Scientists study solar cells

Can chiral molecules improve the stability of perovskite solar cells?
Interfacial engineering is key to ensure the long-term stability of perovskite solar cells. Research now shows that chiral molecules can both improve the mechanical stabilityof the interfaces and afford passivation of defects at the perovskite surface,making solar cells more tolerant to thermal cycling stress.

How efficient are p-i-n perovskite solar cells?
We demonstrated p-i-n perovskite solar cells with a record power conversion efficiency of 24.6% over 18 square millimeters and 23.1% over 1 square centimeter,which retained 96 and 88% of the efficiency after 1000 hours of 1-sun maximum power point tracking at 25° and 75°C,respectively.

Could solar power be a revolution?
It could lead to lower-cost,more efficient systems for powering homes,cars,boats and drones. The solar energy world is ready for a revolution. Scientists are racing to develop a new type of solar cell using materials that can convert electricity more efficiently than today's panels.

What is a research interest in solar energy conversion?
Research interest is the development of new chemical approachesto solar energy conversion - harnessing solar energy either to produce electricity (photovoltaics) or molecular fuels (e.g. hydrogen). Research interests lie in the area of solar energy conversion and molecular electronics.

How do solar cells produce electricity?
Solar cells are devices for converting sunlightinto electricity. Their primary element is often a semiconductor which absorbs light to produce carriers of electrical charge. An applied electric field can then sweep these carriers out of the semiconductor,thus producing an electrical current.

Can perovskite solar cells be tested indoors?
Perovskite solar cells are often tested indoorsunder conditions that do not represent outdoor use. Fei et al. found that faster degradation of the cells in outdoor testing stems from higher ultraviolet levels that cause debonding at the indium-tin oxide and hybrid hole-transporter layer interfaces.

So, instead of just trying to make solar cells better, we figured some other ways to capture more solar energy," said Dr. Tomi Baikie, first author of the study and Research Fellow at the Cavendish Laboratory and at Lucy Cavendish College. "This could be really helpful for communities, giving them different options to think about, instead of just focusing on making ...

The sun is the most plentiful renewable energy source available on the planet. Our research proposes to harness this potential through the development of solar cells. This can be ...

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These kinds of solar cells have been stymied by the fact that light quickly breaks them down after not much use. The AI model developed more stable organic light-harvesting molecules. A second AI ...

In all of this, the research team says that while the thermally stable Spiro unit is only in a solar cell that reaches 6% efficiency, they see a path via future research to stabilize the 24% efficiency solar cell. According to the study, Spiro is currently an expensive material, priced online at $334 per gram. However, the researchers predict ...

A new record for electrical energy generation from CIGS solar cells has been reached. Scientists have achieved a 23.64 percent efficiency.

This Collection presents recent research efforts in stabilizing perovskite solar cells with three interconnected themes: characterizing instability, synthesizing stable ...

The design of hole-transporting materials (HTMs) for perovskite solar cells (PSCs) has mainly been driven by experimentalists qualitatively recognizing patterns in HTM structures to improve device performance (1-3).This approach lacks a mechanistic understanding of new HTMs but also requires pattern recognition in high-dimensional datasets.

Scientists from Australia"s national science agency, CSIRO, have led an international team to a clean energy breakthrough by setting a new efficiency record for fully roll-to-roll printed solar cells.

According to the study, the researchers dissolved KL and BCP in a solvent to form a homogenous solution, which was then uniformly applied to the cathode side of the solar cells. The placement of this binary layer is crucial, as it sits between the active layer--where light absorption and electron-hole pair generation occur--and the cathode. This positioning allows ...

The study reveals new insights on how to make high-efficiency perovskite solar cells, and also provides new directions for engineers working to bring these solar cells to the commercial...

Engineers have discovered a new way to manufacture solar cells using perovskite semiconductors. It could lead to lower-cost, more efficient systems for powering homes, cars, boats and drones....

This Collection presents recent research efforts in stabilizing perovskite solar cells with three interconnected themes: characterizing instability, synthesizing stable perovskites and curing...

We report degradation mechanisms of p-i-n-structured perovskite solar cells under unfiltered sunlight and with LEDs. Weak chemical bonding between perovskites and polymer hole-transporting materials (HTMs) and transparent conducting oxides (TCOs) dominate the accelerated A-site cation migration, rather than direct degradation of HTMs.

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The design of hole-transporting materials (HTMs) for perovskite solar cells (PSCs) has mainly been driven by experimentalists qualitatively recognizing patterns in HTM ...

Researchers use advanced scientific tools at SLAC to study materials that could be used to make better solar cells. Perovskites" unusual response to light could explain the high efficiency of these next-generation ...

To make organic solar cells (OSC) competitive, the light-absorbing molecules should simultaneously satisfy multiple key requirements, including a weak-absorption charge transfer state, a high dielectric constant, suitable surface energy and proper crystallinity.

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