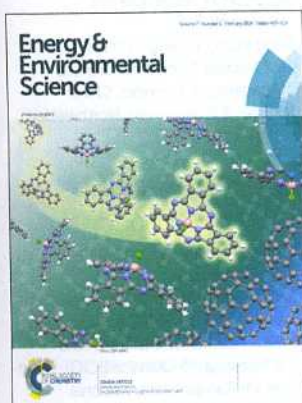


## IN THIS ISSUE

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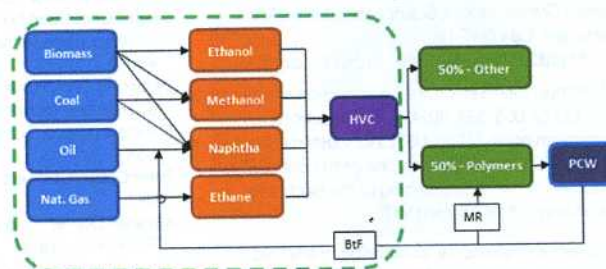
## ANALYSIS

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### Energy demand and emissions of the non-energy sector

Vassilis Daioglou,\* Andre P. C. Faaij, Deger Saygin,  
Martin K. Patel, Birka Wicke and Detlef P. van Vuuren

The description and application of a model projecting energy demand and emissions of chemical feedstocks and the effect of mitigating measures.



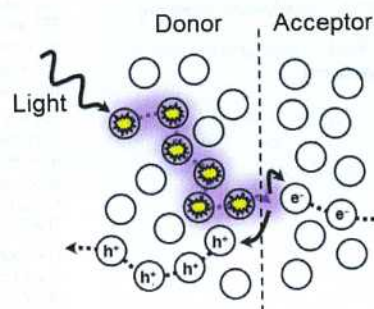
## REVIEWS

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### Exciton diffusion in organic photovoltaic cells

S. Matthew Menke and Russell J. Holmes\*

The efficient harvesting of excitons is an essential step in the operation of organic photovoltaic cells. The ability to engineer and tailor exciton transport remains a key challenge for the design of next generation devices. In this review, we examine recent efforts to characterize exciton transport as well as novel material and device-based techniques aimed at extending the distance over which an exciton can migrate.

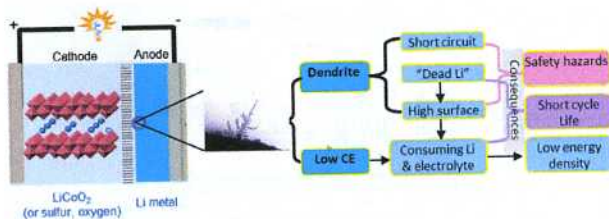


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**Lithium metal anodes for rechargeable batteries**

Wu Xu,\* Jiulin Wang, Fei Ding, Xilin Chen, Eduard Nasybulin, Yaohui Zhang and Ji-Guang Zhang\*

Lithium metal is an ideal anode for rechargeable batteries if dendrite growth and low Coulombic efficiency problems can be overcome.

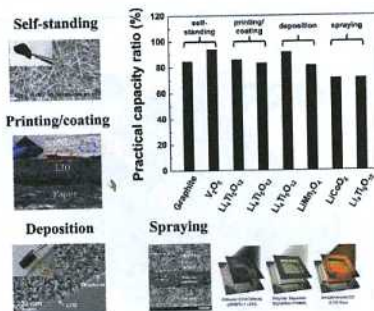


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**Recent progress on flexible lithium rechargeable batteries**

Hyeokjo Gwon, Jihyun Hong, Haegyeom Kim, Dong-Hwa Seo, Seokwoo Jeon and Kisuk Kang\*

This mini-review provides a comprehensive discussion of flexible lithium rechargeable battery technologies.

