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Cover

See Greg G. Qiao *et al.*, pp. 434-440.
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Inside cover

See Xianfeng Li, Huamin Zhang *et al.*, pp. 441-447.
Image reproduced by permission of Xianfeng Li from *Energy Environ. Sci.*, 2016, 9, 441.

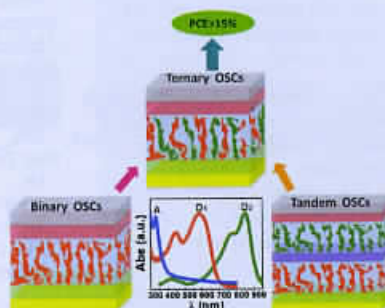
REVIEWS

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Versatile ternary organic solar cells: a critical review

Qiaoshi An, Fujun Zhang,* Jian Zhang, Weihua Tang, Zhenbo Deng and Bin Hu*

Ternary organic solar cells enjoy both the enhanced light absorption by incorporating multiple organic materials in tandem solar cells and the simplicity of processing conditions that are used in single bulk heterojunction solar cells.



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Organometal halide perovskite solar cells: degradation and stability

Taame Abraha Berhe, Wei-Nien Su,* Ching-Hsiang Chen, Chun-Jern Pan, Ju-Hsiang Cheng, Hung-Ming Chen, Meng-Che Tsai, Liang-Yih Chen, Amare Aregahegn Dubale and Bing-Joe Hwang*

What are the bottlenecks for organometal halide perovskite solar cells to achieve the stability required for commercialization?



357

The application of graphene and its composites in oxygen reduction electrocatalysis: a perspective and review of recent progress

Drew Higgins, Pouyan Zamani, Aiping Yu and Zhongwei Chen*

This paper provides a critical review and perspective on progress realized recently towards the development of graphene-based oxygen reduction catalysts.



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Open circuit voltage of organic solar cells: an in-depth review

Naveen Kumar Elumalai* and Ashraf Uddin*

Factors and governing mechanisms influencing the open circuit voltage – a key determinant for improving the device performance efficiency.



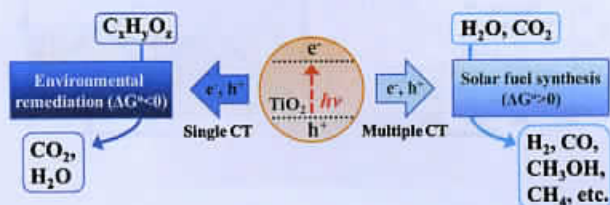
PERSPECTIVE

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Photoinduced charge transfer processes in solar photocatalysis based on modified TiO₂

Hyunwoong Park, Hyoung-il Kim, Gun-hee Moon and Wonyong Choi*

High efficiency solar photocatalysis requires an effective separation of photogenerated charge carriers and their rapid transport to the semiconductor interface.



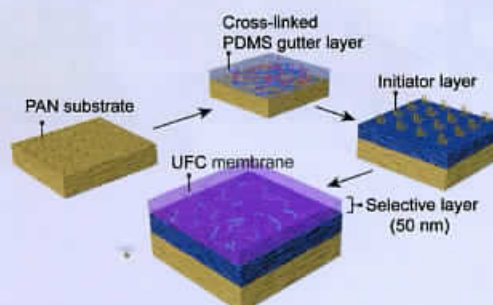
COMMUNICATIONS

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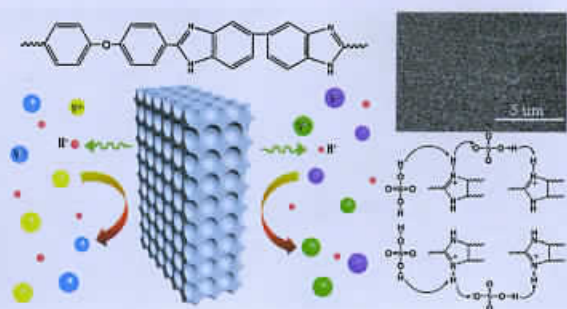
A novel cross-linked nano-coating for carbon dioxide capture

Qiang Fu, Jinguik Kim, Paul A. Gurr, Joel M. P. Scofield, Sandra E. Kentish and Greg G. Qiao*

Defect-free and cross-linked ultra-thin (sub 100 nm) film composite membranes have been prepared. The membrane materials formed exhibited significantly high CO₂ permeances of over 1200 GPU as well as excellent CO₂/N₂ selectivity of over 40.



