

Organic photovoltaics (OPVs) are an emerging solar cell technology that is cost-effective 1,2,3, lightweight 4,5 and flexible 4,6,7,8. Moreover, owing to their energy-efficient production and non ...

Here, vertical field-effect organic photovoltaic (VFEOPV) by integrating an bulk-heterojunction (BHJ) organic photovoltaic (OPV) with vertical field effect transistor (VFET) is invented, in which ...

Clearly, our experimental studies show that mechanical bending can largely increase the photovoltaic actions, leading to mechanically tunable photovoltaic effects in organic-inorganic hybrid perovskites. We note that our mechanical bending occurs within elastic deformation zone in the polycrystalline perovskite films.

Over the past 20 years, significant progress has been made in organic photovoltaics (OPVs) due to its advantages of being cost-effective, being lightweight, and having flexible manufacturability.

Mechanical residual stresses within multilayer thin-film device stacks become problematic during thermal changes because of differing thermal expansion and contraction of the various layers. Thin-film photovoltaic (PV) devices are a prime example where this is a concern during temperature fluctuations that occur over long deployment lifetimes. Here, we show ...

To protect brittle layers in organic photovoltaic devices, the mechanical neutral plane strategy can be adopted through placing the brittle functional materials close to the neutral plane where stress and strain are zero during bending. ... In order to demonstrate the effect of the multiple neutral planes, direct comparison between single and ...

This review paper provides an in-depth analysis of the latest developments in silicon-based, organic, and perovskite solar cells, which are at the forefront of photovoltaic research.

Mechanical flexibility has long been a key attribute of emerging photovoltaic (ePV) devices 1, including organic 2,3, dye-sensitized 4, perovskite 5,6,7,8, quantum-dot 9,10,11 and ...

This paper describes the effects of tensile strains up to 20% on the photovoltaic properties of solar cells based on two types of conjugated polymers, and their blends with a ...

Organic-inorganic hybrid perovskites simultaneously possess strong spin-orbit coupling (SOC) and structure inversion asymmetry, establishing a Rashba effect to influence light emission and photovoltaics. Here, we use mechanical bending as a convenient approach to investigate the Rashba effect throug ...

DOI: 10.1016/J.SOLENER.2014.04.012 Corpus ID: 122016755; Residual stress and mechanical property measurements in amorphous Si photovoltaic thin films @article{Antartis2014ResidualSA, title={Residual stress and mechanical property measurements in amorphous Si photovoltaic thin films}, author={Dimitrios A. Antartis and Ioannis D. Chasiotis}, journal={Solar Energy}, ...

Here, we demonstrate waterproof and ultraflexible organic photovoltaics through the in-situ growth of a hole-transporting layer to strengthen interface adhesion between the active ...

Here, we investigated the electronic band structure and carrier transport mechanism of $\text{Cu}_2\text{ZnSn(S,Se)}_4$ (CZTSSe) photovoltaic devices under mechanical stress. Highly efficient flexible CZTSSe ...

The benefits of enabling mechanical flexibility in next-generation photovoltaics are primarily twofold: besides enriching the solar cell/module functionality (e.g., for applications in wearable electronics and building integration), it can further facilitate large-scale installation using high-throughput techniques such as roll-to-roll fabrication.

ARTICLE OPEN Ultra-flexible semitransparent organic photovoltaics Hanbee Lee^{1,8}, Soyeong Jeong^{2,8}, Jae-Hyun Kim^{3,8}, Yong-Ryun Jo⁴, Hyeong Ju Eun⁵, Byoungwook Park⁶, Sung Cheol Yoon⁶, Jong H. Kim⁵ ...

The certified power conversion efficiency (PCE) of organic photovoltaics (OPV) fabricated in laboratories has improved dramatically to over 19% owing to the rapid development of narrow-bandgap ...

Recent advancements in the development of organic electronics have led to the investigation of natural, biodegradable materials to achieve greener alternatives to current electronics. Shellac, a natural resin material, has recently shown great potential as a dielectric and substrate in greener organic electronics. With this material, the evaluation of other properties, ...

Cross-linked thermosets (CLTs) with strong H-bonding and high modulus are top-grade, thermally stable organics and have a wide range of applications, including construction materials in aerospace, marine, and automotive manufacturing, owing to their excellent mechanical and environmental stability. 27, 28, 29 Cross-linked organic semiconductors ...

The effect of FCBSs length on solubility of the acceptor polymers, and their photovoltaic and mechanical properties in all-polymer solar cells were explored. This work provides useful guidelines for the design of semiconducting polymers by introducing FCBS with proper length, which can greatly improved properties that are not possible to be ...

To establish the possible agglomerate formation depending on the type of solvent, we investigated a wide range of concentrations ($\text{}$), from 5.3×10^{-9} to 2.56×10^{-7} M (6.67×10^{-4} to 3.22×10^{-5} ;

10⁻² mg mL⁻¹), within the limit of 2.1 absorbance units. Following the changes in spectra, the ratios of the integrated intensities of the bands at 621 and 680 nm were compared.

Duan, Y. et al. Pronounced effects of a triazine core on photovoltaic performance-efficient organic solar cells enabled by a pdi trimer-based small molecular acceptor. *Adv. Mater.* 29, 1605115 ...

Developing intrinsically stretchable organic photovoltaics (IS-OPVs) is crucial for serving as power sources in future portable and wearable electronics. PEDOT:PSS is most commonly used to prepare highly conductive, transparent electrodes with high stretchability.

In this study, we demonstrate the in-situ-forming cross-linked thermoset (CLT) matrices in organic semiconductor blends as an efficient and universal strategy for developing resilient organic photovoltaics (OPVs). The synergistic effect of high modulus, high glass transition temperature, and H-bonding interactions endows CLT-based OPV devices with simultaneously ...

A review of photovoltaic performance of organic/inorganic solar cells for future renewable and sustainable energy technologies. ... Fossil fuels also affect the air quality and public health by emitting green house gases like CO₂ and other air pollutants. Based on the current economic growth figures, the world needs energy of 28 TW in 2050 and ...

The PV cell technology originates after the report by Alexandre Edmond Becquerel during his first observations of the photovoltaic effect in 1839 ... Organic photovoltaic cell ... Introducing composite materials promotes the production of flexible and durable OPVs that can withstand mechanical stress and temperature variations ...

Herein, we demonstrate high-performance intrinsically stretchable organic photovoltaics with an initial power conversion efficiency of 14.2%, exceptional stretchability ...

Article In situ formation of thermoset matrices for improved stability in organic photovoltaics Jianhua Han,1,2 Han Xu,1 Anirudh Sharma,1 Maxime Babics,1 Jules Bertrandie,1 Xunchang Wang,3 Luis Huerta Hernandez,1 Yongcao Zhang,1 Yuanfan Wen,1 Diego Rosas Villalva,1 Nicolas Ramos,4 SriHarishK.Paleti,1,5 JaimeMartin,4 FuzongXu,1 JoelTroughton,1 ...

The key to improving the mechanical stability of OPVs lies in realizing mechanically robust active layers. This perspective first analyzes working scenarios of flexible OPVs (static and dynamic conditions) and ...

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Mechanical stress effect on organic photovoltaics