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Cover

See Banglin Chen *et al.*, pp. 3612–3641. Image reproduced by permission of Banglin Chen from *Energy Environ. Sci.*, 2016, 9, 3612.



Inside cover

See Nicolas Plumeré, Erwin Reisner *et al.*, pp. 3698–3709. Image reproduced by permission of Erwin Reisner and Katarzyna Sokół from *Energy Environ. Sci.*, 2016, 9, 3698.

REVIEWS

3570

Nanostructured positive electrode materials for post-lithium ion batteries

Faxing Wang, Xiongwei Wu, Chunyang Li, Yusong Zhu,* Lijun Fu,* Yuping Wu* and Xiang Liu

This review summarizes and discusses the state-of-the-art research activities in the area of positive electrode materials for post-lithium ion batteries.

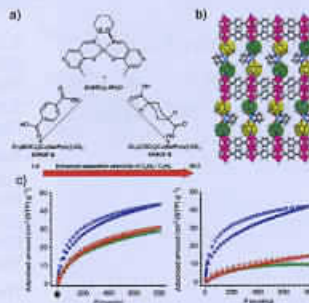


3612

Potential of microporous metal–organic frameworks for separation of hydrocarbon mixtures

Zongbi Bao, Gangang Chang, Huabin Xing, Rajamani Krishna, Qilong Ren and Banglin Chen*

In the process industries, the separation of mixtures of hydrocarbons is important both for the preparation of feedstocks and for use as end products.

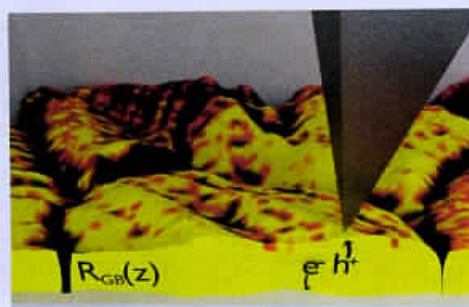


3642

Methylammonium lead iodide grain boundaries exhibit depth-dependent electrical properties

Gordon A. MacDonald, Mengjin Yang, Samuel Berweger, Jason P. Killgore, Pavel Kabos, Joseph J. Berry, Kai Zhu and Frank W. DelRio*

In this communication, the nanoscale through-film and lateral photo-response and conductivity of large-grained methylammonium lead iodide (MAPbI₃) thin films are studied.

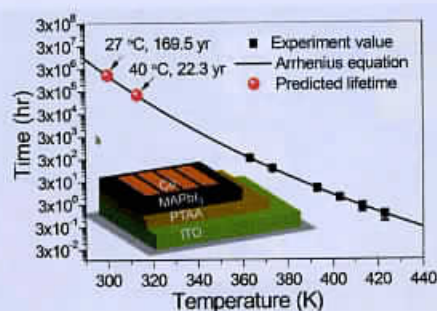


3650

Is Cu a stable electrode material in hybrid perovskite solar cells for a 30-year lifetime?

Jingjing Zhao, Xiaopeng Zheng, Yehao Deng, Tao Li, Yuchuan Shao, Alexei Gruverman, Jeffrey Shield and Jinsong Huang*

Here we explored the potential of using copper as the electrode material for long-term stability of perovskite solar cells.

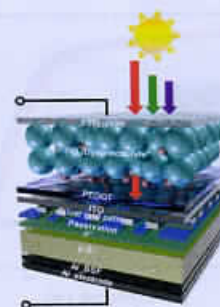


3657

Two-terminal DSSC/silicon tandem solar cells exceeding 18% efficiency

Jeong Kwon, Min Ji Im, Chan Ul Kim, Sang Hyuk Won, Sung Bum Kang, Sung Ho Kang, In Taek Choi, Hwan Kyu Kim, In Ho Kim, Jong Hyeok Park* and Kyoung Jin Choi*

A highly-efficient DSSC/Si monolithic tandem cell utilizing PEDOT:FTS as an interfacial catalytic layer.