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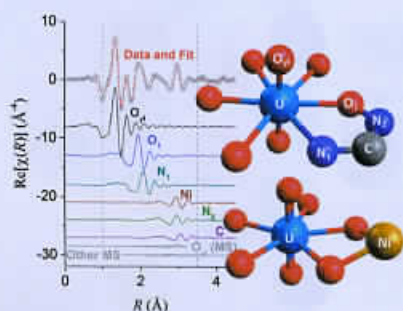


Advanced porous membranes with ultra-high selectivity and stability for vanadium flow batteries

Zhizhang Yuan, Yinqi Duan, Hongzhang Zhang, Xianfeng Li,* Huamin Zhang* and Ivo Vankelecom

Advanced porous membranes combining ultra-high stability and selectivity with very low cost are designed and fabricated for vanadium flow batteries.

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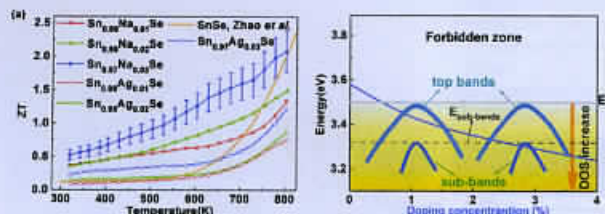


XAFS investigation of polyamidoxime-bound uranyl contests the paradigm from small molecule studies

C. W. Abney,* R. T. Mayes, M. Piechowicz, Z. Lin, V. S. Bryantsev, G. M. Veith, S. Dai and W. Lin*

XAFS investigation of polyamidoxime-bound uranyl reveals an adjacent μ^2 -oxo-bridged transition metal, suggesting new routes for adsorbent design in radionuclide separations.

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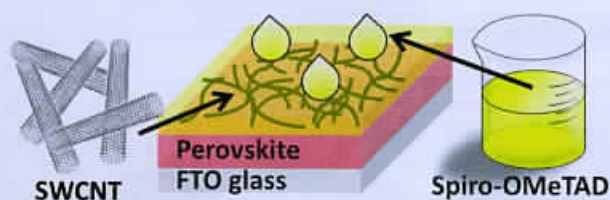


Broad temperature plateau for high ZTs in heavily doped p-type SnSe single crystals

Kunling Peng, Xu Lu, Heng Zhan, Si Hui, Xiaodan Tang, Guiwen Wang, Jiyan Dai, Ctirad Uher, Guoyu Wang* and Xiaoyuan Zhou*

The increased number of carrier pockets near the Fermi level and the optimized carrier concentration in doped SnSe single crystal can lead to a high average $ZT_{ave} \sim 1.2$ from 300 K to 800 K and a peak ZT_{max} value in excess of 2.0 at 800 K along the crystallographic b -axis.

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Carbon nanotube-based hybrid hole-transporting material and selective contact for high efficiency perovskite solar cells

Kerttu Aitola,* Kári Sveinbjörnsson, Juan-Pablo Correa-Baena, Antti Kaskela, Antonio Abate, Ying Tian, Erik M. J. Johansson, Michael Grätzel, Esko I. Kauppinen, Anders Hagfeldt and Gerrit Boschloo

Hybrid hole-transporting material and selective contact for perovskite solar cells was manufactured by industrially viable materials and methods.

467

High ef biomass

Wei Liu, Zisheng

A novel an electro was repo

473

A nanop synthesis of perov

Fang Song

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478

Vertically layered-d on exfolia 3D electro

Yang Hou, Xiaodong Z

A 3D ternar and NiFe-LD graphene w water-splitti

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Pinhole-free modules

W. Qiu,* T. L. Rakocevic, L. Froyen, J. P. Heremans

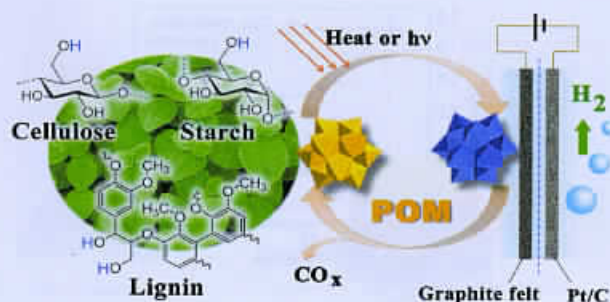
We demonstr solar module fill factor of 9

467

High efficiency hydrogen evolution from native biomass electrolysis

Wei Liu, Yong Cui, Xu Du, Zhe Zhang, Zisheng Chao and Yulin Deng*

A novel approach for directly producing hydrogen using an electrolysis method from almost all native biomasses was reported.

