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IN THIS ISSUE

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Cover

See Odobel *et al.*, pp. 2041–2052.
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Energy Environ. Sci., 2013, **6**, 2041.



Inside cover

See Poizot *et al.*, pp. 2124–2133.
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Energy Environ. Sci., 2013, **6**, 2124.

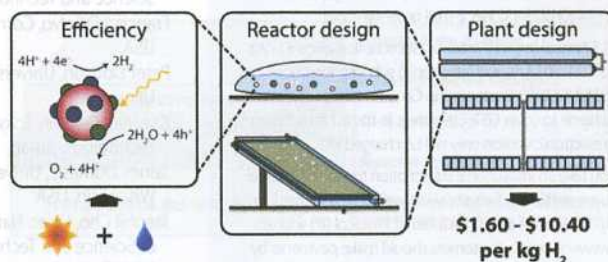
ANALYSIS

1983

Technical and economic feasibility of centralized facilities for solar hydrogen production via photocatalysis and photoelectrochemistry

Blaise A. Pinaud, Jesse D. Benck, Linsey C. Seitz, Arnold J. Forman, Zhebo Chen, Todd G. Deutsch, Brian D. James, Kevin N. Baum, George N. Baum, Shane Ardo, Heli Wang, Eric Miller and Thomas F. Jaramillo*

This work describes the design and technoeconomics of four conceptual water splitting reactors based on particle suspensions and panel electrodes.



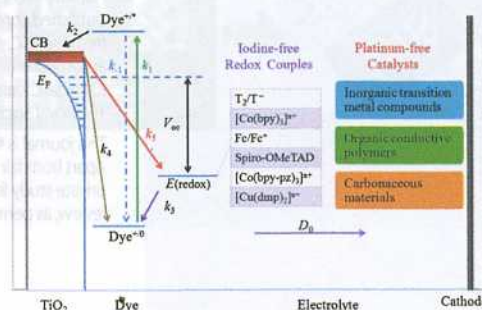
REVIEWS

2003

Recent advances in alternative cathode materials for iodine-free dye-sensitized solar cells

Feng Hao, Pei Dong, Qiang Luo, Jianbao Li, Jun Lou* and Hong Lin*

Recent advances in novel platinum-free cathode materials for iodine-free electrolytes based DSCs are selectively summarized and reviewed.

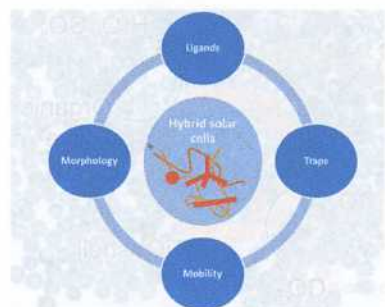


2020

The renaissance of hybrid solar cells: progresses, challenges, and perspectives

Feng Gao,* Shenqiang Ren* and Jianpu Wang*

This article reviews fundamental photovoltaic processes in the operation of hybrid solar cells, and relates recent advances with these processes.



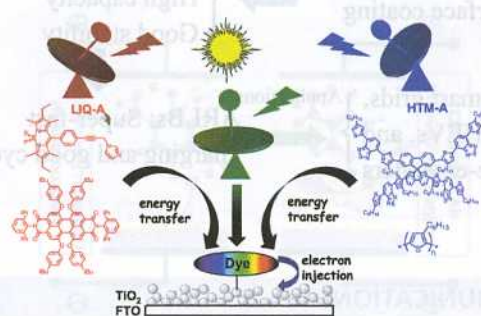
PERSPECTIVES

2041

Bio-inspired artificial light-harvesting antennas for enhancement of solar energy capture in dye-sensitized solar cells

Fabrice Odobel,* Yann Pellegrin and Julien Warnan

This perspective article highlights the benefit of antenna effect to amplify light absorption cross section in dye-sensitized solar cell.

