Green Energy & Environment

Front Cover

Application of deep learning for informatics aided design of electrode materials in metal-ion batteries

Bin Ma, Lisheng Zhang, Wentao Wang, Hanqing Yu, Xianbin Yang, Siyan Chen, Huizhi Wang, Xinhua Liu*

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Research highlight

**Interfacial friction induced capillary flow within nanofiber-supported ionic liquid droplets**

Short review

The structure-directing role of heterologous seeds in the synthesis of zeolite

The heterologous seed-assisted syntheses of zeolites were summarized and the structure-directing effect of heterologous seeds and the "common composite building units (CBUs) hypothesis" and the "common secondary building units (SBUs) hypothesis" were analyzed.
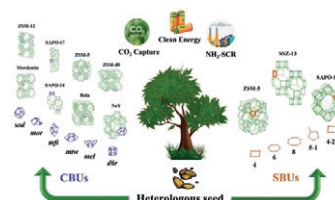

Review articles

Development of sustainable and efficient recycling technology for spent Li-ion batteries: Traditional and transformation go hand in hand

This review comprehensively summarizes the recycling technology of spent lithium-ion batteries, especially reveals a clean and efficient closed-loop mechanism from the methods and policies, and looks forward to the future industrial recycling of spent lithium-ion batteries.
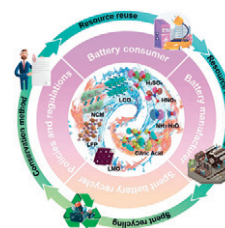
Recent progress in ternary mixed matrix membranes for CO_2 separation

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Conventional binary mixed matrix membranes (MMMs) encounter challenges such as filler agglomeration, interface void, polymer chains rigidification, and pore blockage. The addition of a third component (e.g., IL, polyethylene glycol, amines, etc.) in ternary MMMs serves various purposes such as enhancing filler dispersion, rectifying interfacial voids, and modifying pore structure, which leads to further enhancement of the CO_2/N_2 separation performance of ternary MMMs.
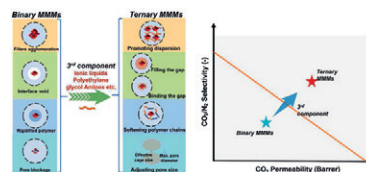
Potential industrial applications of photo/electrocatalysis: Recent progress and future challenges

Jinhao Li, Jing Ren, Shaoquan Li, Guangchao Li, Molly Meng-Jung Li*, Rengui Li, Young Soo Kang, Xiaoxin Zou, Yong Luo*, Bin Liu*, Yufei Zhao*

This review summarized the potential industrial applications of representative catalysts in various photo/electrocatalytic processes. The key problems and challenges of photo/electrocatalysis in future practical industrial applications are also discussed, and the possible development direction is pointed out.
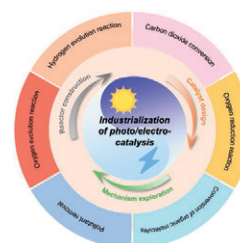

Research papers

Application of deep learning for informatics aided design of electrode materials in metal-ion batteries

Bin Ma, Lisheng Zhang, Wentao Wang, Hanqing Yu, Xianbin Yang, Siyan Chen, Huizhi Wang, Xinhua Liu*

Two deep learning models, model #1 and model #2, are constructed and applied to establish a link between cathode materials and battery electrochemical performances based on the feature groups #1 and #2. The deep learning models are trained with the multilayer perceptron as the core. It's promising that this work can contribute to a high-throughput computational method to accelerate the rational and fast discovery, design and development of emerging electrode materials.
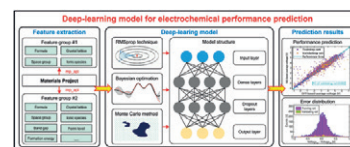
Synthesis of crystalline g-C$_3$N$_4$ with rock/molten salts for efficient photocatalysis and piezocatalysis

Tingting Xu, Jung Hur, Ping Niu*, Shulan Wang, Sangwook Lee, Sang-Eun Chun*, Li Li*

A highly crystalline g-C$_3$N$_4$ catalyst synthesized with rock/molten salts achieved enhanced $\pi \rightarrow \pi^*$ excitation with optimized band positions, enabling efficient photocatalytic overall water splitting and piezocatalysis.
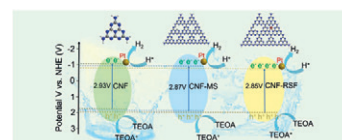
Tetrathiafulvalene esters with high redox potentials and improved solubilities for non-aqueous redox flow battery applications

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The solubility and electrochemical potential of tetrathiafulvalene are significantly increased by the incorporation of ester groups with ethyl substitutions to ensure their application in redox flow batteries. The obtained catholytes deliver outstanding specific capacity, remarkably high discharge voltages and excellent cycling stability.
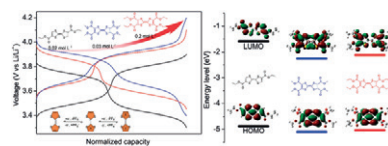
Covalency competition induced selective bond breakage, cobalt leaching and surface reconstruction of spinel-type $MnCo_2O_4$ to CoOOH nanosheets leading to enhanced charge storage capability.
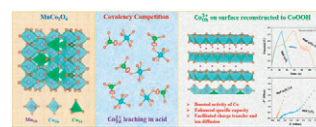
An effective NaOH (10 wt%)-H_2O system to recycle the waste MFFs under mild conditions and the degradation products of MFF can be reused directly in the synthesis of new MUFs materials.
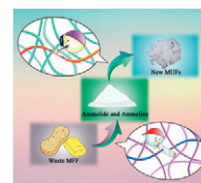
We proposed a practical strategy to successfully prepare biodegradable, thermoplastic and hydrophobic coatings with high transparence, oil resistance and biosafety by weakening the interchain interactions between cellulose chains.