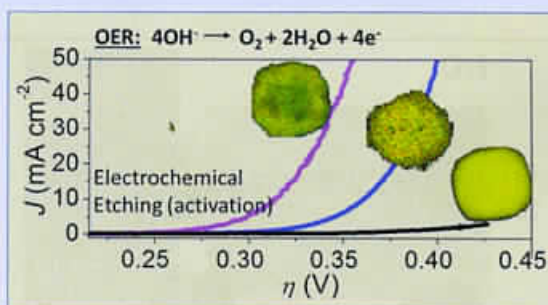


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A nanoporous oxygen evolution catalyst synthesized by selective electrochemical etching of perovskite hydroxide CoSn(OH)₆ nanocubes

Fang Song, Kurt Schenk and Xile Hu*

Large nanocubes of perovskite hydroxide CoSn(OH)₆ can be electrochemically etched to form hierarchical nanoporous CoO_x with high catalytic activity for oxygen evolution reaction.

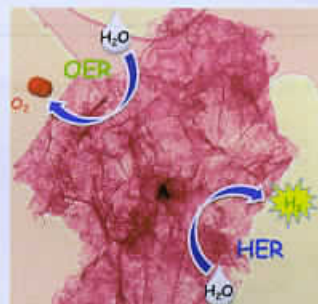


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Vertically oriented cobalt selenide/NiFe layered-double-hydroxide nanosheets supported on exfoliated graphene foil: an efficient 3D electrode for overall water splitting

Yang Hou, Martin R. Lohe, Jian Zhang, Shaohua Liu, Xiaodong Zhuang and Xinliang Feng*

A 3D ternary hybrid containing Co_{0.85}Se nanosheet-array and NiFe-LDH grown on electrochemically exfoliated graphene was synthesized for highly-efficient overall water-splitting.

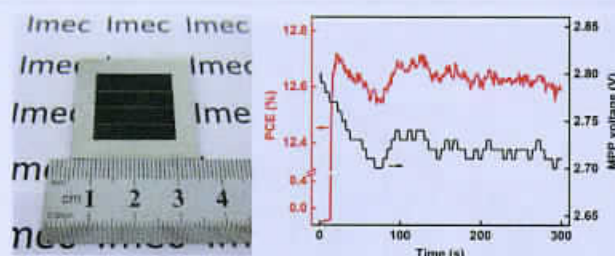


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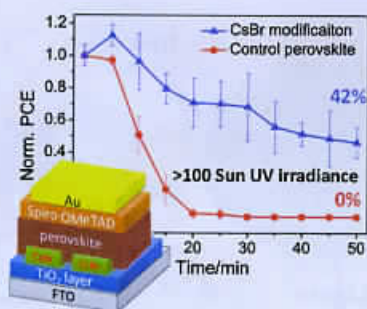
Pinhole-free perovskite films for efficient solar modules

W. Qiu,* T. Merckx, M. Jaysankar, C. Masse de la Huerta, L. Rakocevic, W. Zhang, U. W. Paetzold, R. Gehlhaar, L. Froyen, J. Poortmans, D. Cheyns, H. J. Snaith and P. Heremans*

We demonstrated a 4 cm² aperture area perovskite solar module with a PCE of 13.6% and a geometrical fill factor of 91%.



