

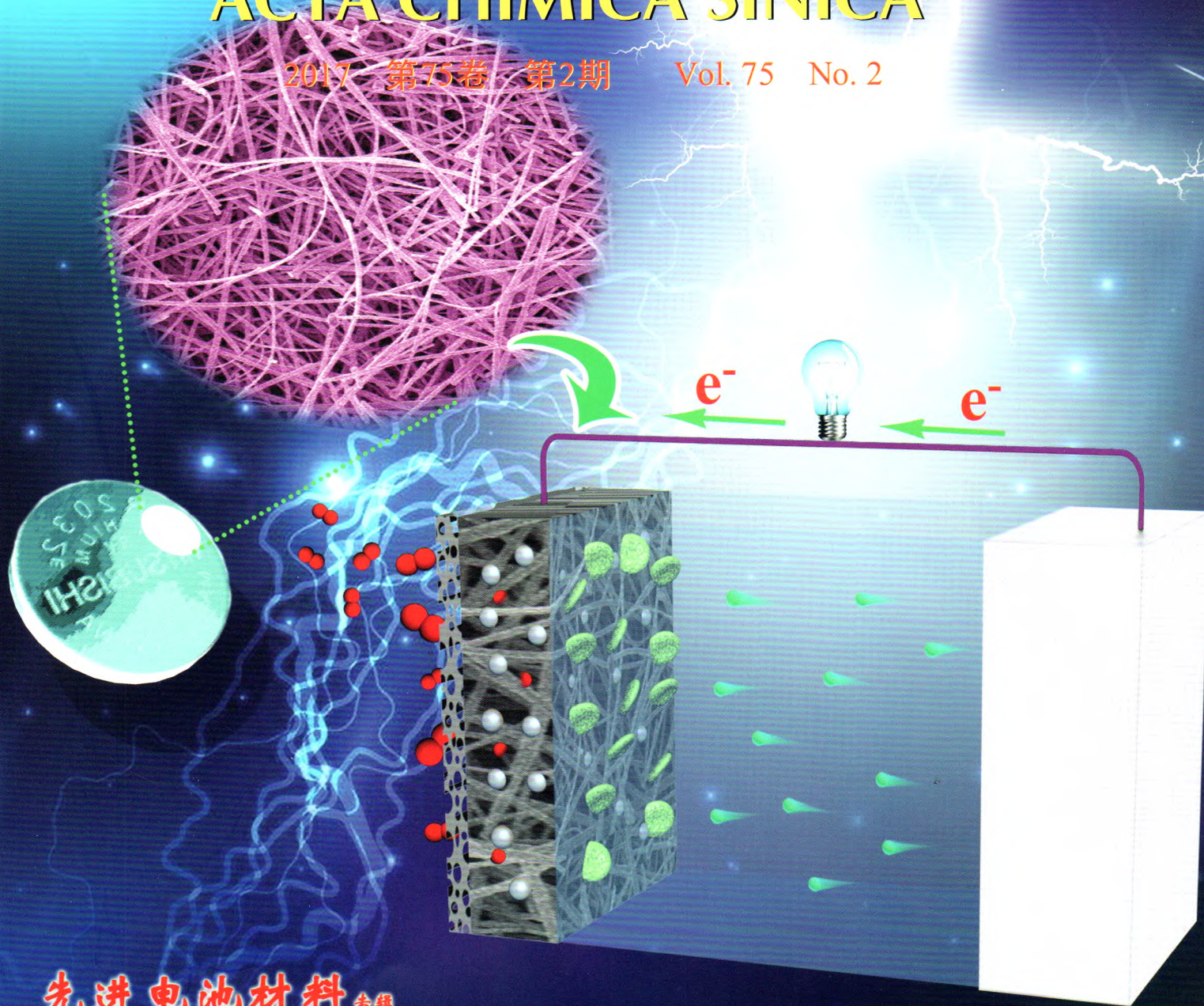


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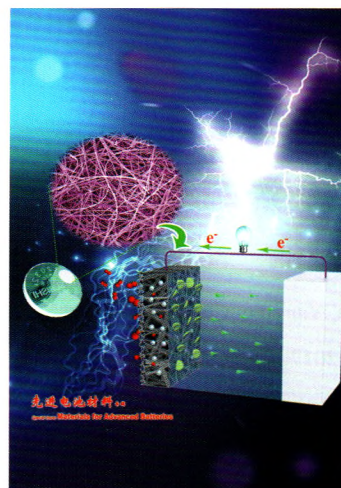
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富锂正极材料 $x\text{Li}_3\text{NbO}_4 \cdot (1-x)\text{LiMO}_2$ ($\text{M}=\text{Mn}, \text{Co}; 0 < x < 1$) 的制备及电化学性能研究
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* 通信联系人.

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On the cover: An innovative way to recycle the depleted Li-ion batteries is proposed by transforming them to rechargeable Li-O₂ batteries. In the discharged primary Li-AgVO₃ batteries where Ag nanoparticles form *in-situ* on the surface of vanadium oxide to act as efficient catalyst, Li₂O₂ can be reversibly generated/decomposed when the batteries are exposed in oxygen. [Chen, Jun *et al.* on page 199-205.]



Editorial

Materials for Advanced Batteries—A Driving Force of the Mobile Information Society.....
..... Chen, Jun *Acta Chim. Sinica* **2017**, 75(2), 127-128

Account

Design and Preparation of Advanced Materials for Lithium-Air Batteries

Liu, Qingchao; Ma, Shiyu; Xu, Jijing; Li, Zhongjun; Zhang, Xinbo*

Acta Chim. Sinica **2017**, 75(2), 137-146



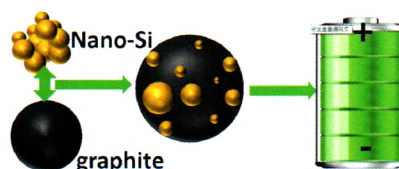
Lithium-air battery holds ultrahigh theory energy density, while its practical application still hindered by many challenges. This review mainly introduces our recent works on lithium-air battery, including cathode fabrication, lithium anode protection as well as design and assembly of novel flexible lithium-air battery, hoping to promote the understanding the development of lithium-air battery.

Perspective

Recent Development of the Synthetic Method for Si/Graphite Anode Materials

Du, Jin; Lin, Ning*; Qian, Yitai

Acta Chim. Sinica **2017**, 75(2), 147-153



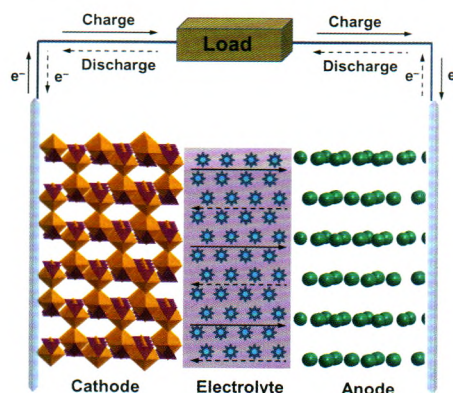
This perspective shows the synthetic methodologies for producing high-capacity nano-Si/graphite composite for rechargeable Li-ion batteries.

Review

Advance and Prospect of Functional Materials for Sodium Ion Batteries

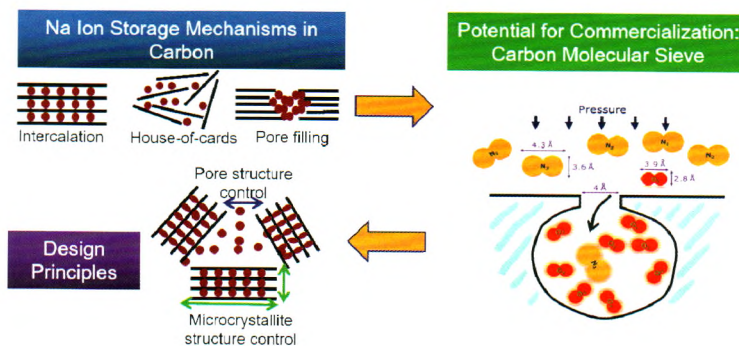
Xiang, Xingde; Lu, Yanying; Chen, Jun*

Acta Chim. Sinica **2017**, 75(2), 154-162



Sodium ion batteries (SIBs) as a new chemical power source have recently attracted a great attention for large-scale energy storage owing to the abundant reserves and low cost of sodium resources. This review summarizes the recent advance of electrode materials and electrolytes for SIBs, mainly focusing on their electrochemical properties, existing challenges and resolution strategies.

