between two electrodes [6]. With an organic dye, we have fabricated a solid state device for the first time, which achieved a Voc value up to 0.6 V. Transient absorption spectroscopy has been used to study the charge transfer mechanism in this novel device. Moreover, we also try to use TiO2 instead of PCBM as electron collector and study the electron transfer kinetics in the new photocathode.

Reference: