Solar hydrogen production using epitaxial srtio3 on a gaas photovoltaic

Films grown using this technique have been shown to have ideal oxygen stoichiometry based on x-ray photoelectron spectroscopy measurements. 1 Representative out-of- plane x-ray diffraction and ...

For this tunable architecture we demonstrate 100% Faradaic efficiency for hydrogen evolution, and incident photon-to-current efficiencies (IPCE) exceeding 50%. High IPCE for hydrogen evolution is a consequence of the low-loss interface achieved via epitaxial growth of a thin oxide on a GaAs solar cell.

[Show full abstract] the low-loss interface achieved via epitaxial growth of a thin oxide on a GaAs solar cell. Developing optimal energetic alignment across the interfaces of the photoelectrode ...

Using a catalyst-free 16 nm-thick SrTiO3 on np-GaAs, a stable hydrogen evolution current is produced under 1 Sun with IPCE reaching 50% at the thermodynamic potential of 0 VRHE. Because of the high-quality of the ...

Fig. 3 Spectral response of SrTiO3/np-GaAs devices. (a) Incident photonto-current efficiency (IPCE) in solution at different potentials near 0 VRHE. (b) IPCE of two-contact photovoltaic measurements with no electrolyte with and without SrTiO3 compared to IPCE of photoelectrochemical HER at 0 VRHE (from panel a). Insets show schematics of ...

Solar hydrogen production using epitaxial SrTiO3 on a GaAs photovoltaic. ... High Performance Ultrathin GaAs Solar Cells Enabled with Heterogeneously Integrated Dielectric Periodic Nanostructures ...

Solar hydrogen production using epitaxial SrTiO3 on a GaAs photovoltaic. Article. Jan 2017; ... GaAs solar cells. Photovoltaic performance of 10-fold-stack GaAs solar cells exhibited promising ...

SrTiO3 can be synthesised by hydrothermal, solvothermal, SSR, MSR, and sol-gel reaction. ... Use the link below to share a full-text version of this article with your friends and colleagues. ... as well as to generate hydrogen fuel via photocatalysis process. Besides that, it was noticed that SrTiO 3 can be synthesised in different pathways.

Although compound semiconductors like gallium arsenide (GaAs) offer advantages over silicon for photovoltaic and optoelectronic applications, these do not outweigh the costly process of growing ...

Photoelectrochemical solar fuel generation requires a highly integrated technology for converting solar energy into chemical fuels. Dihydrogen (H2) and carbon-based fuels can be produced by water splitting and CO2 reduction, respectively. Material synthesis, device assembly, and performance of photoelectrochemical

systems have rapidly improved in the last decade. ...

Despite their excellent photophysical properties and record-high solar-to-hydrogen conversion efficiency, the high cost and limited stability of III-V compound semiconductors prohibit their practical application in solar-driven photoelectrochemical water splitting. Here we present a strategy for III-V photocatalysis that can circumvent these difficulties via printed assemblies of ...

Fig. 1 Physical and electronic structure of the photocathode consisting of an epitaxial oxide grown on a semiconductor solar cell. (a) Schematic of the 16 nm-thick SrTiO3/np-GaAs(001) photocathode (STOPC) at 0 VRHE under illumination, where sunlight is absorbed in the semiconductor solar cell, generating a voltage and driving electrons to the oxide-water ...

We demonstrate, for the first time, GaAs thin film solar cells epitaxially grown on a Si substrate using a metal wafer bonding and epitaxial lift-off process. A relatively thin 2.1 mm GaAs buffer layer was first grown on Si as a virtual substrate, and a threading dislocation density of 1.8 × 107 cm-2 was achieved via two In0.1Ga0.9As strained insertion layers and 6× thermal ...

High IPCE for hydrogen evolution is a consequence of the low-loss interface achieved via epitaxial growth of a thin oxide on a GaAs solar cell. Developing optimal energetic alignment across the interfaces of the photoelectrode using well-established III-V technology is ...

loss interface achieved via epitaxial growth of a thin oxide on a GaAs solar cell. Developing optimal energetic alignment across the interfaces of the photoelectrode using well-established ...

Ji et al. reported that epitaxial SrTiO3/P-Si(001) heterojunction photocathodes loaded with Ti/Pt nanostructured catalysts exhibited a stable photocurrent of 35 mA cm-2 at 0 VRHE over 35 h, thanks to the efficient transfer of photoexcited electrons resulting from the conduction band alignment and lattice match between Si and the productive ...

Arrays of B-doped p-Si microwires, diffusion-doping with P to form a radial n(+) emitter and subsequently coated with a 1.5-nm-thick discontinuous film of evaporated Pt, were used as photocathodes for H(2) evolution from water to ...

We demonstrate an oxide-stabilized III-V photoelectrode architecture for solar fuel production from water in neutral pH. For this tunable architecture we demonstrate 100% ...

Solar H2 production is considered as a potentially promising way to utilize solar energy and tackle climate change stemming from the combustion of fossil fuels. Photocatalytic, photoelectrochemical, photovoltaic-electrochemical, solar thermochemical, photothermal catalytic, and photobiological technologies are the most intensively studied routes for solar H2 ...

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Solar hydrogen production using epitaxial SrTiO 3 on a GaAs photovoltaic+ ... GaAs solar cell. Developing optimal energetic alignment across the interfaces of the photoelectrode ... Following 24 h solar hydrogen production at 0 V RHE under simulated 1 Sun illumination, cyclic voltammetry of the STOPC shows a HER onset potential of B0.3 V RHE ...

The production of synthetic fuels and chemicals from solar energy and abundant reagents offers a promising pathway to a sustainable fuel economy and chemical industry. For the production of ...

Solar hydrogen production using epitaxial SrTiO3 on a GaAs photovoltaic L ... We demonstrate an oxide-stabilized III-V photoelectrode architecture for solar fuel production from water in neutral pH. ... Y. Zhu, E. I. Altman, M. L. Lee, C. H. Ahn, F. J. Walker, Y. Shao-Horn. "Solar hydrogen production using epitaxial SrTiO3 on a GaAs ...

Chemical and electronic structure analysis of a SrTiO3 (001)/p-Ge (001) hydrogen evolution photocathode - Volume 8 Issue 2 ... T.S., and Nocera, D.G.: Solar energy supply and storage for the legacy and nonlegacy worlds. Chem. Rev. 110, ... F.J., and Shao-Horn, Y.: Solar hydrogen production using epitaxial SrTiO 3 on a GaAs photovoltaic. Energy ...