Research Advances of Carbon-based Anode Materials for Sodium-Ion Batteries

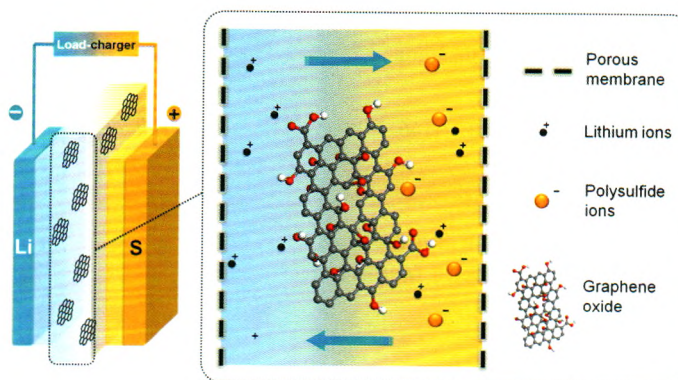


Zhang, Siwei; Zhang, Jun; Wu, Sida; Lv, Wei*; Kang, Feiyu; Yang, Quan-Hong*

Acta Chim. Sinica **2017**, 75(2), 163-172

Sodium-ion battery (SIB) is a promising energy storage device for large scale energy storage systems, but its practical use is restricted by the lack of suitable active anode and cathode materials. Carbon materials are the most promising anode materials, and the commercial carbon molecular sieve is highlighted as a promising anode material for the practical use of SIBs. In this paper, the sodium ion storage behaviors in different carbon structures are discussed and the research advances of carbon-based anode materials are reviewed.

Review on Advanced Functional Separators for Lithium-Sulfur Batteries



Huang, Jiaqi; Sun, Yingzhi; Wang, Yunfei; Zhang, Qiang*

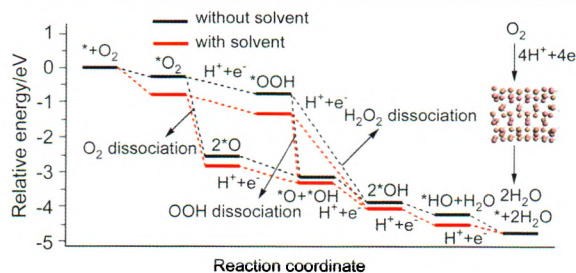
Acta Chim. Sinica **2017**, 75(2), 173-188

In this review article, recent progresses on multifunctional separators/interlayers for lithium sulfur batteries are summarized, including the permselective separators to stop the polysulfide shuttles, separator for low interface resistance, and separator for stable anode interfaces.

Communication

Germanium Nanotube as the Catalyst for Oxygen Reduction Reaction: Performance and Mechanism

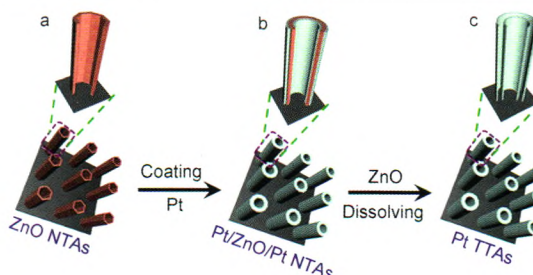
Chen, Xin; Yan, Huijun; Xia, Dingguo*

Acta Chim. Sinica **2017**, 75(2), 189-192

The oxygen reduction reaction catalytic performance and the possible mechanism on germanium nanotube were studied by density functional theory methods.

