# Composite photoelectrodes for solar cells

Can organic ferroelectric materials doping enhance the built-in electric field of perovskite solar cells?
Chen,W. et al. High-polarizability organic ferroelectric materials doping for enhancing the built-in electric field of perovskite solar cells realizing efficiency over 24%. Adv. Mater. 34,2110482 (2022). Ollearo,R. Multidimensional perovskites for high detectivity photodiodes. Adv. Mater. 34,e2205261 (2022).

How are solar cells scanned?
Cells were scanned using a Keithley 2450 source-meterforward and reverse from -0.3 V to 1.23 V,with a scanning velocity of 100 mV/s. The pixel area was 3.2 mm by 1.5 mm,corresponding to the overlapping region among ITO and top metal contact. JV characterizations are performed adopting a solar cell mask with aperture 0.03 cm 2.

Does photo-ferroelectric interface improve device stability?
The photo-ferroelectric device retained more than 90% of its relative PCE after over 1000 h,while the control experienced a severe 40% PCE loss,further confirming the importance of our photo-ferroelectric interface in improving devices' stability.

Does ferroelectric 2D integration improve morphology?
No variation in morphology(Fig. S8),band-gap of the active material (Figs. S9 and S10),or band alignment (Fig. S11) - factors typically contributing to V OC improvement - are observed following the integration of the ferroelectric 2D.

What is a photoferroelectric interface physics?
Modeling depicts a coherent matching of the crystal and electronic structure at the interface, robust to defect states and molecular reorientation. The interface physics is finely tuned by the photoferroelectric field, representing a new tool for advanced perovskite device design.

How much V OC does a champion photo-ferroelectric device deliver?
Consequently,the champion photo-ferroelectric device delivers a V OC of 1.21 V,representing 92% and 97% of the theoretical Shockley-Queisser and radiative V OC limit,respectively,with only 44 mV of V OC losses (Fig. 3g,Figure S18 and Eq. S 5).

Dye-sensitized solar cells (DSSCs) are solar energy conversion devices with high efficiency and simple fabrication procedures. Developing transparent counter electrode (CE) materials for bifacial DSSCs can address the needs of window ...

The efficiency of solar-fuel conversion in photoelectrochemical (PEC) systems is hindered by significant losses of photons and photocarriers within the photoelectrodes. This ...

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Several improvements to TiO 2 photoelectrodes have been shown to enhance the overall photovoltaic performances of the DSSCs over many years of development. TiO 2 photoelectrodes were modified and developed through ...

A composite SiO 2 /TiO 2 photoelectrode (PE) architecture for incorporating in dye-sensitized solar cells (DSC) was developed aiming to increase the electron mobility, the specific surface area and the transparency.

The solar cells were stored under dark conditions at 25°C with 60 % relative humidity, and their characteristics were measured every 72 hours. Fig. 10 shows the changes in photovoltaic parameters for WS2/MoS2 over the 1080-hour period (45 days). A decrease in photovoltaic parameters over time was observed, which is expected. However, the WS2/MoS2-based solar ...

JV characterizations are performed adopting a solar cell mask with aperture 0.03 cm 2. The external quantum efficiency (EQE) measurements were performed using ARKEO platform (Cicci Research S.r.l ...

In this study, a TiO 2 nanofiber/nanoparticles composite photoelectrode was combined with spectral convertors to improve the overall efficiency of dye-sensitized solar cells (DSSCs). In a typical preparation process, several photoelectrodes (PE) with equal thickness but different compositions were prepared. The DSSC composed of TiO

TiO2 nanofiber/nanoparticles composite photoelectrodes with improved light harvesting ability for dye-sensitized solar cells @article{Vu2016TiO2NC, title={TiO2 nanofiber/nanoparticles composite photoelectrodes with improved light harvesting ability for dye-sensitized solar cells}, author={Hong Ha Thi Vu and Timur Sh. Atabaev and De Pham-Cong ...

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Dye-sensitized solar cells (DSSCs) have attracted renewed research interest as a potential low-cost substitute for conventional silicon photovoltaics. This work aims to improve the photovoltaic performance of the DSSCs by incorporating multi-walled carbon nanotubes (MWCNTs) into the BaTiO3 photoelectrode. The pure BaTiO3 and BaTiO3/MWCNT ...

The thickness of ETLs in the PSCs has a critical influence on the device performance. 10, 56 To investigate the effect of the thickness of TiO 2 NF films on the cell efficiency, five PSC devices were fabricated based on the TiO 2 NF photoelectrodes with different thicknesses. The thickness of the TiO 2 NF layer was controlled by dilution of the TiO 2 NF paste.

This study explores the development and characterization of zinc oxide--silicon carbide (ZnO-SiC) composite

materials fabricated using RF magnetron ...

Dye-sensitized solar cells (DSSCs) have attracted renewed research interest as a potential low-cost substitute for conventional silicon photovoltaics. This work aims to improve ...

The ZnO nanowire (NW) array/TiO2 nanoparticle (NP) composite photoelectrode with controllable NW aspect ratio has been grown from aqueous solutions for the fabrication of dye-sensitized solar cells (DSSCs), which combines the advantages of the rapid electron transport in ZnO NW array and the high surface area of TiO2 NPs. The results ...

5 ???· The representative of third generation solar cells, dye sensitized solar cells (DSSCs), ... The IV curves of commercial Bi 2 S 3 /TiO 2 composite and hydrothermal Bi 2 S 3 /TiO 2 composite as photoelectrodes for DSSCs are shown in Fig. 6, Fig. 7 while the photovoltaic performance is summarized in Table 1, Table 2, respectively. The DSSCs with commercial Bi ...

The efficiency of solar-fuel conversion in photoelectrochemical (PEC) systems is hindered by significant losses of photons and photocarriers within the photoelectrodes. This study introduces an innovative ITO@In 2 S 3 core-shell nanowire structure designed to overcome these challenges through cutting-edge materials engineering and sophisticated simulation ...

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