

Can squaraine dyes be used as donor materials in organic photovoltaic cells?

Recently, squaraine (SQ) dyes used as donor materials in organic photovoltaic (OPV) cells have received increasing attention because of their simple synthetic routes, high absorption coefficients with tunable bandgaps and bandwidths in the visible-near infrared region, as well as high photochemical and thermal stabilities.

What are the recent advances of SQS in photovoltaic field?

Thus, in this review, after an introduction of SQs, the recent advances of SQs in the photovoltaic field are comprehensively summarized including dye-sensitized solar cells, organic solar cells, and perovskite solar cells.

Do squaraine dyes have a conflict of interest?

The authors declare no conflict of interest. Abstract Squaraine dyes (SQs) are an important class of polymethine dyes with a unique reasonable-stabilized zwitterionic structure, in which electrons are highly delocalized over the conjugated br...

Squaraine dyes for organic photovoltaic cells. Guo Chen Hisahiro Sasabe T. Igarashi Z. Hong J. Kido. Materials Science, Physics. 2015; Recently, squaraine (SQ) dyes used as donor materials in organic photovoltaic (OPV) cells have received increasing attention because of their simple synthetic routes, high absorption coefficients ...

The donor, 2,4-bis[4-(N,N-diisobutylamino)-2,6-dihydroxyphenyl] squaraine (SQ) is used with the acceptor, [6,6]-phenyl C70 butyric acid methyl ester (PC70BM) to result in efficient, solution-processed, small-molecule bulk heterojunction photovoltaic cells. The distribution of the donor nanoparticles in the acceptor matrix as a function of relative concentrations results in a trade ...

Keywords Organic solar cells · Ternary photovoltaics · Polymer thin films · Squaraine dye · Energy transfer 1 Introduction Organic-based bulk heterojunction solar cells have garnered substantial attention due to their inherent advantages, including facile fabrication processes, the potential for large-scale

Squaraine (SQ) dyes are an important class of electron-donating (donors or p-type) semiconductors for organic solar cells (OSC) due to their facile synthetic access, broad optical ...

zations, the NIR-absorbing squaraine dyes complemented with commercial organic dyes (D35 and Y123) gave a high photocurrent output of 21 mA/cm² with a PCE of 9.4%. INTRODUCTION Dye-sensitized solar cells (DSSCs) are a practical, cost-effective alternative photovoltaic technology.¹⁻⁴ A working DSC contains a sensitizer for light absorption, a wide

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2,4-Bis[4-(N,N-diisobutylamino)-2,6-dihydroxyphenyl] squaraine (SQ) was employed as a donor material in organic photovoltaic cells based on planar heterojunctions. We studied optical properties of SQ films, and discussed its photovoltaic performance via numerical fitting and simulation on the photovoltaic cells.

This study presents the synthesis, characterization, and photovoltaic performance of two novel unsymmetrical squaraine dyes, USQI-NPh 2 Me 2 and USQI-OMe, engineered for application in dye-sensitized solar cells (DSSCs). These chromophores were functionalized with distinct electron-donating groups, di-p-tolylamine for USQI-NPh 2 Me 2 and methoxy for USQI-OMe.

Squaraines (SQs) have been demonstrated as one of potential low-cost donor materials for organic solar cells (OSCs), for which the performances however are limited by low open circuit voltage (V_{OC}). Herein, we show a new molecular design strategy that can achieve SQ-based OSCs with high V_{OC} s exceeding 1.0 V by constructing butterfly-shaped SQ ...

Photovoltaic cells are considered to be one of the most promising renewable energy sources of the 21st century. In particular, dye-sensitized solar cells (DSSCs) and organic photovoltaic devices (OPVs) are potentially the most economical and environmentally friendly ones. Squaraine (SQ) has intense absorption at 600-850 nm, exactly where sun flux is the ...

The strong electron-withdrawing arylamine group results in a highest occupied molecular orbital energy of 5.3 eV, compared to 5.1 eV for the parent SQ, making 1-NPSQ a suitable donor ...

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2,4-bis[4-(N,N-diisobutylamino)-2,6-dihydroxyphenyl] squaraine was systematically studied as an electron donor in solution processed photovoltaic cells, showing power conversion efficiency of $\geq 4.0\%$ under AM1.5G 1 sun illumination at room temperature. In this work, 2,4-bis[4-(N,N-diisobutylamino)-2,6-dihydroxyphenyl] squaraine (SQ) was systematically studied as an ...

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DOI: 10.1039/C3TC31243G Corpus ID: 95701999; J-aggregation of a squaraine dye and its application in organic photovoltaic cells @article{Chen2013JaggregationOA, title={J-aggregation of a squaraine dye and its application in organic photovoltaic cells}, author={Guo Chen and Hisahiro Sasabe and Wei Lu and Xiao-Feng

Wang and Junji Kido and Z. R. Hong ...

