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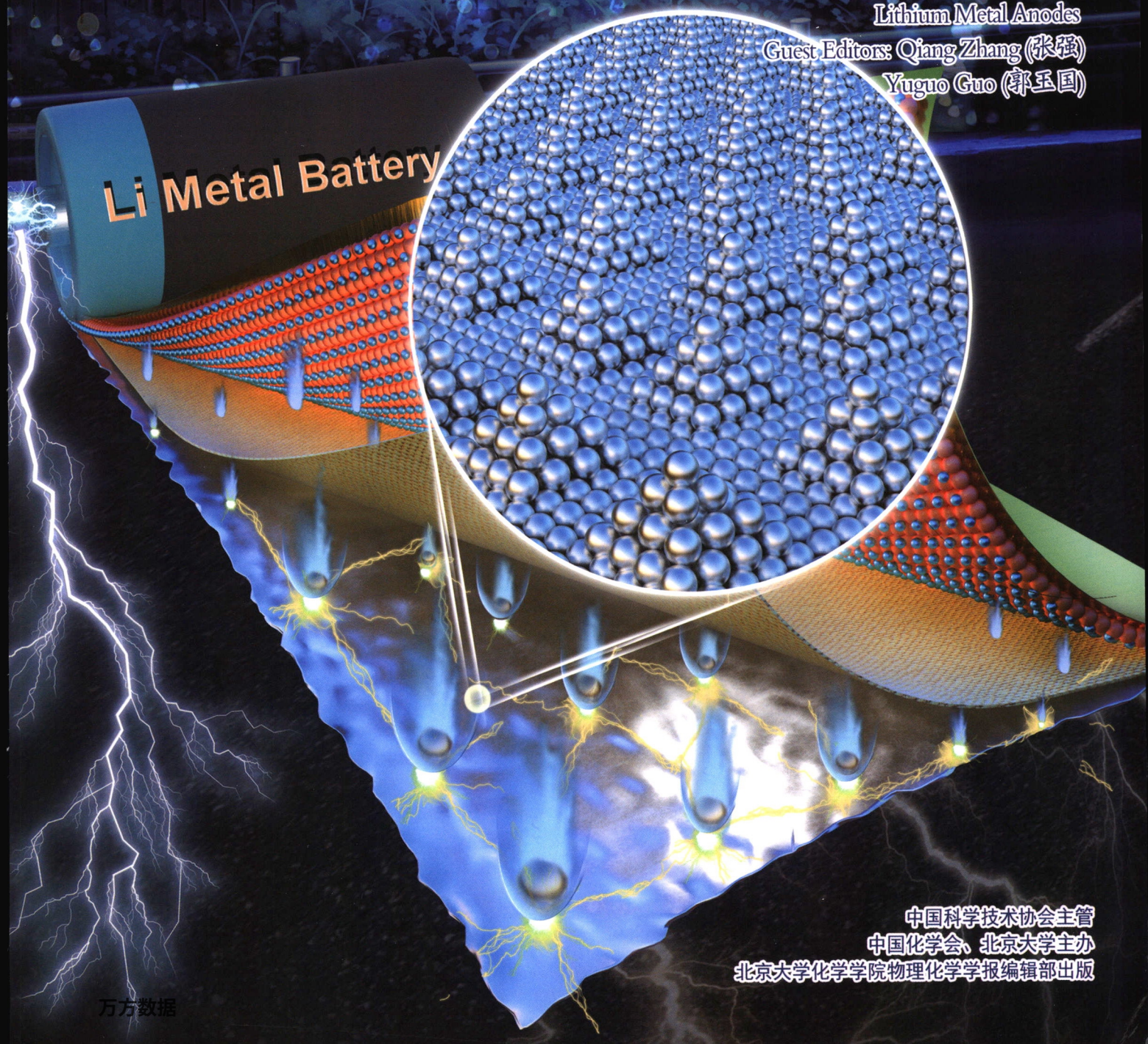
金属锂负极专刊

Lithium Metal Anodes

Guest Editors: Qiang Zhang (张强)

Yuguo Guo (郭玉国)



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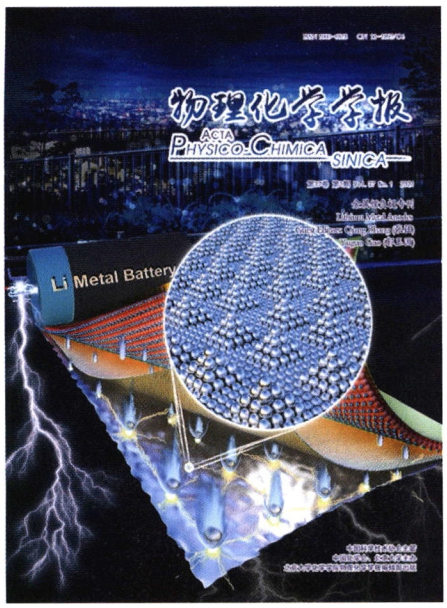
北京大学化学学院物理化学学报编辑部出版