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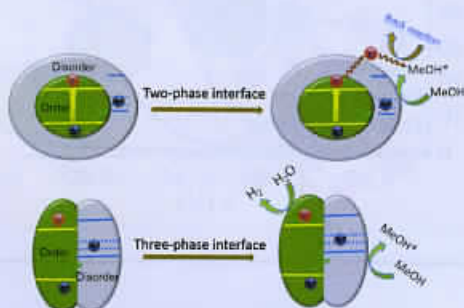
Enhanced UV-light stability of planar heterojunction perovskite solar cells with caesium bromide interface modification

Wenzhe Li, Wei Zhang, Stephan Van Reenen, Rebecca J. Sutton, Jiandong Fan, Amir A. Haghighirad, Michael B. Johnston, Liduo Wang* and Henry J. Snaith*

CsBr interface modification simultaneously enhances the device power conversion efficiency and improves the device resilience to UV irradiation.

PAPERS

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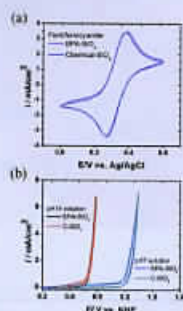


An order/disorder/water junction system for highly efficient co-catalyst-free photocatalytic hydrogen generation

Kan Zhang, Luyang Wang, Jung Kyu Kim, Ming Ma, Ganapathy Veerappan, Chang-Lyoul Lee, Ki-jeong Kong, Hyoyoung Lee* and Jong Hyeok Park*

Order/disorder interfacial engineering realizes highly efficient co-catalyst free hydrogen generation.

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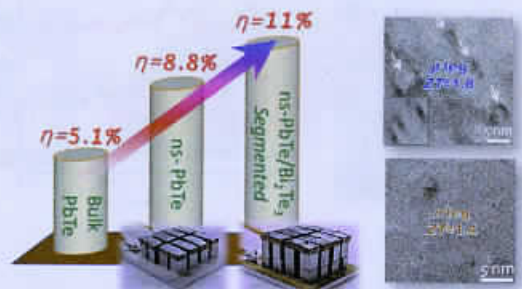


Conductance and capacitance of bilayer protective oxides for silicon water splitting anodes

A. G. Scheuermann, K. W. Kemp, K. Tang, D. Q. Lu, P. F. Satterthwaite, T. Ito, C. E. D. Chidsey and P. C. McIntyre*

State-of-the-art silicon water splitting photoelectrochemical cells employ oxide protection layers that exhibit electrical conductance in between that of dielectric insulators and electronic conductors, optimizing both built-in field and conductivity.

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Power generation from nanostructured PbTe-based thermoelectrics: comprehensive development from materials to modules

Xiaokai Hu, Priyanka Jood, Michihiro Ohta,* Masaru Kunii, Kazuo Nagase, Hirotaka Nishiata, Mercouri G. Kanatzidis and Atsushi Yamamoto

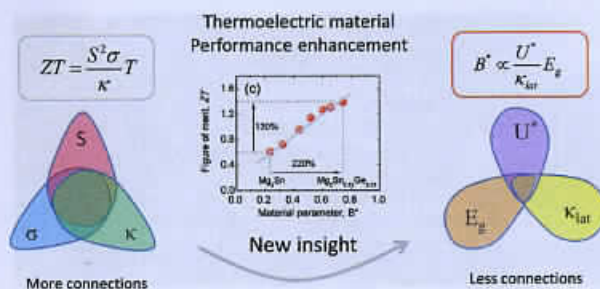
In this work, we demonstrate the use of high performance nanostructured PbTe-based materials in high conversion efficiency thermoelectric modules.

530

New insight into the material parameter B to understand the enhanced thermoelectric performance of $\text{Mg}_2\text{Sn}_{1-x-y}\text{Ge}_x\text{Sb}_y$

Weishu Liu, Jiawei Zhou, Qing Jie, Yang Li, Hee Seok Kim, Jiming Bao, Gang Chen* and Zhifeng Ren*

A new generalized material parameter B^* , connecting weighted mobility, lattice thermal conductivity, and also the band gap, provides a new insight in pursuing high thermoelectric figure-of-merit ZT .

