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## Latest and Hot Papers

ZHUANG Lin

*College of Chemistry and Molecular Sciences, Wuhan University*, lzhuang@whu.edu.cn

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## 近期热点文章 Latest and Hot Papers

### Field Effect Modulation of Outer-Sphere Electrochemistry at Back-Gated, Ultrathin ZnO Electrodes

C.-H. Kim, C. D. Frisbie

*J. Am. Chem. Soc.* DOI: 10.1021/jacs.6b02547

通过场效应调节 ZnO 薄膜半导体的带沿, 从而影响电极/电解质界面的电荷转移速度. 这种场效应对半导体带沿的调控效应可达 0.1 ~ 0.4 eV.

### Enhancing Perovskite Electrocatalysis through Strain Tuning of the Oxygen Deficiency

J. R. Petrie, H. Jeon, S. C. Barron, T. L. Meyer, H. N. Lee

*J. Am. Chem. Soc.* DOI: 10.1021/jacs.6b03520

将  $\text{SiCoO}_x$  薄膜外延生长于各种晶格失配的钙钛矿基底上, 利用晶格变形效应调控  $\text{SiCoO}_x$  中的氧缺陷, 使其对氧析出反应(OER)的催化活性提高一个数量级, 与  $\text{IrO}_2$  催化剂相当.

### Unconventional Supercapacitors from Nanocarbon-Based Electrode Materials to Device Configurations

L. Liu, Z. Niu, J. Chen

*Chem. Soc. Rev.* DOI: 10.1039/C6CS00041J

关于超级电容器碳基电极材料与器件结构的综述, 引用了 397 篇参考文献.

### A Green and Cost-Effective Rechargeable Battery with High Energy Density Based on a Deep Eutectic Catholyte

Y. Wang, H. Zhou

*Energy Environ. Sci.* DOI: 10.1039/C6EE00902F

以  $\text{FeCl}_3 \cdot \text{H}_2\text{O}$  与尿素 (2:1) 形成的室温共熔体 (DEC) 为正极电解质 (Catholyte), 理论容量为  $144.72 \text{ Ah} \cdot \text{L}^{-1}$ . 与金属锂负极一起形成 Li-DEC 电池, 其容量可达  $300 \text{ Wh} \cdot \text{kg}^{-1}$  ( $480 \text{ Wh} \cdot \text{L}^{-1}$ ).

### Interface Strain in Vertically Stacked Two-Dimensional Heterostructured Carbon-MoS<sub>2</sub> Nanosheets Controls Electrochemical Reactivity

L. Oakes, R. Carter, T. Hanken, A. P. Cohn, K. Share, B. Schmidt, C. L. Pint

*Nature Commun.* DOI: 10.1038/ncomms11796

发现碳与  $\text{MoS}_2$  之间形成的异质界面, 仅 ~ 0.1% 的晶格失配便可有效加速锂离子嵌入  $\text{MoS}_2$  的过程. 此发现有助于离子嵌入材料的设计.

### Freestanding Three-Dimensional Core-Shell Nanoarrays for Lithium-Ion Battery Anodes

G. Tan, F. Wu, Y. Yuan, R. Chen, T. Zhao, Y. Yao, J. Qian, J. Liu, Y. Ye, R. Shahbazian-Yassar, J. Lu, K. Amine

*Nature Commun.* DOI: 10.1038/ncomms11774

在 Cu 基底上生长  $\text{CuO}$  纳米线, 再通过磁控溅射包覆氮化碳薄膜, 此纳米结构电极无须添加粘接剂和导电材料, 用作锂离子负极可克服材料结构变化引起的容量衰减.

### Water Splitting-Biosynthetic System with CO<sub>2</sub> Reduction Efficiencies Exceeding Photosynthesis

C. Liu, B. C. Colón, M. Ziesack, P. A. Silver, D. G. Nocera

*Science* 352 (2016) 1210.

采用具有生物相容性的 Co-P 催化剂作为电解水的阴阳极材料, 将微生物与电解水相结合, 细菌通过消耗电解产生的  $\text{H}_2$ , 在含  $\text{O}_2$  的环境下将  $\text{CO}_2$  转化为生物质或低级醇. 与光伏器件相结合, 此系统的  $\text{CO}_2$  还原的能量效率约 10%, 高于自然界的光合作用效率.

### Theoretical Modelling and Facile Synthesis of a Highly Active Boron-Doped Palladium Catalyst for the Oxygen Reduction Reaction

T. T. V. Doan, J. Wang, K. C. Poon, D. C. L. Tan, B. Khezri, R. D. Webster, H. Su, H. Sato

*Angew. Chem. Int. Ed.* DOI: 10.1002/anie.201601727

理论计算表明, B 掺杂可向 Pd 表面注入电子, 削弱了 Pd-O 相互作用, 提升 Pd 对氧还原反应 (ORR) 的电催化活性. 实验也证明了这一点.

### Unusual Formation of CoSe@Carbon Nanoboxes, Which Have An Inhomogeneous Shell, for Efficient Lithium Storage

H. Hu, J. Zhang, B. Guan, X. W. Lou

*Angew. Chem. Int. Ed.* DOI: 10.1002/anie.201603852

以含 Co 的 MOF (ZIF-67) 和 Se 粉为前体, 制备  $\text{CoSe}@C$  核-壳结构材料. 用作锂离子电池负极, 具有大于  $700 \text{ mAh} \cdot \text{g}^{-1}$  的容量 ( $@1 \text{ A} \cdot \text{g}^{-1}$ ) 和稳定的循环性能.