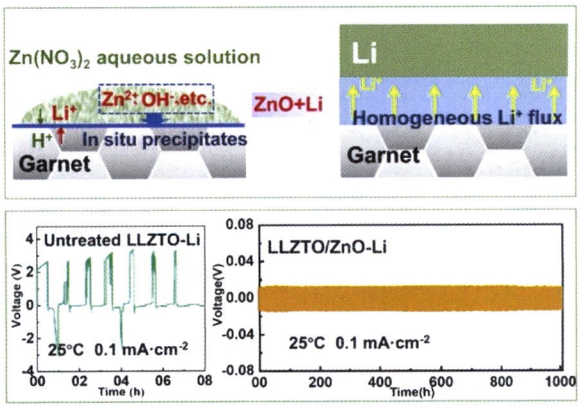
物 理 化 学 学 报 第 37 卷 第 1 期
ACTA PHYSICO-CHIMICA SINICA, Vol. 37, No. 1

COVER



This cover image shows the potential application of Li metal batteries by regulating Li nucleation and inducing uniform Li deposition. In article No. 2006021, Liu *et al.* summarized the progress in challenges and improvements of Li metal anodes from dendrite-growing mechanisms to dendrite-inhibiting strategies, including 3D matrix design, artificial SEI, electrolyte optimization, and separator modification.

CONTENTS



Acta Phys. -Chim. Sin. **2021,** *37* (1), 2009006

doi: 10.3866/PKU.WHXB202009006

In situ lithiophilic ZnO layer formed on a garnet surface induced by $Zn(NO_3)_2$ aqueous solution significantly improves the garnet/Li interface.

锂金属负极的挑战与改善策略研究进展

刘凡凡，张志文，叶淑芬，姚雨，余彦

Challenges and Improvement Strategies Progress of Lithium Metal Anode

Fanfan Liu, Zhiwen Zhang, Shufen Ye, Yu Yao, Yan Yu

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2006021

doi: 10.3866/PKU.WHXB202006021

Strategies developed to tackle the challenges of Li metal anode are summarized and analyzed in this review paper.

金属有机骨架材料在金属锂电池界面的应用

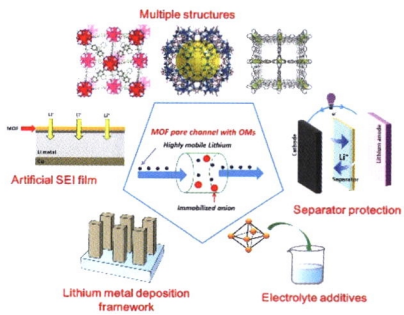
孙宇恒，高铭达，李慧，徐丽，薛晴，王欣然，白莹，吴川

Application of Metal-Organic Frameworks to the Interface of Lithium Metal Batteries

Yuheng Sun, Mingda Gao, Hui Li, Li Xu, Qing Xue, Xinran Wang, Ying Bai, Chuan Wu

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2007048

doi: 10.3866/PKU.WHXB202007048



This review introduces the unique structure and functionality of MOF materials that can protect the interface in lithium metal batteries (LMBs). The mechanism underlying the interfacial instability of LMBs and the versatile application of MOF for interface protection are systematically illustrated. Future prospects and problems hindering the development of MOF are also mentioned.

金属锂电池的热失控与安全性研究进展

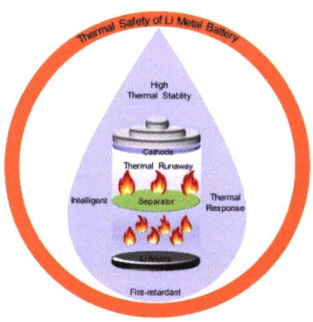
张世超，沈泽宇，陆盈盈

Research Progress of Thermal Runaway and Safety for Lithium Metal Batteries

Shichao Zhang, Zeyu Shen, Yingying Lu

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2008065

doi: 10.3866/PKU.WHXB202008065



Improving the safety of lithium metal batteries at material level provides a basis for suppressing thermal runaway.