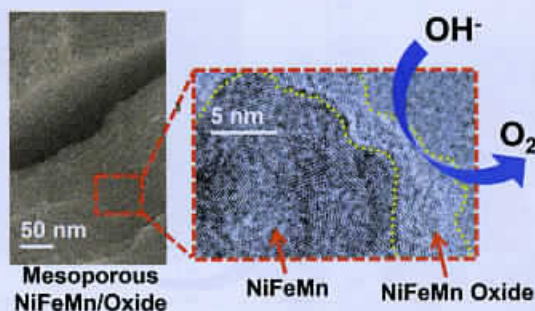


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Mesoporous $\text{Ni}_{60}\text{Fe}_{30}\text{Mn}_{10}$ -alloy based metal/metal oxide composite thick films as highly active and robust oxygen evolution catalysts

Eric Detsi,* John B. Cook, Benjamin K. Lesel, Christopher L. Turner, Yu-Lun Liang, Shauna Robbennolt and Sarah H. Tolbert*

Mesoporous NiFeMn-based electrocatalysts made by selective alloy corrosion stably produce O_2 from water for more than eleven days in 1 M KOH at a current density of 500 mA cm^{-2} and an overpotential of just 360 mV.



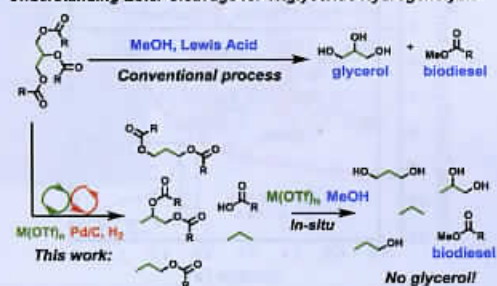
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Mono- and tri-ester hydrogenolysis using tandem catalysis. Scope and mechanism

Tracy L. Lohr, Zhi Li, Rajeev S. Assary, Larry A. Curtiss and Tobin J. Marks*

The scope and mechanism of thermodynamically leveraged ester RC(O)O-R' bond hydrogenolysis by tandem metal triflate + supported Pd catalysts are investigated both experimentally and theoretically by DFT and energy span analysis.

Understanding Ester Cleavage for Triglyceride Hydrogenolysis

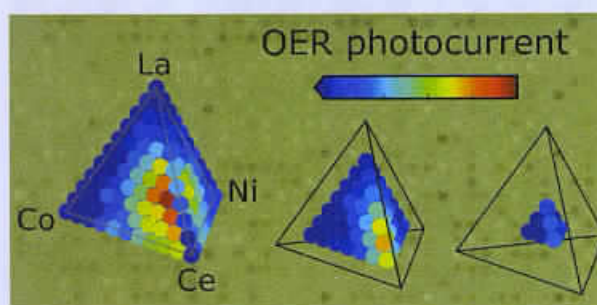


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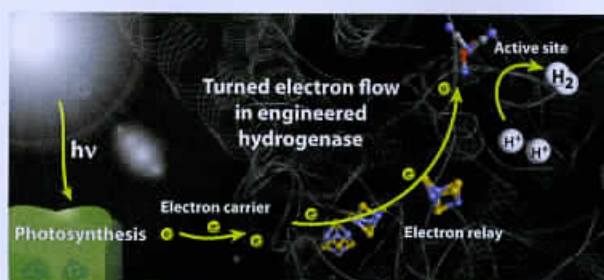
Development of solar fuels photoanodes through combinatorial integration of Ni-La-Co-Ce oxide catalysts on BiVO_4

D. Guevarra, A. Shinde, S. K. Suram, I. D. Sharp, F. M. Toma,* J. A. Haber* and J. M. Gregoire*

Optimal material interfaces evade prediction and are discovered through combinatorial catalyst/semiconductor integration – unexpected interactions hold great promise for solar fuels.



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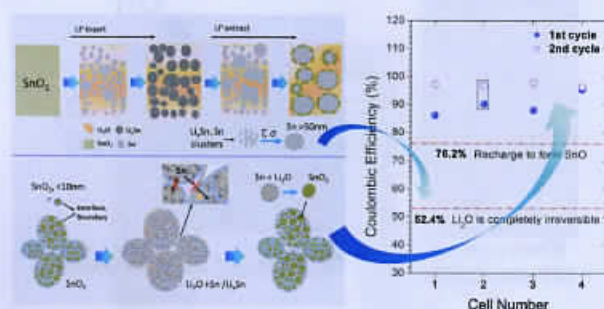


Turning around the electron flow in an uptake hydrogenase. EPR spectroscopy and *in vivo* activity of a designed mutant in HupSL from *Nostoc punctiforme*

Patrícia Raleiras, Namita Khanna, Hélder Miranda, Livia S. Mészáros, Henning Krassen, Felix Ho, Natalia Battchikova, Eva-Mari Aro, Ann Magnuson,* Peter Lindblad* and Stenbjörn Styring*

The uptake hydrogenase HupSL became a H_2 producer in *N. punctiforme* after modifying the proximal FeS cluster with the single point mutation C12P.