### Solvent-Mediated Control of the Electrochemical Discharge Products of Non-Aqueous Sodium-Oxygen Electrochemistry

I. M. Aldous, L. J. Hardwick

*Angew. Chem. Int. Ed.* DOI: 10.1002/anie.201601615  
采用表面增强拉曼(SERS)等电化学谱学方法,研究多种含  $\text{Na}^+$  有机溶剂中的氧还原反应,发现溶剂的 Gutmann Donor Number 是决定反应产物为  $\text{Na}_2\text{O}_2$  或  $\text{Na}_2\text{O}$  的重要参数。

### The Electrostatic Screening Length in Concentrated Electrolytes Increases with Concentration

A. M. Smith, A. A. Lee, S. Perkin

*J. Phys. Chem. Lett.* DOI: 10.1021/acs.jpcclett.6b00867  
测量两个云母片间不同浓度电解质溶液中的离子相互作用,发现传统 Debye-Hückel 理论所预测的离子相互作用随离子浓度提高指数衰减的规律在离子浓度大于  $0.1 \text{ mol}\cdot\text{L}^{-1}$  后被打破,浓溶液中 Debye 长度( $\lambda_D$ )大于平均场理论的预测。

### A Zwitterionic Gel Electrolyte for Efficient Solid-State Supercapacitors

X. Peng, H. Liu, Q. Yin, J. Wu, P. Chen, G. Zhang, G. Liu, C. Wu, Y. Xie

*Nature Commun.* DOI: 10.1038/ncomms11782  
采用偶极离子型(Zwitterionic)凝胶电解质与石墨烯电极构成超级电容器,其体积电容量为  $300.8 \text{ F}\cdot\text{cm}^3@0.8 \text{ A}\cdot\text{cm}^3$ ,电流提高至  $20 \text{ A}\cdot\text{cm}^3$  时容量仅衰减 15%。

### Water at Interfaces

O. Björneholm, M. H. Hansen, A. Hodgson, L.-M. Liu, D. T. Limmer, A. Michaelides, P. Pedevilla, J. Rossmeisl, H. Shen, G. Tocci, E. Tyrode, M.-M. Walz, J. Werner, H. Bluhm

*Chem. Rev.* DOI: 10.1021/acs.chemrev.6b00045  
关于固体/水溶液界面水分子物理化学性质的理论与实验研究的综述,引用了 306 篇参考文献。

### Bioreduction of Precious Metals by Microorganisms: Efficient Gold@N-Doped Carbon Electrocatalysts for the Hydrogen Evolution Reaction

W. Zhou, T. Xiong, C. Shi, J. Zhou, K. Zhou, N. Zhu,

L. Li, Z. Tang, S. Chen

*Angew. Chem. Int. Ed.* DOI: 10.1002/anie.201602627  
采用微生物还原 Au 并担载于氮杂碳上,对氢析出反应(HER)和 ORR 均表现出较好的催化活性。

### Coordination Polymer Structure and Revisited Hydrogen Evolution Catalytic Mechanism for Amorphous Molybdenum Sulfide

P. D. Tran, T. V. Tran, M. Orto, S. Torelli, Q. D. Truong, K. Nayuki, Y. Sasaki, S. Y. Chiam, R. Yi, I. Honma, J. Barber, V. Artero

*Nature Mater.* DOI: 10.1038/nmat4588  
非晶态  $\text{MoS}_2$  比晶态具有更高的 HER 催化活性,但机理尚未清楚.本研究发现非晶态  $\text{MoS}_2$  具有配位高分子的结构,结构单元为  $[\text{Mo}_3\text{S}_{13}]^2$ ,其中两个  $\text{S}_2^{2-}$  配体为聚合物连接体,另一个自由的  $\text{S}_2^{2-}$  配体可能是催化 HER 的活性位点。

### Separating Hydrogen and Oxygen Evolution in Alkaline Water Electrolysis Using Nickel Hydroxide

L. Chen, X. Dong, Y. Wang, Y. Xia

*Nature Commun.* DOI: 10.1038/ncomms11741  
将水分解分两步进行,HER 与  $\text{Ni}(\text{OH})_2$  氧化配对,然后  $\text{NiOOH}$  还原与 OER 配对,以此实现在时空上隔开氢气的析出和氧气的析出。

### Engineering Electrocatalytic Activity in Nano-sized Perovskite Cobaltite Through Surface Spin-State Transition

S. Zhou, X. Miao, X. Zhao, C. Ma, Y. Qiu, Z. Hu, J. Zhao, L. Shi, J. Zeng

*Nature Commun.* DOI: 10.1038/ncomms11510  
发现当  $\text{LaCoO}_3$  钙钛矿纳米粒子缩小至 80 nm,其  $e_g$  轨道的电子填充数可从 1 增大至 1.2,同时表面钴离子处于高自旋态,提升了 ORR 催化活性。

庄 林

(武汉大学 化学与分子科学学院)  
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