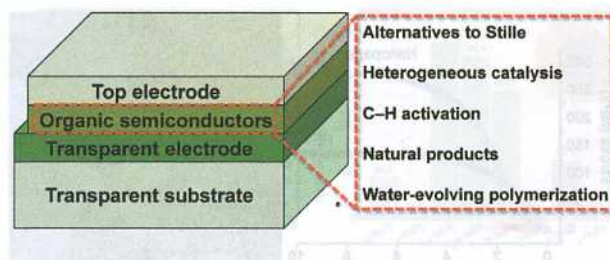


2053

Green chemistry for organic solar cells

Daniel J. Burke and Darren J. Lipomi*

This Perspective discusses strategies for synthesizing semiconducting polymers for organic solar cells using green chemistry.

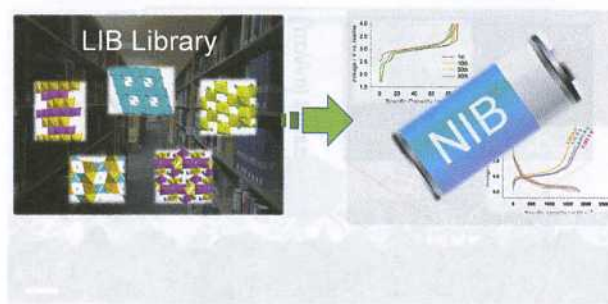


2067

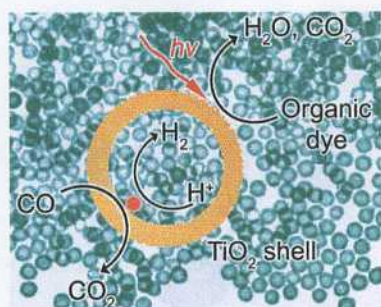
Charge carriers in rechargeable batteries: Na ions vs. Li ions

Sung You Hong, Youngjin Kim, Yuwon Park, Aram Choi, Nam-Soon Choi and Kyu Tae Lee*

This perspective provides a comparative overview on similarities and dissimilarities of Li-ion vs. Na-ion batteries in terms of negative and positive electrodes.



2082

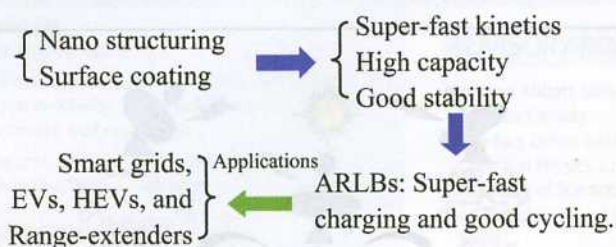


Tailored synthesis of mesoporous TiO₂ hollow nanostructures for catalytic applications

Ji Bong Joo, Michael Dahl, Na Li, Francisco Zaera and Yadong Yin*

In this minireview we summarize the recent advances in tailored synthesis of mesoporous TiO₂ hollow nanostructures and their catalytic applications.

2093



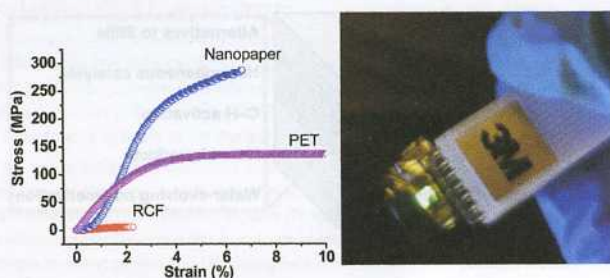
Aqueous rechargeable lithium batteries as an energy storage system of superfast charging

Wei Tang, Yusong Zhu, Yuyang Hou, Lili Liu, Yuping Wu,* Kian Ping Loh, Hanping Zhang and Kai Zhu

The advantages and challenges associated with aqueous rechargeable lithium batteries, with emphasis on the electrochemical performance of various electrode materials, is discussed.