金属锂负极的成核机制与载体修饰

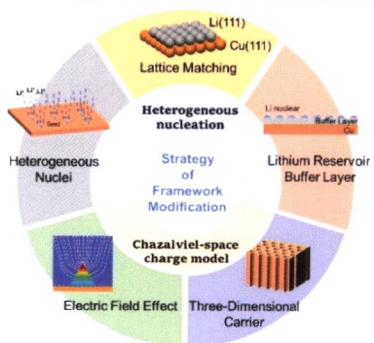
邱晓光，刘威，刘九鼎，李俊志，张凯，程方益

Nucleation Mechanism and Substrate Modification of Lithium Metal Anode

Xiaoguang Qiu, Wei Liu, Jiuding Liu, Junzhi Li, Kai Zhang, Fangyi Cheng

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2009012

doi: 10.3866/PKU.WHXB202009012



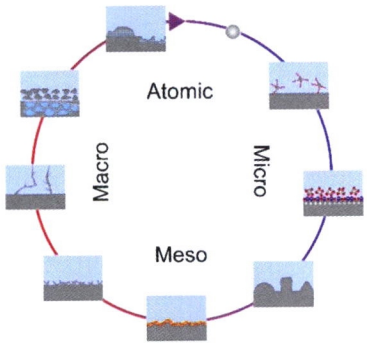
The nucleation mechanism and strategies of framework modification to upgrade lithium metal anodes are overviewed.

多空间尺度下的金属锂负极表征技术

潘弘毅，李泉，禹习谦，李泓

Characterization Techniques for Lithium Metal Anodes at Multiple Spatial Scales

Hongyi Pan, Quan Li, Xiqian Yu, Hong Li



Acta Phys. -Chim. Sin. **2021,** *37* (1), 2008091

doi: 10.3866/PKU.WHXB202008091

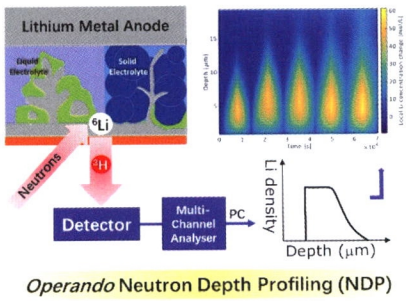
The basic science, technology issues, and corresponding characterization techniques of lithium metal anodes in multiple spatial scales were summarized.

中子深度剖析技术研究可充锂金属负极

郑国瑞，向宇轩，杨勇

Neutron Depth Profiling Technique for Studying Rechargeable Lithium Metal Anodes

Guorui Zheng, Yuxuan Xiang, Yong Yang



Operando Neutron Depth Profiling (NDP)

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2008094

doi: 10.3866/PKU.WHXB202008094

Neutron depth profiling (NDP) is a quantitative and nondestructive technique for the real-time observation of electrochemical behavior of Li in liquid/solid electrolyte-based Li metal batteries.

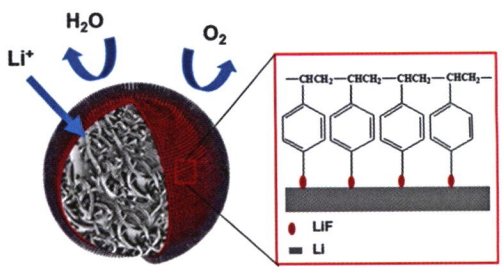
论文　**ARTICLE**

原位聚合表面修饰的金属锂负极

刘亚，郑磊，谷巍，沈炎宾，陈立桅

Surface Passivation of Lithium Metal *via in situ* Polymerization

Ya Liu, Lei Zheng, Wei Gu, Yanbin Shen, Liwei Chen



Acta Phys. -Chim. Sin. **2021,** *37* (1), 2004058

doi: 10.3866/PKU.WHXB202004058

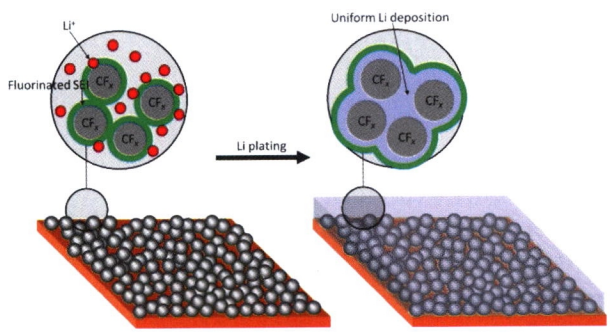
The Li-CNT composite is passivated by a LiF-rich layer through *in situ* polymerization of 4-fluorostyrene.

一种有助于稳定锂金属循环的富氟化位点框架结构

王木钦，彭哲，林欢，李振东，刘健，任重民，何海勇，王德宇

A Framework with Enriched Fluorinated Sites for Stable Li Metal Cycling

Muqin Wang, Zhe Peng, Huan Lin, Zhendong Li, Jian Liu, Zhongmin Ren, Haiyong He, Deyu Wang



Acta Phys. -Chim. Sin. **2021,** *37* (1), 2007016

doi: 10.3866/PKU.WHXB202007016

A framework with enriched fluorinated sites enables uniform lithium deposition and stable lithium metal cycling.