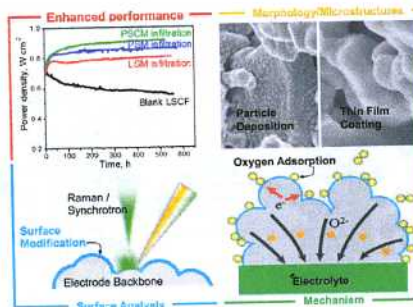


552

**Enhancing SOFC cathode performance by surface modification through infiltration**

Dong Ding, Xiayi Li, Samson Yuxiu Lai, Kirk Gerdes and Meilin Liu\*

Wet chemical infiltration processes have been demonstrated to be effective to enhance electrocatalytic activity and stability in SOFC cathodes.

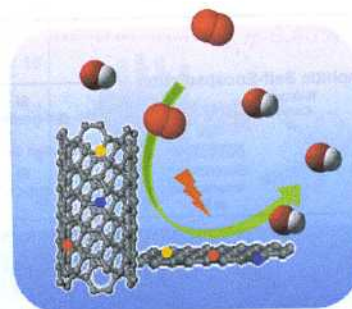


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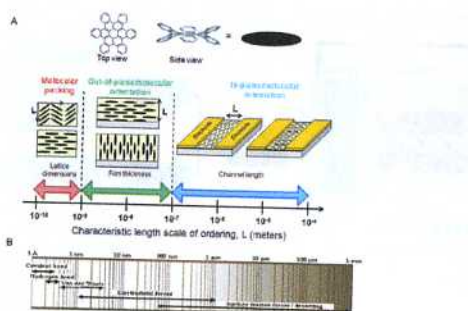
**Heterogeneous nanocarbon materials for oxygen reduction reaction**

Da-Wei Wang\* and Dangsheng Su\*

This review updates the recent progress of heterogeneous nanocarbon electrocatalysts for the oxygen reduction reaction. The different functions of heteroatoms (N, O, B, P, S) and their combinations are revisited.



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### Directing the film structure of organic semiconductors via post-deposition processing for transistor and solar cell applications

Anna M. Hiszpanski\* and Yueh-Lin Loo\*

Post-deposition processing methods offer means to control the structure of organic semiconductor thin films across various length scales.

## COMMUNICATIONS

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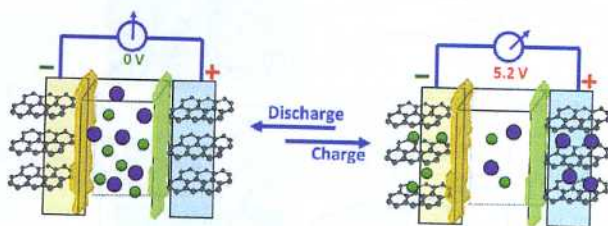


### High-performance bi-functional electrocatalysts of 3D crumpled graphene-cobalt oxide nanohybrids for oxygen reduction and evolution reactions

Shun Mao, Zhenhai Wen, Taizhong Huang, Yang Hou and Junhong Chen\*

High-performance bi-functional electrocatalysts for oxygen reduction and evolution reactions were fabricated with 3D crumpled graphene-CoO hybrids.

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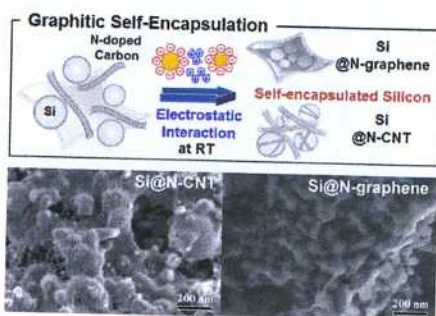


### Dual-graphite chemistry enabled by a high voltage electrolyte

Jeffrey A. Read,\* Arthur V. Cresce, Matthew H. Ervin and Kang Xu

Schematic illustration of a dual-graphite intercalation cell wherein  $\text{Li}^+$  and  $\text{PF}_6^-$  are simultaneously accommodated in graphitic structures at the anode and cathode upon charge.

