



Thin-film solar cell counter electrode

Synthesis of Wurtzite $\text{Cu}_2\text{ZnSnS}_4$ Nanosheets with Exposed High-Energy (002) Facets for Fabrication of Efficient Pt-Free Solar Cell Counter Electrodes

The TCO-coated electrode (e.g., SnO_2 /glass) consists of a nanocrystalline oxide semiconductor thin-film electrode (TiO_2 or ZnO), a sensitizer (dye) is adsorbed on the surface of the TiO_2 electrode, and the TiO_2 electrode absorbs the incoming photons, causing a transition from the ground state (S) to the excited state (S^*). An electron ...

A cost-efficient and effective alternative counter electrode (CE) to substitute an available commercial counter electrode (CE) to make DSSCs efficient, platinum (Pt)-based ...

In this work, we aim to develop a viable, inexpensive and non-toxic material for counter electrodes in dye sensitized solar cells (DSSCs). We employed an ultra-simple synthesis process to deposit MoO_3 thin films at low temperature by sol-gel spin coating technique. These MoO_3 films showed good transparency. It is predicted that there will be 150 ...

A cobalt sulfide (CoS) thin film is deposited on fluorine doped SnO_2 (FTO) glass by repetitive electrophoretic deposition (EPD) and ion exchange deposition (IED), then ...

Iron Pyrite Thin Film Counter Electrodes for Dye-Sensitized Solar Cells: High Efficiency for Iodine and Cobalt Redox Electrolyte Cells Sudhanshu Shukla,+ ,? Nguyen Huu Loc,§ Pablo P. Boix,§ Teck Ming Koh,§ Rajiv Ramanujam Prabhakar,? Hemant K. Mulmudi,§ Jun Zhang,) Shi Chen,) Chin Fan Ng,) Cheng Hon Alfred Huan,) Nripan Mathews,?

Copper oxide (CuO) and CuO /graphene nanostructured thin films were used as counter electrodes (CEs) for dye-sensitized solar cells (DSSCs). CuO and CuO /graphene pastes were prepared and coated on fluorine-doped tin oxide (FTO) glass substrates using a doctor-blade coating method. The substrates were then sintered at $350\text{ }^\circ\text{C}$...

A cobalt sulfide (CoS) thin film is deposited on fluorine doped SnO_2 (FTO) glass by repetitive electrophoretic deposition (EPD) and ion exchange deposition (IED), then the thin film is treated with sodium borohydride or/and sulfuric acid solution. The film is used as the counter electrode of dye-sensitized solar cells (DSSCs), and is characterized by field ...

A solar cell or photovoltaic cell (PV) is a device that directly converts sunlight into electricity using the photoelectric effect. Photovoltaic technology is regarded the most promising among all renewable energy technologies [7,8,9].Solar PV has become a fast-growing, multi-billion sector and the most potential of any renewable technology [].The abundant, clean, ...



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Process optimization of dip-coated MWCNTs thin-films: Counter electrode in dye sensitized solar cells. Author links open overlay panel Pooja A. Mithari, Avinash C ... Bi₂S₃ nanoparticles densely grown on electrospun-carbon-nanofibers as low-cost counter electrode for liquid-state solar cells, Mater. Res. Bull., 125 (2020), p. 110800, 10.1016 ...

We present herein a new facile solution-phase route to the growth of high crystalline quality Cu₂SnSe₃ (CTSe) thin film on a conductive substrate and demonstrate for the first time its promising application as an efficient counter electrode (CE) in liquid-junction quantum dot-sensitized solar cells (QDSCs). Dissolving Cu₂Se and SnSe powders in the ...

Rational design of advanced cost-effective counter electrode (CE) is vital for the development of dye-sensitized solar cells (DSSCs). Herein, we report a novel CoS/reduced graphene oxide (CoS/rGO) composite counter electrode via a facile and rapid microwave irradiation plus ion exchange method. CoS nanoparticles are strongly anchored on three ...

The in situ solvothermal preparation method of the CZTS thin films for counter electrode of DSSCs is green, low cost and simple. ... With the great progress of traditional silicon-based solar cells, thin-film solar cells and the emerging third-generation solar cells such as dye-sensitized solar cells (DSSCs), quantum dot solar cells, ...

When the optimized CIS film was utilized as counter electrode (CE) for dye-sensitized solar cell (DSSC), a PCE of 8.81% was achieved under AM 1.5 illumination (100 mW cm⁻²), constituting over ...

DOI: 10.1016/J.ELECTACTA.2015.01.214 Corpus ID: 93222061; A high performance cobalt sulfide counter electrode for dye-sensitized solar cells @article{Huo2015AHP, title={A high performance cobalt sulfide counter electrode for dye-sensitized solar cells}, author={Jinghao Huo and Min Zheng and Yongguang Tu and Jihuai ...

As a conventional counter electrode used in sensitized solar cells, the Pt counter electrode was chosen as the control sample to evaluate the potential of our novel CuSbS₂ counter electrode [19]. The Pt electrodes were fabricated via a mature processing technology, according to experimental parameters that widely used [21], which made the ...

In this study, a gold leaf 100 nm thin film is used as the counter electrode in dye-sensitized solar cells. The traditional method of hammering gold foil to obtain a thin gold leaf, which requires ...