COMMUNICATIONS

2105

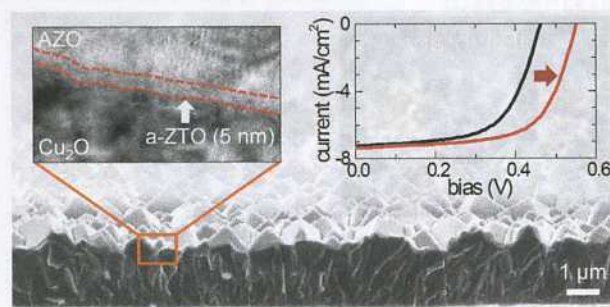


Biodegradable transparent substrates for flexible organic-light-emitting diodes

Hongli Zhu, Zhengguo Xiao, Detao Liu, Yuanyuan Li, Nicholas J. Weadock, Zhiqiang Fang, Jinsong Huang and Liangbing Hu*

Transparent nanopaper and a regenerated cellulose film are prepared and their properties are compared. Highly flexible organic-light-emitting diodes (OLEDs) are also demonstrated on the biodegradable substrates.

2112



Ultrathin amorphous zinc-tin-oxide buffer layer for enhancing heterojunction interface quality in metal-oxide solar cells

Yun Seog Lee, Jaeyeong Heo, Sin Cheng Siah, Jonathan P. Mailoa, Riley E. Brandt, Sang Bok Kim, Roy G. Gordon and Tonio Buonassisi*

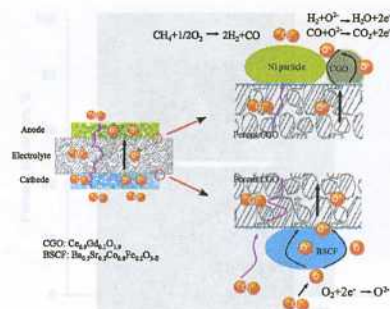
An atomic-layer deposited, tunable amorphous zinc-tin-oxide buffer layer reduces dark saturation current and increases open-circuit voltage and fill-factor in all-metal-oxide thin film solar cells.

2119

An all porous solid oxide fuel cell (SOFC): a bridging technology between dual and single chamber SOFCs

Youmin Guo, Mehdi Bessaa, Sonia Aguado, Marlu Cesar Steil, Damien Rembelski, Mathilde Rieu, Jean-Paul Viricelle, Nassira Benameur, Christian Guizard, Caroline Tardivat, Philippe Vernoux and David Farrusseng*

A porous conducting CGO electrolyte can control the oxygen concentration at the anode side for enabling safe methane oxy-reforming.



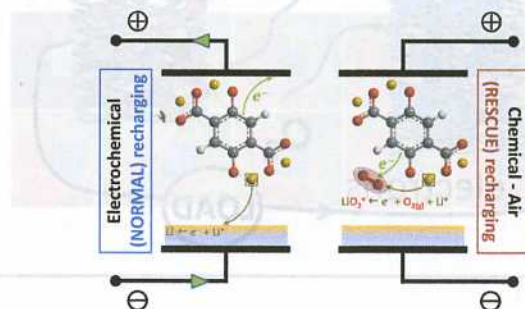
PAPERS

2124

A green Li-organic battery working as a fuel cell in case of emergency

Stéven Renault, Sébastien Gottis, Anne-Lise Barrès, Matthieu Courty, Olivier Chauvet, Franck Dolhem and Philippe Poizot*

Elaboration of a green organic cathode material for a Li battery which is self-rechargeable in air: towards smarter electrochemical generators with advanced chemistries.

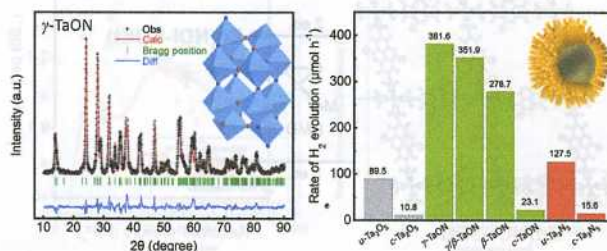


2134

Hierarchical metastable γ -TaON hollow structures for efficient visible-light water splitting

Zheng Wang, Jungang Hou, Chao Yang, Shuqiang Jiao, Kai Huang and Hongmin Zhu*

Novel hierarchical tantalum-based oxide and (oxy)nitride with hollow urchin-like nanostructures have been synthesized for the first time, and single-phase metastable γ -TaON among the tantalum (oxy)nitrides exhibits high photocatalytic activity for photocatalytic and photoelectrochemical performances.