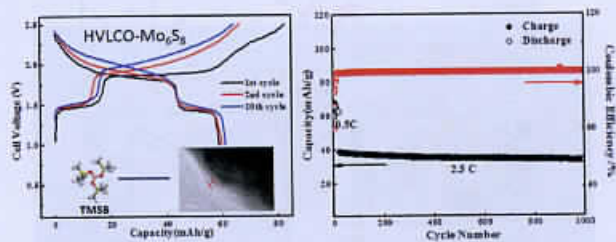


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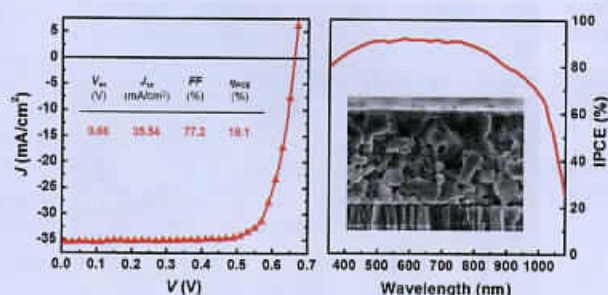
Stabilizing high voltage LiCoO₂ cathode in aqueous electrolyte with interphase-forming additive

Fei Wang, Yuxiao Lin, Liumin Suo, Xiulin Fan, Tao Gao, Chongyin Yang, Fudong Han, Yue Qi, Kang Xu and Chunsheng Wang*

High voltage LiCoO₂ was stabilized in aqueous electrolytes by the cathode electrolyte interphase through electrochemical oxidation of the tris(trimethylsilyl) borate additive.



3674

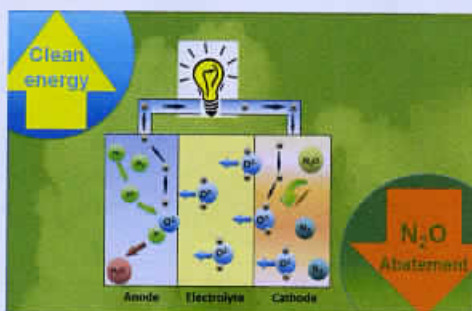


High efficiency solution-processed thin-film Cu(In,Ga)(Se,S)₂ solar cells

Ting Zhang, Yixing Yang, Deang Liu, Shing Chi Tse, Weiran Cao, Zongbao Feng, Song Chen and Lei Qian*

World record efficiency for solution-processed CIGS solar cells has been demonstrated.

3682

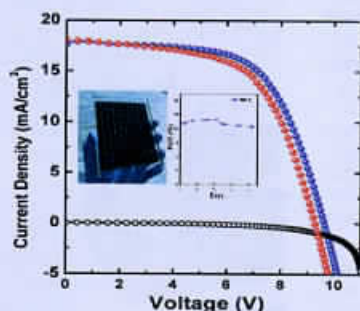


A highly-robust solid oxide fuel cell (SOFC): simultaneous greenhouse gas treatment and clean energy generation

T. Li, M. F. Rabuni, L. Kleiminger, B. Wang, G. H. Kelsall, U. W. Hartley and K. Li*

A novel micro-structured, highly-robust SOFC that can convert greenhouse gas into clean electrical energy has been developed.

3687

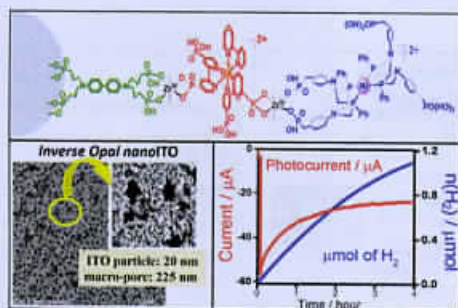


A large area (70 cm²) monolithic perovskite solar module with a high efficiency and stability

Anish Priyadarshi, Lew Jia Haur, Paul Murray, Dongchuan Fu, Sneha Kulkarni, Guichuan Xing, Tze Chien Sum, Nripan Mathews* and Subodh G. Mhaisalkar*

A large area and highly stable perovskite solar module (10 cm × 10 cm, active area ~70 cm²) is demonstrated using low cost processing methods and materials.

3693



Photogeneration of hydrogen from water by a robust dye-sensitized photocathode

B. Shan, A. K. Das, S. Marquard, B. H. Farnum, D. Wang, R. M. Bullock and T. J. Meyer*

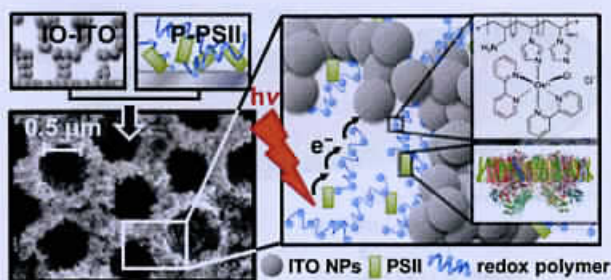
Structure and hydrogen evolution performance of the photocathode consisting of a tri-layer assembly on a macro-mesoporous ITO electrode.