柱状金属锂沉积物：电解液添加剂的影响

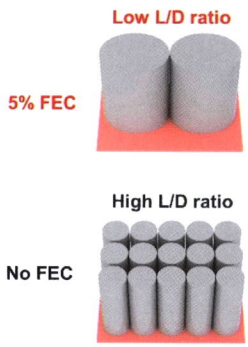
杨世杰，徐向群，程新兵，王鑫萌，陈金秀，肖也，
袁洪，刘鹤，陈爱兵，朱万诚，黄佳琦，张强

Columnar Lithium Metal Deposits: the Role of Non-Aqueous Electrolyte Additive

Shijie Yang, Xiangqun Xu, Xinbing Cheng, Xinmeng Wang, Jinxiu Chen, Ye Xiao, Hong Yuan, He Liu, Aibing Chen, Wancheng Zhu, Jiaqi Huang, Qiang Zhang

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2007058

doi: 10.3866/PKU.WHXB202007058



The influence of electrolytes on lithium deposition was quantitatively analyzed, and FEC additive was found to decrease the length/diameter ratio of lithium deposits.

亲锂的三维二硫化锡@碳纤维布用于稳定的锂金属负极

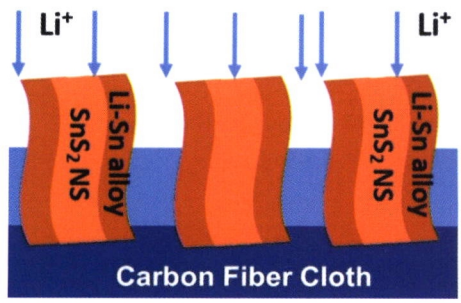
王骞，吴恺，王航超，刘文，周恒辉

Lithiophilic 3D SnS_2@Carbon Fiber Cloth for Stable Li Metal Anode

Qian Wang, Kai Wu, Hangchao Wang, Wen Liu, Henghui Zhou

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2007092

doi: 10.3866/PKU.WHXB202007092



SnS_2 arrays can be converted to Li-Sn alloy and Li_2S, thereby inducing uniform Li deposition and improving the electrochemical kinetics.

锂金属负极的可逆性与沉积形貌的关联

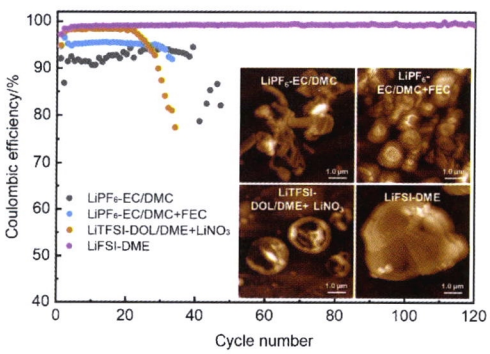
黄凡洋，揭育林，李新鹏，陈亚威，曹瑞国，
章根强，焦淑红

Correlation between Li Plating Morphology and Reversibility of Li Metal Anode

Fanyang Huang, Yulin Jie, Xinpeng Li, Yawei Chen, Ruiguo Cao, Genqiang Zhang, Shuhong Jiao

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2008081

doi: 10.3866/PKU.WHXB202008081



The correlation between the Li plating morphology and Coulombic efficiency indicates that particle-like metallic Li exhibits superior Li plating/stripping reversibility.

多孔泡沫铜和硫脲协同作用构筑无枝晶锂负极

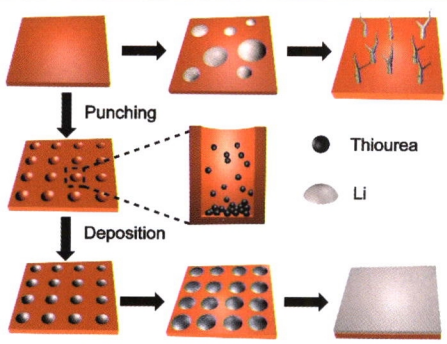
秦金利，任龙涛，曹欣，赵亚军，许海军，
刘文，孙晓明

Porous Copper Foam Co-operation with Thiourea for Dendrite-free Lithium Metal Anode

Jinli Qin, Longtao Ren, Xin Cao, Yajun Zhao, Haijun Xu, Wen Liu, Xiaoming Sun

Acta Phys. -Chim. Sin. **2021,** *37* (1), 2009020

doi: 10.3866/PKU.WHXB202009020



Thiourea acts synergistically with a porous copper foam to guide the growth of lithium in small pores and achieve uniform lithium deposition.

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电　　话	+86-10-62751724, +86-10-62756388		
主　　任	张小娟		
主管单位	中国科学技术协会	Tel.:	+86-10-62751724, +86-10-62756388
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