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### N-doped graphitic self-encapsulation for high performance silicon anodes in lithium-ion batteries

Won Jun Lee, Tae Hoon Hwang, Jin Ok Hwang, Hyun Wook Kim, Joonwon Lim, Hu Young Jeong, Jongwon Shim, Tae Hee Han, Je Young Kim, Jang Wook Choi\* and Sang Ouk Kim\*

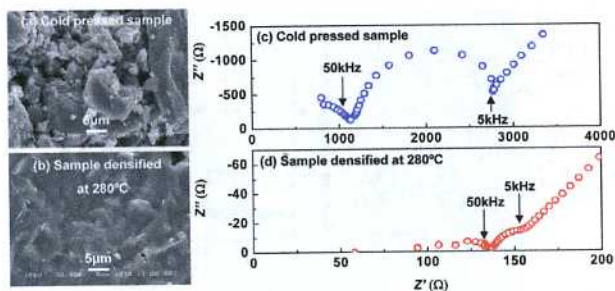
We demonstrate spontaneous room temperature graphitic encapsulation of Si particles for high performance LIB anodes with carbon nanotubes and graphene. Superior capacity retention and excellent rate capability have been achieved.

627

### A sulphide lithium super ion conductor is superior to liquid ion conductors for use in rechargeable batteries

Yoshikatsu Seino,\* Tsuyoshi Ota, Kazunori Takada, Akitoshi Hayashi and Masahiro Tatsumisago

We report that a heat-treated  $\text{Li}_2\text{S}-\text{P}_2\text{S}_5$  glass-ceramic conductor has an extremely high ionic conductivity of  $1.7 \times 10^{-2} \text{ S cm}^{-1}$  and the lowest conduction activation energy of  $17 \text{ kJ mol}^{-1}$  at room temperature among lithium-ion conductors reported to date.

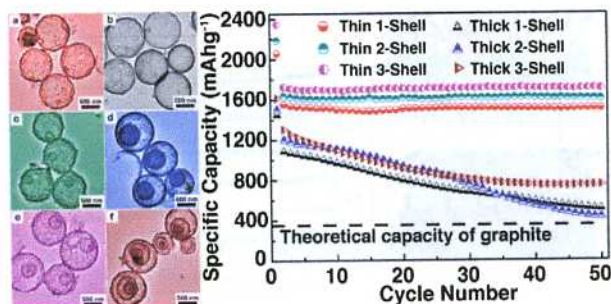


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### $\alpha\text{-Fe}_2\text{O}_3$ multi-shelled hollow microspheres for lithium ion battery anodes with superior capacity and charge retention

Simeng Xu, Colin M. Hessel, Hao Ren, Ranbo Yu,\* Quan Jin, Mei Yang, Huijun Zhao and Dan Wang\*

Multi-shelled  $\alpha\text{-Fe}_2\text{O}_3$  hollow microspheres show a thickness dependent lithium storage capacity of up to  $1702 \text{ mA h g}^{-1}$  at a current density of  $50 \text{ mA g}^{-1}$ .

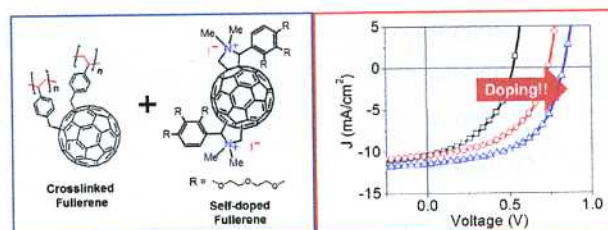


638

### In situ doping and crosslinking of fullerenes to form efficient and robust electron-transporting layers for polymer solar cells

Namchul Cho, Chang-Zhi Li, Hin-Lap Yip and Alex K.-Y. Jen\*

Efficient electron-transporting layers (ETLs) with a stable conductive fullerene doped into a thermally crosslinkable fullerene matrix have been developed for inverted polymer solar cells (PSCs).