Directly hydrothermal growth of ultrathin MoS₂ nanostructured films as high performance counter electrodes for dye-sensitized solar cells. RSC Advances 4, 21277-21283 (2014).

SnX (X = S, Se) thin films as cost-effective and highly efficient counter electrodes for dye-sensitized solar cells Chem. Commun., 51 (2015), pp. 8108 - 8111, 10.1039/C5CC00772K View in Scopus Google Scholar



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We present herein a new facile solution-phase route to the growth of high crystalline quality Cu_2SnSe_3 (CTSe) thin film on a conductive substrate and demonstrate ...

Solar cells with absorbing materials like hybrid perovskites have emerged as one of the most researched topics in recent years due to their extraordinary improvement in power conversion efficiency (PCE) from 3.8% in 2009 to 26.1% till 2021 (NREL 2020). These group of materials have a similar crystal structure as inorganic mineral perovskite, CaTiO_3 .

The as-prepared AuPt nanomaterials, which were characterized by XRD, XPS, SEM, and CA, and electrochemical analysis such as cyclic voltammetry, electrochemical ...

In this study, we deposited $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) thin films with various thicknesses using electrodeposition and sputtering methods to exploit them as counter ...

Request PDF | Sol-gel spin coated well adhered MoO_3 thin films as an alternative counter electrode for dye sensitized solar cells | In this work, we aim to develop a viable, inexpensive and non ...

DOI: 10.1016/J.SOLIDSTATESCIENCES.2016.08.016 Corpus ID: 100474041; Sol-gel spin coated well adhered MoO_3 thin films as an alternative counter electrode for dye sensitized solar cells @article{Mutta2016SolgelSC, title={Sol-gel spin coated well adhered MoO_3 thin films as an alternative counter electrode for dye sensitized solar cells}, author={Geeta Rani Mutta and ...

In this paper, we demonstrated that platinum (Pt) counter electrodes (CEs) fabricated using electrochemical deposition and chemical reduction can replace conventional high-temperature thermally decomposed Pt ...

The transparency of super-thin metal film can be enhanced by applying a protective layer due to the anti-reflective and optical interference. Roldán-Carmona et al. [] used super thin Au layer as a transparent counter electrode in a PSCs featuring configuration of fluorine-doped tin oxide/(poly(3,4-ethylenedioxythiophene) polystyrene ...

In this study, it was aimed to produce graphene/polyaniline nanocomposite thin films as counter electrode materials by PECVD system and to determine the photovoltaic performances of these counter electrodes in dye-sensitized solar cells (DSSCs). Graphene/polyaniline counter electrode (GPCE) material was produced in two different steps. ...

A thin film of iron sulphide was also deposited on fluorine-doped tin oxide glass to work as a counter electrode for dye-sensitized solar cells. In this study, iron sulphide thin films were prepared by simple and low-cost chemical spray-pyrolysis method using tilt deposition with a spraying angle of

With perovskite solar cells (PSCs) reaching efficiencies comparable to or above crystalline silicon and thin



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film solar cells, initially sidelined topics such as the choice of counter electrodes are now receiving growing attention.

In dye-sensitized solar cells (DSSCs), the counter electrode (CE) plays a crucial role as an electron transfer agent and regenerator of the redox couple. Unlike conventional CEs that are generally made of glass-based substrates (e.g., FTO/glass), polymer substrates appear to be emerging candidates, owing to their intrinsic properties of lightweight, high ...

In the present investigation, kesterite phase $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) nanoparticle, and one-dimensional (1D) nanorods and three-dimensional (3D) flower-like rutile phase TiO_2 thin films were obtained by the conventional hydrothermal method. The (112) plane-oriented single-phase CZTS nanoparticles with chemical composition $\text{Cu}/(\text{Zn} + \text{Sn}) = 0.84, 0.90, 1.05$ were ...

Compared with conventional cells using natural dye electrolytes and platinum as the counter electrodes, cells with a single-walled nanotube (SWNT) film counter electrode show comparable conversion efficiency, which is attributed to the increase in short circuit current density due to the high conductivity of the SWNT film. Carbon nanotube (CNT) films have ...

Dye-sensitized solar cells (DSSCs) have gained a lot of attention as a potential contender for efficient solar energy utilization in an economical fast easily scalable manner. ... Different mol% of Ni-doped MoO_3 thin film counter electrodes were fabricated by a facile spin coating method. Doping of nickel in molybdenum was done to explore the ...

The performance of the deposited CZTS thin films used as the counter electrode for dye-sensitized solar cells (DSSCs) was evaluated by measuring photocurrent density-voltage curves of DSSCs ...

In this paper, the prospects of iron oxide films and their sulfidation for dye-sensitized solar cells (DSSC) are reviewed. Iron oxide thin films were prepared by hollow cathode plasma jet (HCPJ) ...

Counter electrodes (CEs) are key components for collecting external circuit electrons and catalyzing reduced electrolytes in quantum dot-sensitized solar cells (QDSSCs). Hence, ...

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The thin film is used as counter electrode (CE) in quantum dot-sensitized solar cell. Superior electrocatalytic activity and stability in the polysulfide electrolyte is received. The narrow band gap characteristics and p-type conductivity enhances the cell efficiency. An efficiency of 4.67% is received for the CdS/CdSe co-sensitized ...

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