3698

Rational wiring of photosystem II to hierarchical indium tin oxide electrodes using redox polymers

Katarzyna P. Sokol, Dirk Mersch, Volker Hartmann, Jenny Z. Zhang, Marc M. Nowaczyk, Matthias Rögner, Adrian Ruff, Wolfgang Schuhmann, Nicolas Plumeré* and Erwin Reisner*

A rational approach for a photosystem II-based electrode assembly is described, integrating redox polymers with high surface area hierarchically structured electrodes.

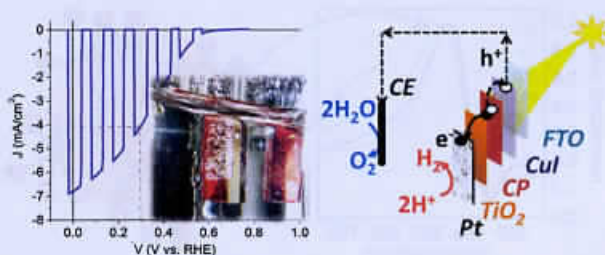


3710

Polymer-based photocathodes with a solution-processable cuprous iodide anode layer and a polyethyleneimine protective coating

Hansel Comas Rojas, Sebastiano Bellani, Francesco Fumagalli, Gabriele Tullii, Silvia Leonardi, Matthew T. Mayer, Marcel Schreier, Michael Grätzel, Guglielmo Lanzani, Fabio Di Fonzo* and Maria Rosa Antognazza*

Organic semiconductors are proven to efficiently drive photoelectrochemical water splitting.

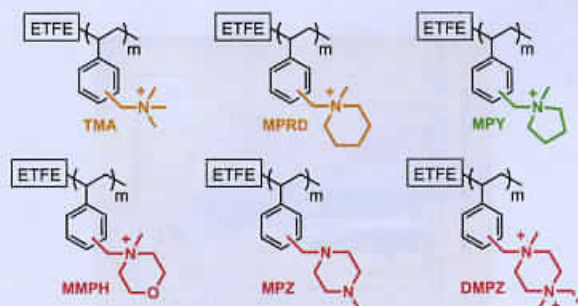


3724

High performance aliphatic-heterocyclic benzyl-quaternary ammonium radiation-grafted anion-exchange membranes

J. Ponce-González,* D. K. Whelligan, L. Wang, R. Bance-Soualhi, Y. Wang, Y. Peng, H. Peng, D. C. Apperley, H. N. Sarode, T. P. Pandey, A. G. Divekar, S. Seifert, A. M. Herring, L. Zhuang and J. R. Varcoe

High performance benzylpyrrolidinium anion-exchange membrane.

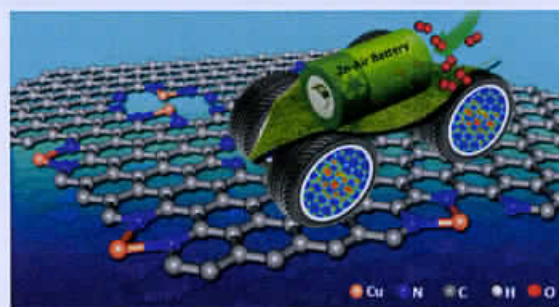


3736

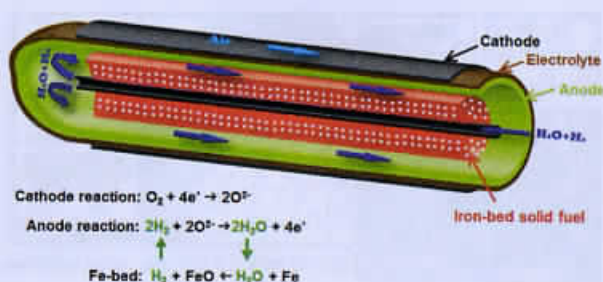
Highly doped and exposed Cu(I)-N active sites within graphene towards efficient oxygen reduction for zinc-air batteries

Haihua Wu, Haobo Li, Xinfei Zhao, Qingfei Liu, Jing Wang, Jianping Xiao, Songhai Xie, Rui Si, Fan Yang, Shu Miao, Xiaoguang Guo, Guoxiong Wang* and Xinhe Bao*

High-density coordination unsaturated copper(I)-nitrogen embedded in graphene demonstrates a high performance and stability in primary zinc-air batteries with ultralow catalyst loading.