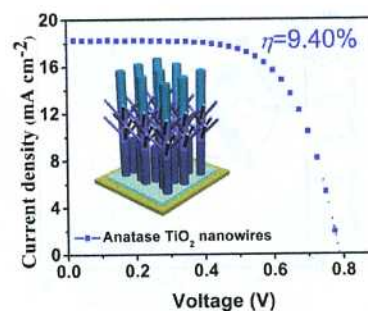


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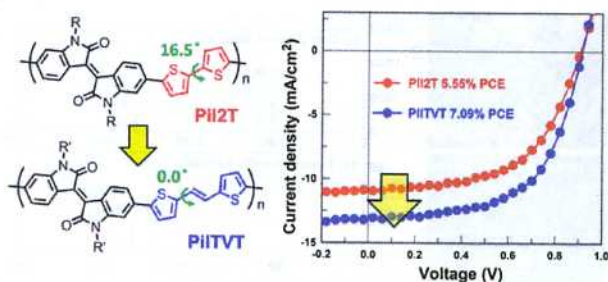
### Ultra-long anatase $\text{TiO}_2$ nanowire arrays with multi-layered configuration on FTO glass for high-efficiency dye-sensitized solar cells

Wu-Qiang Wu, Yang-Fan Xu, Cheng-Yong Su and Dai-Bin Kuang\*

DSSC based on  $47 \mu\text{m}$ -long anatase  $\text{TiO}_2$  nanowire array attains an impressive power conversion efficiency of 9.40%.



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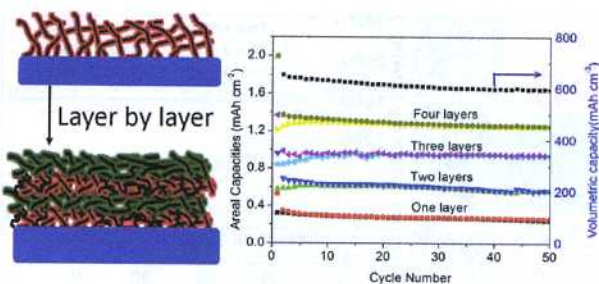


### $\pi$ -Extended low bandgap polymer based on isoindigo and thienylvinylene for high performance polymer solar cells

Eui Hyuk Jung and Won Ho Jo\*

A  $\pi$ -extended low bandgap polymer, PIITVT showed a promising power conversion efficiency of 7.09% in polymer solar cells. It is higher than that of PII2T (5.55%), because of the better coplanar structure of the TVT unit than the 2T unit.

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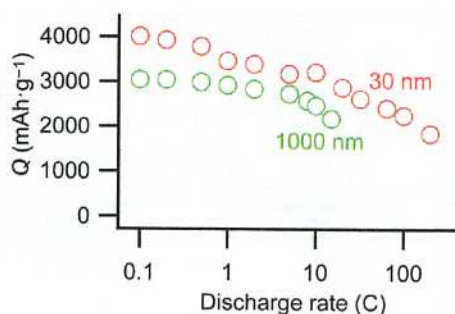


### A multilayer Si/CNT coaxial nanofiber LIB anode with a high areal capacity

Qizhen Xiao, Yu Fan, Xinghui Wang, Rahmat Agung Susantyoko and Qing Zhang\*

Multilayer Si/CNT composites have been used as LIB anodes, which have significantly high silicon loading, areal capacity and excellent cyclability.

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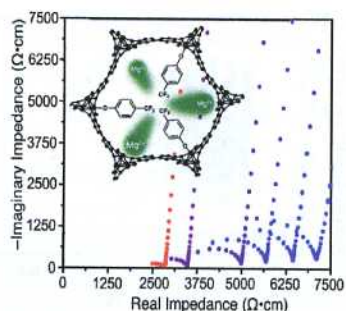


### High performance silicon-based anodes in solid-state lithium batteries

Rinlee B. Cervera, Naoki Suzuki, Tsuyoshi Ohnishi, Minoru Osada, Kazutaka Mitsuishi, Takayoshi Kambara and Kazunori Takada\*

Si-based anodes fabricated into thin films exhibit high capacity and rate capability in a solid electrolyte.

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### Metal-organic frameworks as solid magnesium electrolytes

M. L. Aubrey, R. Ameloot, B. M. Wiers and J. R. Long\*

By post-synthetic modification of a metal-organic framework, solid magnesium electrolytes have been prepared with room temperature ionic conductivities over one-hundred times greater than any previously reported rigid material.