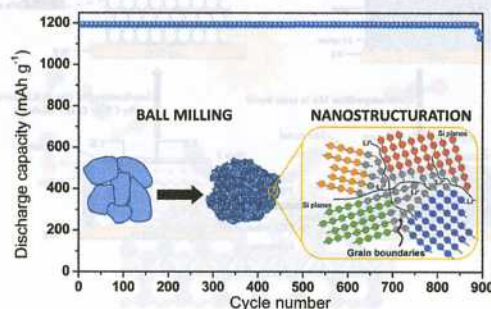


2145

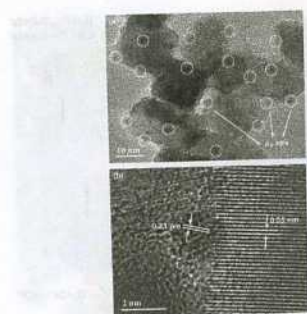
A low-cost and high performance ball-milled Si-based negative electrode for high-energy Li-ion batteries

Magali Gauthier, Driss Mazouzi, David Reyter, Bernard Lestriez, Philippe Moreau, Dominique Guyomard and Lionel Roué*

A Si-based anode with improved performance can be achieved using high-energy ball-milling as a cheap and easy process to produce Si powders prepared from a coarse-grained material.



2156

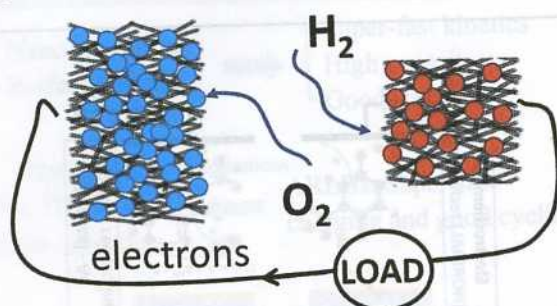


Gold nanoparticles inlaid TiO₂ photoanodes: a superior candidate for high-efficiency dye-sensitized solar cells

Yan Li, Hong Wang, Quanyou Feng, Gang Zhou and Zhong-Sheng Wang*

A 4 μm-thick Au-TiO₂ anode based dye-sensitized solar cell has achieved power conversion efficiency of 10.1% with open-circuit photovoltage of 863 mV.

2166

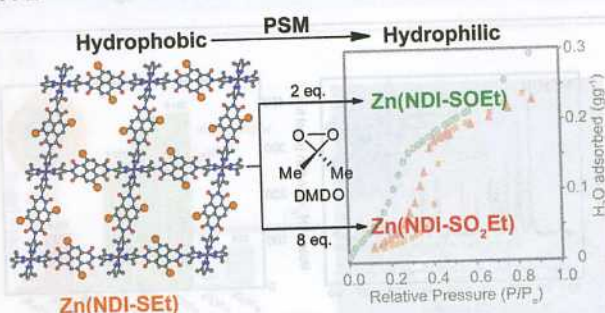


Optimizing the power of enzyme-based membrane-less hydrogen fuel cells for hydrogen-rich H₂-air mixtures

Lang Xu and Fraser A. Armstrong*

Membrane-less fuel cell using enzymes embedded in compacted mesoporous carbon provides milliwatt per cm² (anode) power density from a hydrogen-air mixture.

2172

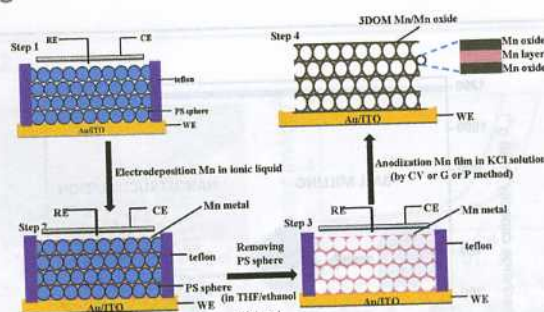


Postsynthetic tuning of hydrophilicity in pyrazolate MOFs to modulate water adsorption properties

Casey R. Wade, Tachmajal Corrales-Sanchez, Tarun C. Narayan and Mircea Dincă*

Postsynthetic modification of a novel Zn²⁺-pyrazolate metal-organic framework modulates pore hydrophilicity and water adsorption characteristics for heat pump applications.