Enhanced photovoltaic performances have been obtained for the dyes containing electron-donating groups, where the dye with the -NPh₂ group showed a maximum of 7.03% (V_{OC} 708 mV, J_{SC} 13.16 mA cm⁻², and ff 78%). The dye with the strong electron-withdrawing group -NO₂ showed an efficiency of 1.49% (V_{OC} = 634 mV, J_{SC} = 3.13 mA cm⁻² ...

Squaraine (SQ) dyes have been considered as efficient photoactive materials for organic solar cells. In this work, we purposely controlled the molecular aggregation of an SQ dye, 2,4-bis[4-(N,N-dibutylamino)-2-dihydroxyphenyl] SQ (DBSQ-(OH)₂) in the DBSQ(OH)₂:[6,6]-phenyl-C₆₁-butyric acid methyl ester (PCBM) blend film by using the thermal annealing ...

In this work, we have systematically investigated the post-thermal annealing-induced enhancement in photovoltaic performance of a 2,4-bis[4-(N, N-diisobutylamino)-2,6-dihydroxyphenyl] squaraine (DIBSQ)/C₆₀ planar heterojunction (PHJ) organic solar cells (OSCs). An increased power conversion efficiency (PCE) of 3.28% has been realized from a ...

Effect of Position of Donor Units and Alkyl Groups on Dye-Sensitized Solar Cell Device Performance: Indoline-Aniline Donor-Based Visible Light Active Unsymmetrical Squaraine Dyes. ACS Omega 2024, 9 ...
Synthesis of a Near-Infrared Emitting Squaraine Dye in an Undergraduate Organic Laboratory. Journal of Chemical Education 2012, 89 (9), ...

Light absorbing sensitizer is the heart of the third generation photovoltaic technologies such as dye-sensitized solar cells. Despite possessing large extinction coefficients for the metal-free organic dyes, the light-harvesting efficiency is limited with the narrow absorption profile in either visible or NIR regions of the solar spectrum. Though monolayer formation of ...

Squaraine (SQ) dyes are one of the most representative organic functional dyes, and they have been applied in the field of artificial photosynthesis as components of photovoltaics such as dye-sensitized solar cells [24], [25], organic ...

In this paper, we investigated the aggregation behavior of a squaraine dye in solid films, as well as the effects on its optical and electrical properties. We observed a strong intermolecular interaction in thin films, which can be controlled via processing solvents. Two typical aggregation behaviors, i.e. H- and J- aggregation, can be selectively formed via the proper selection of ...

Among the multifarious kinds of small molecular photovoltaic materials, squaraines are quite attractive due to their facile and low-cost synthesis, intense and broad absorption in Vis-NIR spectral regions with very high molar extinction coefficients. Nevertheless, one key factor limiting the performance of squaraine-based

organic solar cells (OSCs) is their low fill factor ...

To further investigate the influence of dye architecture on dye-sensitized solar cell (DSSC) performance, some near-infrared absorbing quinoline-based squaraine dyes (4a, 4b, and 4c) with different conjugated degrees carrying carboxylic or sulfonic groups as anchoring groups were designed, prepared, and applied as sensitizers in solar cells. The photophysical and ...

Watson et al. report the design, synthesis, and characterization of unsymmetrical core indolizine-squaraine-indoline dyes to improve short-circuit current density in solar cells. The use of a bulky indolizine donor design broadens NIR photon use in solar cell devices and reduces charge recombination pathways.

In this work, to directly compare the photovoltaic performance of solution- and vacuum-processed small-molecule bulk heterojunction (SMBHJ) solar cells, we employed a squaraine small molecular dye ...

Indoline (In) and aniline (An) donor-based visible light active unsymmetrical squaraine (SQ) dyes were synthesized for dye-sensitized solar cells (DSSCs), where the position of An and In units was changed with respect to the anchoring group (carboxylic acid) to have In-SQ-An-CO₂H and An-SQ-In-CO₂H sensitizers, AS1-AS5. Linear or branched alkyl groups ...

reports with squaraines applied in dye sensitized photovoltaic cells.[28-38] In 2008, Silvestri et al. reported the first organic bulk heterojunction cell running on a low molecular weight squaraine/PCBM system with promising results and efficiencies up to 1.24 %.[39] Since then, a few more publications

Squaraine (SQ) dyes are notable for their exceptionally high absorption coefficients extending from the green to the near-infrared. In this work, we utilize the functionalized SQ donor: 2,4-bis [4-(N-phenyl-1-naphthylamino)-2,6-dihydroxyphenyl] squaraine (1-NPSQ) by substitution of isobutylamines in the common "parent SQ" with arylamines to improve stacking and hence ...

Squaraines (SQs) are unusual cyanine dyes with a unique resonance-stabilized zwitterionic structure. These dyes have attracted significant attention in the fields of organic electronics and organic photonics, due to their facile synthesis, intense and narrow visible and near-infrared absorption/emission, high photostability, low biotoxicity, etc. In this review, we ...

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