Pt Tube-in-Tube Arrays as High-Performance Electrocatalysts for Direct Methanol Fuel Cell

Li, Qi; Xu, Han; Tong, Yexiang*; Li, Gao-ren*

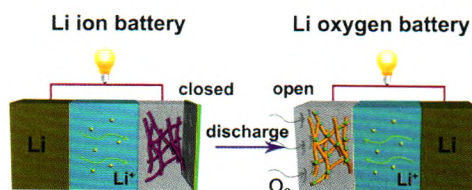
Acta Chim. Sinica **2017**, 75(2), 193-198

The Pt tube-in-tube arrays (TTAs) were designed and synthesized by ZnO template-assisted electrodeposition. The Pt TTAs can obviously enhance the utilization rate of Pt and efficiently prevent the Ostwald ripening and aggregation, which is derived from the unique TTAs structure provides fast transport and short diffusion paths for electroactive species because of their multi-walled, hollow and one-dimensional (1D) nanostructures. The design of TTAs structure provides a new avenue for the synthesis of Pt-based electrocatalysts with excellent catalytic activity and durability for DMFCs.

Article

Resumption of the Discharged Li-AgVO₃ Primary Batteries for Rechargeable Li-O₂ Batteries

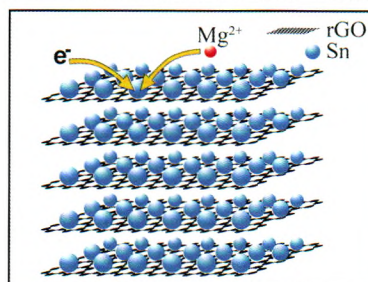
Li, Ran; Lu, Yanying; Lei, Kaixiang; Li, Fujun; Cheng, Fangyi*; Chen, Jun

Acta Chim. Sinica **2017**, 75(2), 199-205

The discharged Li-AgVO₃ primary battery can be further resumed as a rechargeable Li-O₂ battery by exposing the cathode to oxygen with the Ag nanoparticles generated during discharge of Li-AgVO₃ battery. The discharged silver vanadium oxide electrode acts as an electronically conductive and catalytically active catalyst for the reversible formation/decomposition of Li₂O₂.

Synthesis of Sn Nanoparticles/Graphene Nanosheet Hybrid Electrode Material with Three-Dimensional Conducting Network for Magnesium Storage

Zhang, Changhuan; Li, Nianwu; Yao, Huirong; Liu, Lin; Yin, Yaxia*; Guo, Yuguo*

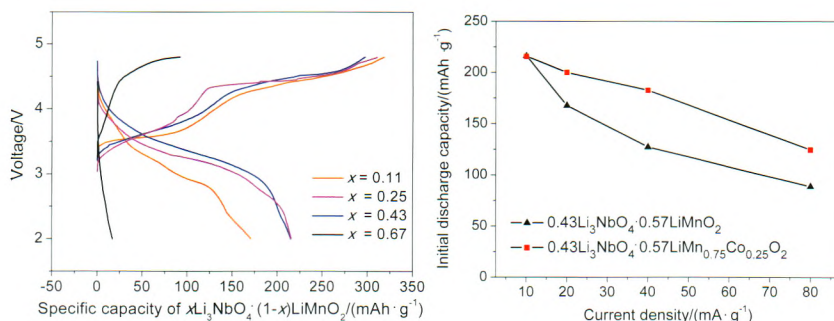
Acta Chim. Sinica **2017**, 75(2), 206-211

The 3D conducting network of rGO can effectively prevent the aggregation of Sn nanoparticles and alleviate the serious volume variation of Sn during repeated discharging/charging process. The Sn/rGO nanocomposite exhibits good capacity retention and a high Coulombic efficiency.

