

Silicon Crystal Optoelectronics solar container outdoor power





Overview

Organic electrochemical transistors (OECTs) have been increasingly explored for innovative electronic devices. However, they inherently demand two power suppliers, which is unfavorable for the utilization of portable and wearable systems with strict energy requirements. Herein, by assembling a monocrystalline silicon solar cell into the OECT circuit with light as fuel, we demonstrated the possibility of a self-powered and light-modulated operation of organic photo-electrochemical transistor (OPECT) optoelectronics. Exemplified by poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate) (PEDOT:PSS)-based depletion-mode and accumulation-mode OECTs, different light-addressable configurations were constructed, and the corresponding characteristics were systematically studied and compared. Different device behaviors with distinct characteristics could be achieved with the appropriate usage of light stimulation. Toward applications, optologics were designed with various parameters depending on the incident irradiance. Light-controlled OPECT unipolar inverters were further demonstrated and optimized with respect to the power source and resistance. This work features new OPECT optoelectronics combined with proper flexible substrates and solar cells for potential applications in portable and wearable devices.

Can photonic crystal structures improve light trapping in amorphous silicon solar cells?

Similarly, Lin et al. (2015) focused on the design and fabrication of photonic crystal structures to improve light trapping in amorphous silicon solar cells 27. Zhang et al. (2016) explored the utilization of photonic crystal nanostructures to enhance light trapping in amorphous silicon solar cells as well 28.

What are the advantages of silicon heterojunction solar cells?

Silicon heterojunction (SHJ) solar cells, as one of the most promising passivated contact solar cell technologies of the next generation, have the advantages of high conversion efficiency, high open-circuit voltage, low-temperature coefficient, and no potential-induced degradation.

Can photonic crystals improve light trapping in thin-film solar cells?



Additionally, Chutinan et al. (2005) optimized photonic crystal light-trapping in thin-film solar cells 29, while Zhang et al. (2014) studied the design and optimization of photonic crystal structures for enhanced light trapping in amorphous silicon thin film solar cells 30.

Can photonic crystals improve solar cell performance?

Numerous studies have demonstrated the potential of photonic crystals (PCs) to advance the performance of many solar cell technologies, including thin-film, crystalline silicon and Dye-sensitized solar cells 22, 23, 24, 25.



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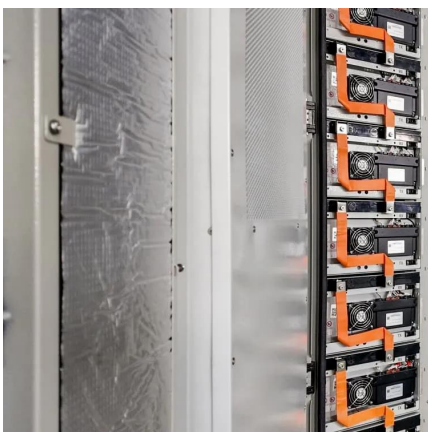


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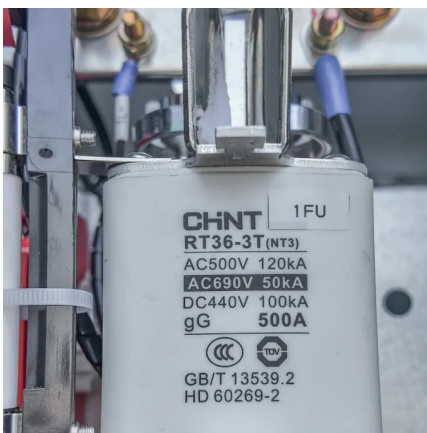
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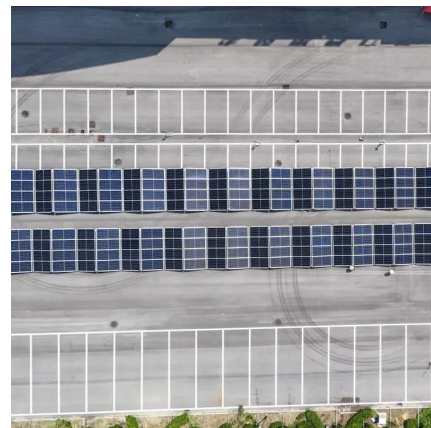


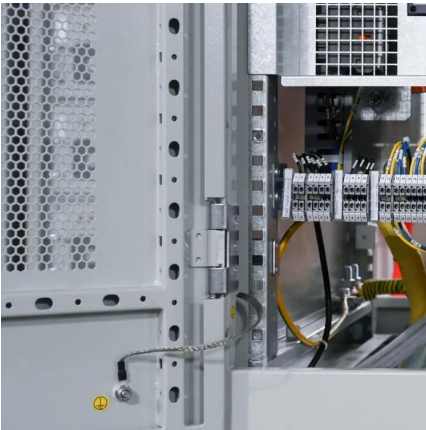
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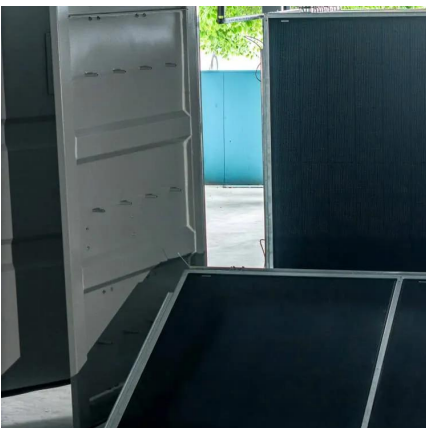
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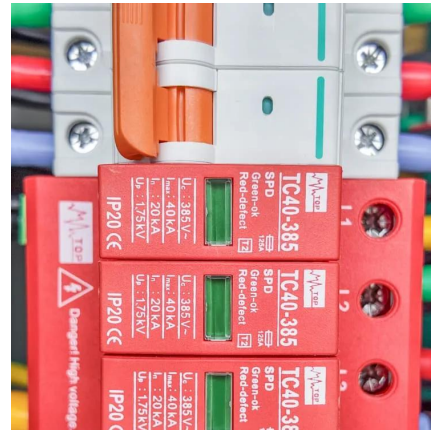
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