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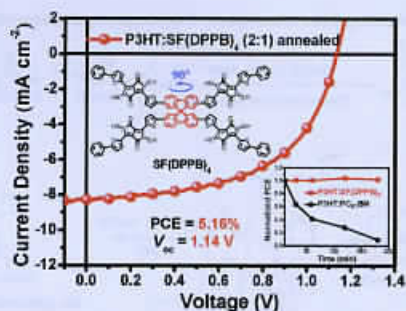


Dramatically enhanced reversibility of Li_2O in SnO_2 -based electrodes: the effect of nanostructure on high initial reversible capacity

Renzong Hu, Dongchang Chen, Gordon Waller, Yunpeng Ouyang, Yu Chen, Bote Zhao, Ben Rainwater, Chenghao Yang, Min Zhu* and Meilin Liu*

Suppressing the Sn coarsening in the Li_2O matrix enabled highly reversible conversion between Li_2O and SnO_2 and an initial Coulombic efficiency of $\sim 95.5\%$ was achieved.

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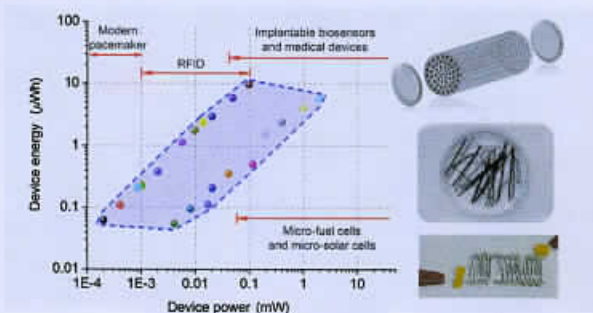


A spirobifluorene and diketopyrrolopyrrole moieties based non-fullerene acceptor for efficient and thermally stable polymer solar cells with high open-circuit voltage

Shuixing Li, Wenqing Liu, Minmin Shi,* Jiangquan Mai, Tsz-Ki Lau, Junhua Wan, Xinhui Lu, Chang-Zhi Li* and Hongzheng Chen*

A PCE of 5.16% with a V_{oc} of 1.14 V is achieved with thermally stable P3HT:SF(DPPB)₄ solar cells.

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Space-confined assembly of all-carbon hybrid fibers for capacitive energy storage: realizing a built-to-order concept for micro-supercapacitors

Wenchao Jiang, Shengli Zhai, Qihui Qian, Yang Yuan, H. Enis Karahan, Li Wei, Kunli Goh, Andrew Keong Ng, Jun Wei and Yuan Chen*

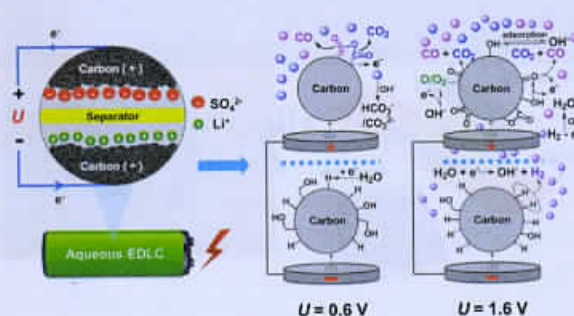
Customized hybrid carbon fiber supercapacitors with energy across two orders and power across four orders of magnitude.

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Ageing phenomena in high-voltage aqueous supercapacitors investigated by *in situ* gas analysis

Minglong He, Krzysztof Fic, Elżbieta Frąckowiak, Petr Novák and Erik J. Berg*

In situ gas analysis reveals the nature, onset and extent of carbon and electrolyte degradation mechanisms in high-voltage aqueous supercapacitors.

