

Could distributed energy resources boost the deployment of renewables on islands?

Distributed energy resources - or small-scale energy resources that are usually situated near sites of electricity use, such as rooftop solar - could play an important role in boosting the deployment of renewables on islands, increasing the security, resilience and affordability of power systems while accelerating decarbonisation.

Do IEA islands need resilient power systems?

Islands need resilient power systems more than ever. Clean energy can deliver - Analysis - IEA Islands need resilient power systems more than ever.

What is Argonne's advanced energy technologies Directorate?

Argonne's Advanced Energy Technologies directorate seeks to enable a future energy system that is sustainable, secure and equitable. We are solving the most critical challenges related to energy, mobility, materials and manufacturing with world-class scientific and engineering expertise and facilities.

Why do small islands need a new energy infrastructure?

Islands - including those that make up the group known as Small Island Developing States (SIDS) - also need to upgrade their energy infrastructure so that it is resilient to higher temperatures, more frequent natural disasters and flooding related to rising sea levels.

What are the challenges faced by remote and island communities?

Remote and island communities face several energy challenges, including unreliable power, lack of robust connections to mainstream power grids, and threats from strengthening storms.

Could Fiji's mepsL programme Save 17% of its electricity demand?

Expanding the product coverage of the Fiji's MEPSL programme could allow the buildings sector to save 17% of its electricity demand annually by 2030, according to analysis by the Copenhagen Centre on Energy Efficiency.

Renewable NH₃ Production. NH₃ is a pivotal chemical commodity that is energy-intensive to produce with a substantial carbon footprint. In article number 2302740, Peter G. Loutzenhiser and co-workers investigated non-catalytic NH₃ production is investigated for a renewable two-step solar thermochemical looping cycle using Co₃Mo₃N/Co₆Mo₆N ...

CO₂-to-Carbon Conversion. In article number 2300883, Chao Yu and co-workers report an innovative system for integrated carbon capture and conversion. This cutting-edge technology utilizes a seamless, continuous

gas-liquid-solid reaction system, enhanced by the interactions at the liquid metals interfaces and the dynamic characteristics of the helical ...

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In article number 2000075, Weichao Wang, Shuhui Sun, Antonino S. Aricò, Ana C. Tavares and co-workers report the novel design of a Ta-based hybrid catalyst with significantly enhanced oxygen reduction reaction activity and stability in both acid and alkaline media, via tailoring the surface/interface of catalyst phases.This work provides a promising strategy to ...

Prelithiation. Prelithiation is a well-established strategy for enhancing battery performance bymitigating the first-cycle active lithium loss. In article number 2304097, Wang Wan, Sa Li, Yunhui Huang, Chao Wang, and ...

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Energy storage technologies represent a cutting-edge field within sustainable energy systems, offering a promising solution by enabling the capture and storage of excess energy during periods of low demand for later use, thereby smoothing out fluctuations in supply and demand.

Lithium-Ion Battery Cathodes. In article number 2401074, Klaus Bretterbauer and co-workers present innovative, water-soluble, surfactant-like polymer binders for lithium-ion battery cathodes.These materials are fluorine-free, enhance adhesion, and are compatible with NMC 622 cathode materials while offering eco-friendly, aqueous processing, and opening new ...

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This battery technology is a prominent candidate for grid-scale energy storage because of its scalability, modularity, and capability of decoupling power and energy. Despite several advantages, finding cost-effective redox active materials with long cycle life ...

Self Driving Lab. In article number 2302303, Milad Abolhasani and co-workers present a self-driving lab, called Smart Dope, for the fast-tracked discovery of doped quantum dots (QDs) for applications in clean energy technologies. Smart Dope utilizes machine learning-guided operation of flow reactors integrated with an in-situ characterization module in a "closed ...

Directly converting CO₂ into multi-carbon C₃ products still meets the challenges of low selectivity and conversion efficiency for electrocatalysts. Based on first-principle machine learning techniques, this work supplies the direct predictions of C-C-C coupling processes and reaction trends to different C₃ products. This work proposes the potential reaction ...

Indoor photovoltaics are a promising technology in the field of self-powered electronic devices for the Internet of Things. In article number 1901980, Shien-Ping Feng and co-workers report an I/Br/Cl triple-anion ...

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Today, the U.S. Department of Energy's (DOE) Energy Transitions Initiative Partnership Project (ETIPP) is announcing nine new projects with remote and island communities building local energy systems that are ...

Hydrogen Generation. In article number 2401547, Mohamed Nawfal Ghazzal and co-workers highlight the role of oxygen defects and the quantum size effect on the photophysical properties and light harvesting ability of graphdiyne. The defect-rich graphdiyne quantum behaves as a chromophore, absorbing a wide range of solar energy and injecting photoexcited ...

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Ammonium Ion Storage. In article number 2402715, De-en Jiang, Guillermo Carlos Bazan, Xuehang Wang, and co-workers report on a self-assembled MXene/n-type conjugated polyelectrolyte (CPE) superlattice-like heterostructure that enables fast and redox-active ammonium ion storage. The superlattice-like structure persists as the CPE:MXene ratio ...

Solar Energy Harvesting. In article number 2303059, Omer Yaffe, Ian D. Sharp, David A. Egger, and co-workers uncover pronounced anharmonic vibrational effects in the ternary nitride semiconductor, CuTaN

2. These dynamic structural characteristics are found to have a large impact on the fundamental properties of this compound, causing an opening of its ...

A high-efficiency biomimetic photoelectric system is presented based on bipyridine ruthenium (N3) and thiophene polyelectrolyte (PTE-BS) patterned Al₂O₃ nanochannels. Dependent on different energy levels, an interfacial-potential-gradient is established in the tip region, where photo-induced electron transfer from PTE-BS to N3, ...

Herein, emerging Janus WSeS/WSe₂ heterostructure nanowalls are systematically explored. These nanowalls are used as a nitrogen fixation catalyst in the electrolytes. The nanowalls exhibit a high NH₃ yield rate and Faradaic efficiency of 13.97 μ g h-mg cat⁻¹ and 35.24% at -0.3 V in 0.1 HCl, as well as 15.96 mg h-mg cat⁻¹ and 40.2% in 0.1 ...

In article number 1902898, Dawen Li and co-workers demonstrate a rapid layer-specific annealing on perovskite active layer enabled by UV-LEDs. An efficiency close to 19% is achieved for a simple inverted planar structure without any ...

A Ca-ion hybrid energy storage device (Ca-HSC) with capacitor component cathode and battery component anode is developed in this work. The Ca-HSC achieves a reversible capacity of 92 mAh g⁻¹ and excellent cycling stability with capacity retention of 84% after 1000 cycles at a high current rate of 0.1 A g⁻¹, suggesting its potential application for ...

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