2178



Fabrication of Mn/Mn oxide core-shell electrodes with three-dimensionally ordered macroporous structures for high-capacitance supercapacitors

Ming-Jay Deng,* Pei-Jung Ho, Cheng-Zhao Song, Shin-An Chen, Jyh-Fu Lee, Jin-Ming Chen* and Kueih-Tzu Lu*

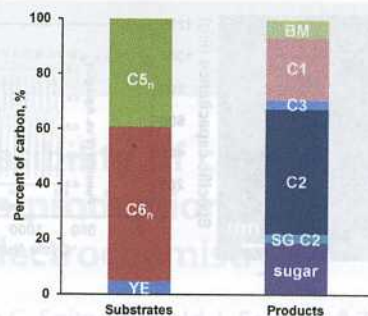
A new approach for developing novel energy storage devices involving three-dimensionally ordered macroporous inverse opal electrodes is proposed.

2186

Carbohydrate and lignin are simultaneously solubilized from untreated switchgrass by microbial action at high temperature

I. Kataeva, M. B. Foston, S.-J. Yang, S. Pattathil, A. K. Biswal, F. L. Poole II, M. Basen, A. M. Rhaesa, T. P. Thomas, P. Azadi, V. Olman, T. D. Saffold, K. E. Mohler, D. L. Lewis, C. Doeppke, Y. Zeng, T. J. Tschaplinski, W. S. York, M. Davis, D. Mohnen, Y. Xu, A. J. Ragauskas, S.-Y. Ding, R. M. Kelly, M. G. Hahn and M. W. W. Adams*

Thermophilic microbes could potentially enable the direct conversion of plant biomass to biofuels without the need for any chemical pretreatment.

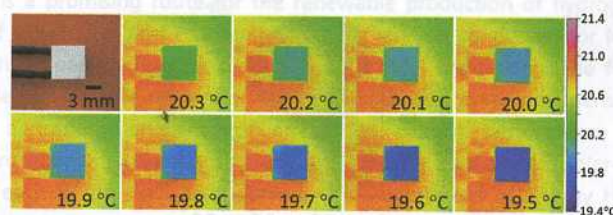


2196

Enhanced mechanical energy harvesting using needleless electrospun poly(vinylidene fluoride) nanofibre webs

Jian Fang, Haitao Niu, Hongxia Wang, Xungai Wang and Tong Lin*

Poly(vinylidene fluoride) nanofibre webs produced by needleless electrospinning show enhanced mechanical-to-electrical energy conversion ability compared with needle electrospun nanofibres.

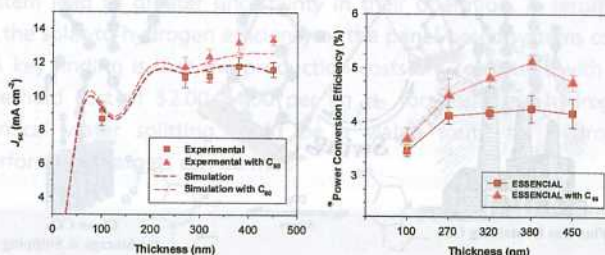


2203

Optimization of polymer photovoltaic cells with bulk heterojunction layers hundreds of nanometers thick: modifying the morphology and cathode interface

Hui Joon Park, Hyunsoo Kim, Jae Yong Lee, Taehwa Lee and L. Jay Guo*

The factors that affect the device performances of BHJ PVs with the increased film thickness are investigated, and the ways to help alleviate the problems in thick BHJ PVs are introduced.