3746

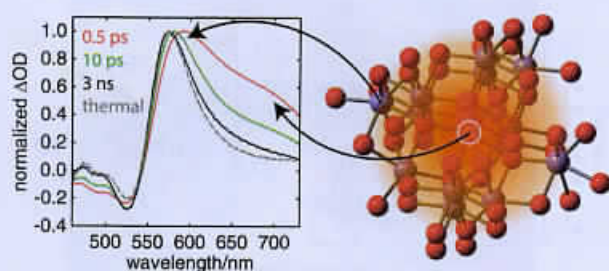


A dynamic solid oxide fuel cell empowered by the built-in iron-bed solid fuel

Cuijuan Zhang, Chengxiang Ji, Wensheng Wang, Doug Schmidt, Xinfang Jin, John P. Lemmon and Kevin Huang*

A new dynamic solid oxide fuel cell containing a built-in Fe-bed solid fuel can operate at high overload and provide fast ramping power.

3754

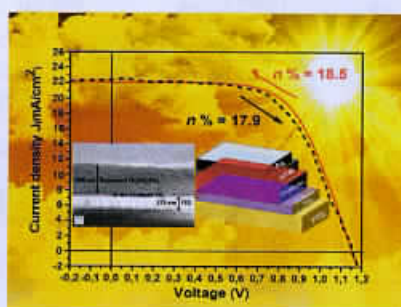


Electronic and nuclear contributions to time-resolved optical and X-ray absorption spectra of hematite and insights into photoelectrochemical performance

Dugan Hayes,* Ryan G. Hadt, Jonathan D. Emery, Amy A. Cordones, Alex B. F. Martinson, Megan L. Shelby, Kelly A. Fransted, Peter D. Dahlberg, Jiyun Hong, Xiaoyi Zhang, Qingyu Kong, Robert W. Schoenlein and Lin X. Chen*

Spectra show both transient photocarriers and lattice heating.

3770

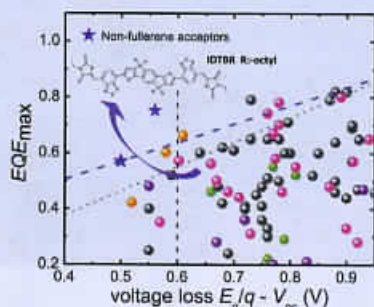


Frustrated Lewis pair-mediated recrystallization of $\text{CH}_3\text{NH}_3\text{PbI}_3$ for improved optoelectronic quality and high voltage planar perovskite solar cells

Sagar Motilal Jain, Zhen Qiu, Leif Häggman, Mohammad Mirmohades, Malin B. Johansson, Tomas Edvinsson* and Gerrit Boschloo*

Films of the hybrid lead halide perovskite $\text{CH}_3\text{NH}_3\text{PbI}_3$ were found to react with pyridine vapor at room temperature leading to complete bleaching followed by recrystallization of the film.

3783



Reduced voltage losses yield 10% efficient fullerene free organic solar cells with >1 V open circuit voltages

D. Baran,* T. Kirchartz,* S. Wheeler, S. Dimitrov, M. Abdelsamie, J. Gorman, R. S. Ashraf, S. Holliday, A. Wadsworth, N. Gasparini, P. Kaienburg, H. Yan, A. Amassian, C. J. Brabec, J. R. Durrant and I. McCulloch

Non-fullerene acceptors with optimized energy levels enable 10% efficient solar cells with reduced voltage losses <0.6 V.

3794

Correction: Two-terminal DSSC/silicon tandem solar cells exceeding 18% efficiency

Jeong Kwon, Min Ji Im, Chan Ul Kim, Sang Hyuk Won, Sung Bum Kang, Sung Ho Kang, In Taek Choi, Hwan Kyu Kim, In Ho Kim, Jong Hyeok Park* and Kyoung Jin Choi*