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For the previous few decades, the photovoltaic (PV) market was dominated by silicon-based solar cells. However, it will transition to PV technology based on flexible solar cells recently because of increasing demand for devices with high flexibility, lightweight, conformability, and bendability. In this review, flexible PVs based on silicone ...

Thin-film flexible solar cells are lightweight and mechanically robust. Along with rapidly advancing battery technology, flexible solar panels are expected to create niche products that require lightweight, mechanical flexibility, and moldability into complex shapes, such as roof-panel for electric automobiles, foldable umbrellas, camping tents, etc.

Here, we summarize the recent progress on the photovoltaic performance and mechanical robustness of foldable solar cells. The key requirements to construct highly foldable solar cells, including structure design based on tuning the neutral axis plane, and adopting flexible alternatives including substrates, transparent electrodes and absorbers ...

A champion flexible perovskite solar cell and module using ultrathin TCEs achieve efficiencies of 19.16% and 13.26% (aperture areas of 0.078 and 16 cm²), respectively, outperforming reference devices using commercial high-performing flexible TCEs. The modules maintain 100% and 92% of their initial performance after 10 000 bending cycles with a ...

In article number 2004092, Shigeo Maruyama, Phillip Lee, Il Jeon, and co-workers report carbon nanotube-embedded ultra-thin polyimide conductor-based foldable perovskite solar cells. The foldable photovoltaic device exhibits 15.2% of power output and withstands 10 000 cycles of folding test at a bending radius of 0.5 mm. Such high efficiency ...

Semitransparent organic solar cells (ST-OSCs) have attracted extensive attention for their potential greenhouse applications. Conventional ST-OSCs are typically based on indium tin oxide (ITO) electrodes which suffer from mechanical brittleness. Therefore, alternatives for ITO are required for realization of foldable-flexible ST-OSCs (FST-OSCs). Herein, flexible poly(3,4 ...

Here we provide a strategy for fabricating large-scale, foldable silicon wafers and manufacturing flexible solar cells. A textured crystalline silicon wafer always starts to crack at the sharp...

The key requirements to construct highly foldable solar cells, including structure design based on tuning the

neutral axis plane, and adopting flexible alternatives including substrates ...

Energy devices, such as photovoltaic devices are following suit in the form of hair-wrapping-flexible organic solar cells and perovskite solar cells (PSCs) that can be crumpled. [12, 13] In deformable electronics technology, transparent conductors and substrates play the most crucial role, governing the entire mechanical flexibility of the device.

My research team developed a strategy to fabricate foldable silicon wafers with a small bending radius of about 4 mm. When made into lightweight flexible amorphous-crystalline silicon heterojunction solar cells, the power conversion efficiency is independently calibrated to be more than 24% (Fig. 2). When the cells are encapsulated into a large ...

Folding-flexible semitransparent organic solar cells with over 10% efficiency and 21% average visible light transmission are realized by using xylitol microdoping and acid treatment on poly(3,4-ethyl...

A champion flexible perovskite solar cell and module using ultrathin TCEs achieve efficiencies of 19.16% and 13.26% (aperture areas of 0.078 and 16 cm²), respectively, outperforming reference devices using ...

Silicon solar cells are a mainstay of commercialized photovoltaics, and further improving the power conversion efficiency of large-area and flexible cells remains an important research objective^{1,2}.

In this study, we propose a morphology engineering method to fabricate foldable crystalline silicon (c-Si) wafers for large-scale commercial production of solar cells with remarkable efficiency. Our first goal was to fabricate foldable c-Si wafers with a strong light-harvesting ability.

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