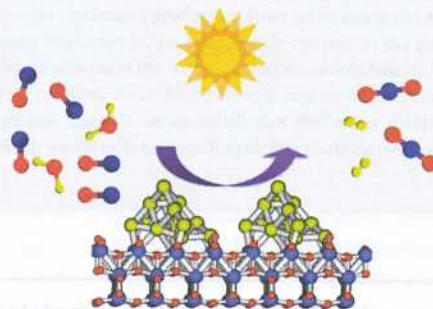


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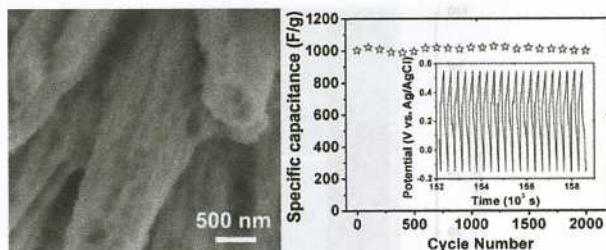
Photocatalytic water gas shift using visible or simulated solar light for the efficient, room-temperature hydrogen generation

Francesc Sastre, Marica Oteri, Avelino Corma* and Hermenegildo García*

Gold nanoparticles act as antennae and catalytic sites for introducing visible activity in titania for the photocatalytic water gas shift.



2216

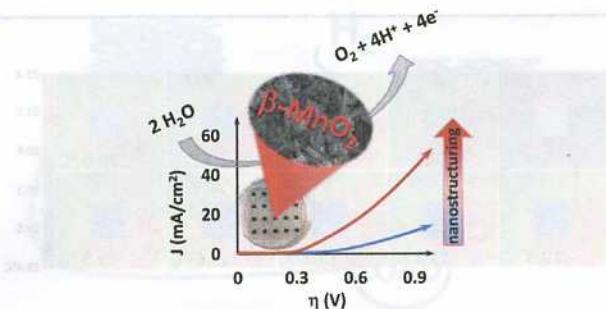


One-step synthesis of Ni_3S_2 nanorod@ $\text{Ni}(\text{OH})_2$ nanosheet core-shell nanostructures on a three-dimensional graphene network for high-performance supercapacitors

Weijia Zhou, Xiehong Cao, Zhiyuan Zeng, Wenhui Shi, Yuanyuan Zhu, Qingyu Yan, Hong Liu, * Jiyang Wang and Hua Zhang*

A Ni_3S_2 @ $\text{Ni}(\text{OH})_2$ core-shell hierarchical composite electrode synthesized using a one-step hydrothermal reaction exhibits a high specific capacitance with good cycling performance.

2222

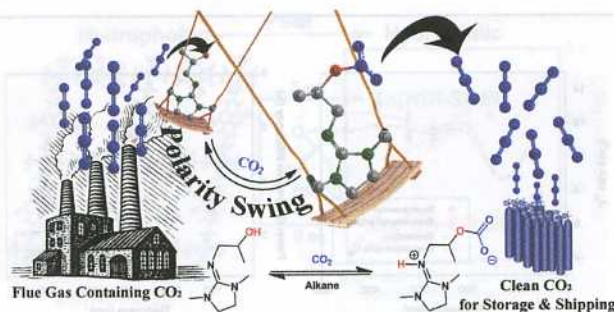


Highly active screen-printed electrocatalysts for water oxidation based on β -manganese oxide

Monika Fekete, Rosalie K. Hocking, Shery L. Y. Chang, Cristina Italiano, Antonio F. Patti, Francesco Arena and Leone Spiccia*

Nanostructured electrocatalysts, based on pyrolusite ($\beta\text{-MnO}_2$), deposited *via* screen-printing are effective as water oxidation anodes in neutral and alkaline electrolytes.

2233



Improving the regeneration of CO_2 -binding organic liquids with a polarity change

Paul. M. Mathias, Kash Afshar, Feng Zheng, Mark D. Bearden, Charles J. Freeman, Tamer Andrea, Phillip K. Koech, Igor Kutnyakov, Andy Zwoster, Arnold R. Smith, Philip G. Jessop, Omid Ghaffari Nik and David J. Heldebrant*

Unique CO_2 -separating solvent regeneration strategy that alters free energies of solvation of the CO_2 -carrier by means of a polarity change.