

Can zirconium oxide films be used in dye-sensitized solar cells?

The review enlightens the contributions on the synthesis of zirconium oxide films and their applications in dye-sensitized solar cells which will help the vision scientists, researchers, and trainees to intensify their research work on ZrO₂. Deposition techniques of thin films can be categorized into chemical and physical methods.

Can Zirconium acetylacetonate be used in inverted solar cells?

Effective interface treatments by inserting zirconium acetylacetonate between the perovskite and fullerene-based electron transport layer led to high-performance and stable inverted solar cells. 1. Introduction

Does zirconium content affect photovoltaic properties of DSSC?

It has been shown that $x = 5\%$ of zirconium content, an increased V_{OC} has been achieved [129, 131]. They have studied the influence of electrical properties of $Ti_{1-x}Zr_xO_2$ on the photovoltaic properties of the DSSC. By increasing zirconium content, a monotone increase in lattice constant and hence increase in V_{OC} were observed.

What causes photoluminescence in zirconium?

The study proposed that the photoluminescence mechanism was originated from the emission of a recombination center related to oxygen vacancies formed during anodization of zirconium. Simka et al. reported anodic oxidation of zirconium. A solution containing KOH and K_2SiO_3 was used for oxidation process.

Can mesoporous zirconia-based dye-sensitized solar cells improve conversion efficiency?

Mesoporous zirconia-based dye-sensitized solar cells can change the overall scenario if conversion efficiency is enhanced. Photovoltaic devices are economical and clean sources of energy, and hence, they are studied on large scale.

Can zirconia film be used as a photoanode?

The deposition techniques reported by various research groups discussed here are very much practical. The use of ZrO₂ film as a photoanode is not yet reported, but mesoporous zirconia films are being used in different manners in enhancing the quantum efficiency of TiO₂-based dye-sensitized solar cells.

Low-temperature zinc oxide nanoparticles (ZnO NPs) are widely applied as cathode interfacial layers (CILs) for rigid and flexible organic solar cells. However, the inferior optoelectronic properties of ZnO NPs constrain the improvement in the photovoltaic performance and enhance the thickness sensitivity. Herein, upon application of ...

A research team including scientists from Italian module manufacturer 3Sun has tested new zirconium-doped

indium oxide electrodes in commercial heterojunction solar modules. The new electrodes ...

By using ZnO:Zr as ETL in inverted device configuration, the maximum power conversion efficiency (PCE) of PM6:Y6:PC 71 BM solar cell devices is up to 17.2%, which makes an enhancement of 9.55% compared to ZnO-based devices (15.7%). As the thickness of ZnO:Zr ETL increases to 60 nm, the presence of the lower parasitic absorption together with uniform ...

To test the performances of a proof-of-concept solar cell based on IZrO ...

A European research group led by Italy's University of Catania has tested the use of zirconium (Zr)-doped indium oxide (In₂O₃) as a transparent conductive film in the silicon heterojunction (HJT)...

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IZrO film was used as a transparent conducting electrode in silicon ...

All-inorganic wide-bandgap perovskite CsPbI₂Br has attracted much attention because of its inherent thermal stability and ideal bandgap for the front subcell of tandem solar cells (TSCs). However, the low power conversion efficiency (PCE) and poor moisture stability of CsPbI₂Br still restrict its future commercialization. Herein, zirconium tetrachloride (ZrCl₄) was ...

Carbon-based mesoscopic perovskite solar cells (PSCs) and photodetectors were fabricated with the application of double-layered ZrO₂ films, consisting of zirconia nanoparticles and microparticles for the first and the second layer, respectively. This assembly exploits the ability of the zirconia microparticles to scatter and hence diffuse the incident light, ...

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Here we demonstrate high performance PSCs by employing as-prepared ...

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In the present review, various deposition techniques used to grow zirconium oxide thin films and their application to enhance the quantum efficiency of titanium oxide (TiO₂) based dye-sensitized solar cells

(DSSCs) are discussed. Also, the modulated performances of DSSCs fabricated by growing the conformal ZrO₂ insulating films to ...

Efficient carrier transport and suppressed interface recombination at back contact are essential for high-efficiency solar cells. Herein, we developed a zirconium nitride (ZrN) film with a low film resistivity of 1.6 $\times 10^{-3}$ Ωcm ; ...

Inverted polymer solar cells incorporating solution-processed zirconium acetylacetonate (ZrAcac) buffer layers were demonstrated. The optimal device delivered a power conversion efficiency up to 9.2%, displaying ~20% ...

Recently, zirconium acetylacetonate (ZrAcac), as a stable electron-selective material, has been considered as a simple and effective alternative to traditional interlayers and has been integrated in perovskite and polymer solar cells successfully (Chen et al., 2017, Fan and Zhu, 2016, Hancox et al., 2015, Lu et al., 2020). The ZrAcac was first served as an effective ...

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