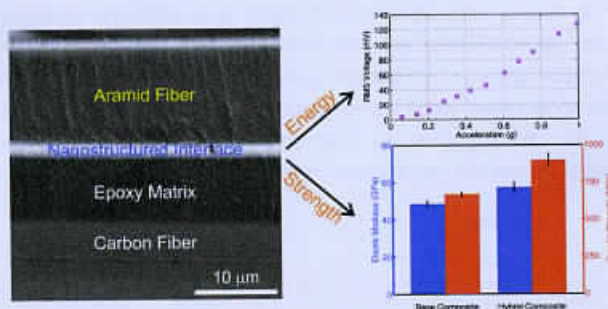


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ZnO nanowire interfaces for high strength multifunctional composites with embedded energy harvesting

Mohammad H. Malakooti, Brendan A. Patterson, Hyun-Sik Hwang and Henry A. Sodano*

We introduce the first multifunctional material that simultaneously exhibits enhanced mechanical strength and embedded energy harvesting functionality.

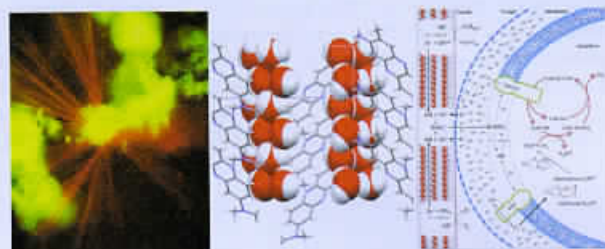


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Novel phenazine crystals enable direct electron transfer to methanogens in anaerobic digestion by redox potential modulation

Sabrina Beckmann,* Cornelia Welte, Xiaomin Li, Yee M. Oo, Lena Kroeninger, Yooun Heo, Miaomiao Zhang, Daniela Ribeiro, Matthew Lee, Mohan Bhadbhade, Christopher E. Marjo, Jan Seidel, Uwe Deppenmeier and Mike Manfield*

Phenazine crystals enhance methanogenesis by electron delivery to respiratory heterodisulfide reductase enzyme.

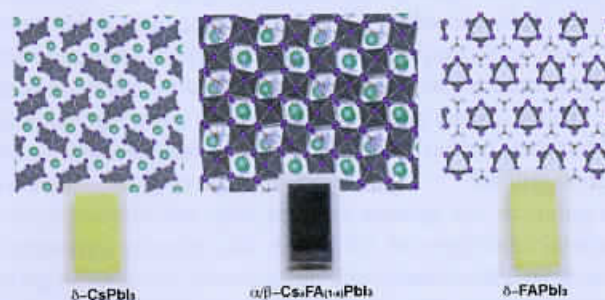


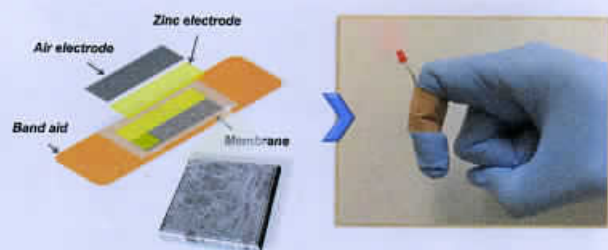
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Entropic stabilization of mixed A-cation ABX₃ metal halide perovskites for high performance perovskite solar cells

Chenyi Yi, Jingshan Luo, Simone Meloni, Ariadni Boziki, Negar Ashari-Astani, Carole Grätzel, Shaik M. Zakeeruddin, Ursula Röthlisberger* and Michael Grätzel*

A mixture of CsPbI₃ and FAPbI₃ is thermodynamically stabilized in the perovskite phase with respect to the pure δ phases.





A flexible solid-state electrolyte for wide-scale integration of rechargeable zinc–air batteries

Jing Fu, Jing Zhang, Xueping Song, Hadis Zarrin, Xiaofei Tian, Jinli Qiao, Lathanken Rasen, Kecheng Li and Zhongwei Chen*

Replacing liquid electrolytes with a versatile, solid-state membrane based on highly functionalized cellulose nanofibers allows for easy integration of rechargeable zinc–air into any bendable and wearable devices.

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Broad

The fast and renewable technology of organic solar cells (OSCs) is rapidly advancing. The term heterojunction

1 Intro

Due to excellent energy storage and major photovoltaic energy resources, Organic solar voltaic technology has attracted attention of their ease of fabrication and abundant advantages.

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Department of Information Management
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