Synthesis and Electrochemical Performance of Lithium Rich Cathode Materials $x\text{Li}_3\text{NbO}_4 \cdot (1-x)\text{LiMO}_2$ ($\text{M} = \text{Mn, Co}; 0 < x < 1$) for Li-ion Batteries

Yang, Chun; Gong, Zhengliang*; Zhao, Wengao; Yang, Yong*

Acta Chim. Sinica **2017**, 75(2), 212-217

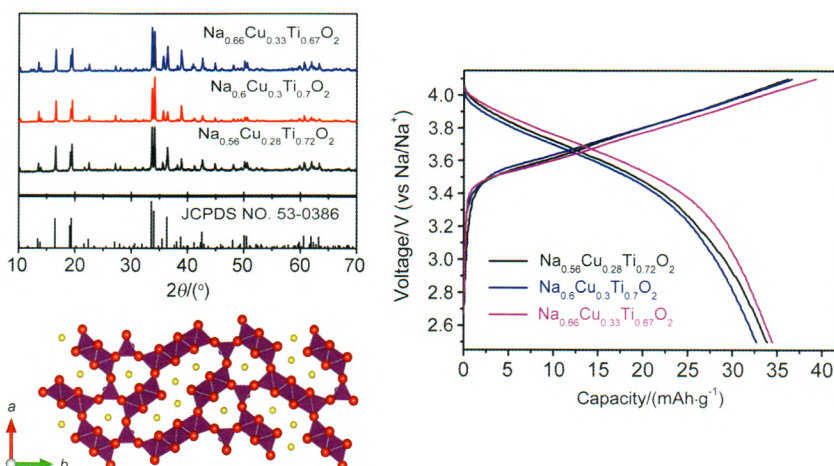


Lithium rich material $x\text{Li}_3\text{NbO}_4 \cdot (1-x)\text{LiMnO}_2$ was synthesized and investigated, the samples with $x=0.25$ or $x=0.43$ deliver a large capacity in the first cycle. The Co^{3+} doped material shows improved rate capability.

Novel Cu Based Oxides with Tunnel Structure as Cathode for Sodium-ion Batteries

Liu, Lili; Qi, Xingguo; Hu, Yongsheng*; Chen, Liquan; Huang, Xuejie

Acta Chim. Sinica **2017**, 75(2), 218-224

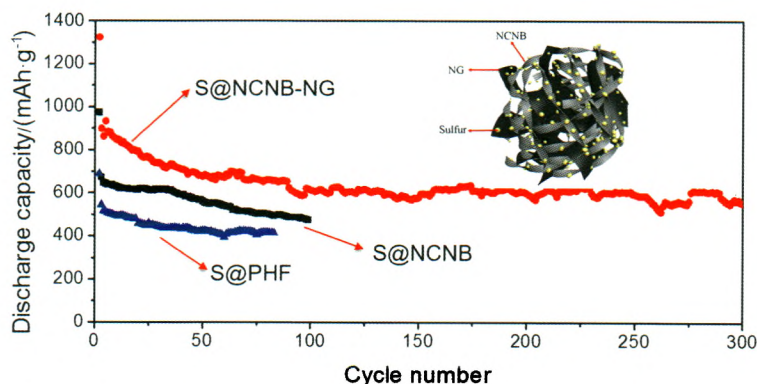


A series of Cu based tunnel type oxides were synthesized with different sodium contents. The space group is *pbam*, which is the same as $\text{Na}_{0.44}\text{MnO}_2$. Electrochemical performance tests demonstrated, for the first time, the electroactivity of $\text{Cu}^{3+}/\text{Cu}^{2+}$ redox couple in tunnel type structure.

Preparation of Three-dimensional Nitrogen-doped Carbon Nanoribbon and Application in Lithium/Sulfur Batteries

Li, Wanfei; Ma, Qian; Zheng, Zhaozhao; Zhang, Yuegang*

Acta Chim. Sinica **2017**, 75(2), 225-230

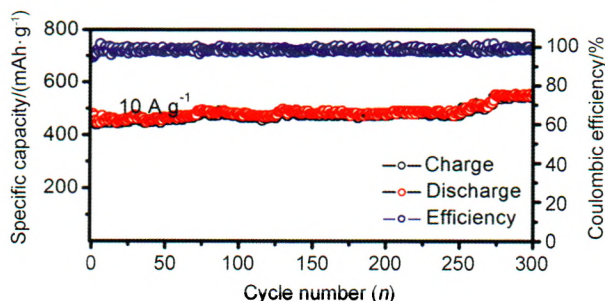


A high nitrogen-doped three-dimensional (3D) carbon nanoribbon network structure was built via thermal nitridation of a polymer of 1,4-hydroquinone and formaldehyde/graphene oxide (PHF/GO) composites. The developed S@NCNT-NG cathode exhibits high sulfur utilization, excellent rate capacities and good cyclability. The reported facile, cost-effective and scalable process shows great promise in practical lithium/sulfur batteries.

Hydrothermal for Synthesis of CoO Nanoparticles/Graphene Composite as Li-ion Battery Anodes

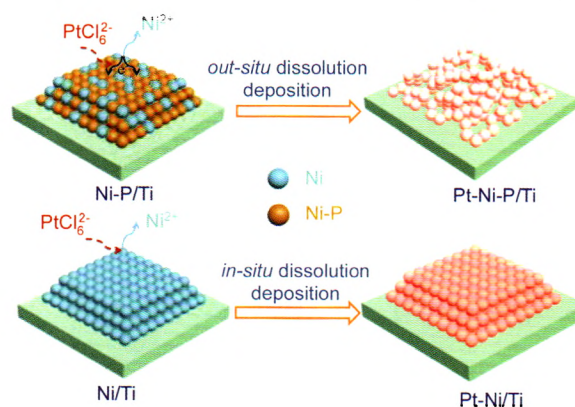
Wang, Lei; Zhao, Dongdong; Liu, Xu; Yu, Peng; Fu, Honggang*

Acta Chim. Sinica **2017**, 75(2), 231-236



CoO/reduced graphene oxide (RGO) composite has been synthesized by a facile and effective route. As Li-ion battery anode, it could exhibit high discharge capacity, well rate capability and superior cyclic stability.

Preparation and Electrochemical Properties of Honeycomb-like Pt-Ni-P/Ti Electrode for Methanol Oxidation

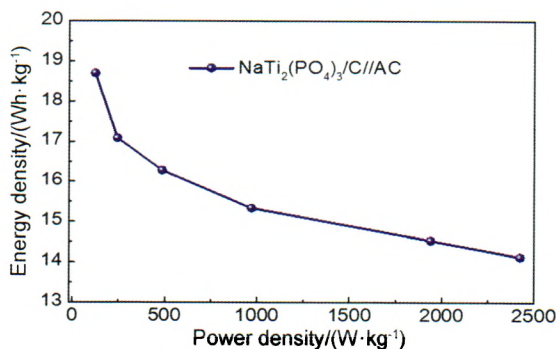


Tao, Xiongxin; Li, Li; Qi, Xueqiang; Wei, Zidong*

Acta Chim. Sinica **2017**, 75(2), 237-240

A honeycomb-like Pt-Ni-P catalyst supported on titanium sheet was prepared via a so-called “out-situ dissolution-deposition mechanism”. Electrochemical measurements confirmed that the incorporation of P can significantly enhance the methanol oxidation activity and CO-tolerance. The combination of compositionally and geometrically favorable factors provides a new avenue to design new anode electrocatalyst for direct methanol fuel cells.

Study on the Aqueous Hybrid Supercapacitor Based on Carbon-coated NaTi₂(PO₄)₃ and Activated Carbon Electrode Materials



Wang, Chaoqiang; Qiu, Feilong; Deng, Han; Zhang, Xiaoyu; He, Ping*; Zhou, Haoshen*

Acta Chim. Sinica **2017**, 75(2), 241-246

A Na-ion aqueous hybrid supercapacitor was fabricated by combining NaTi₂(PO₄)₃ anode and active carbon cathode. This hybrid supercapacitor shows the power density of 121.15 W·kg⁻¹ with specific energy of 18.71 Wh·kg⁻¹ at the current density of 0.5 A·g⁻¹. Moreover, the specific energy and power density goes to 14.13 Wh·kg⁻¹ and 2.42 kW·kg⁻¹ at a higher current density of 10 A·g⁻¹.



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