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物理化学学报

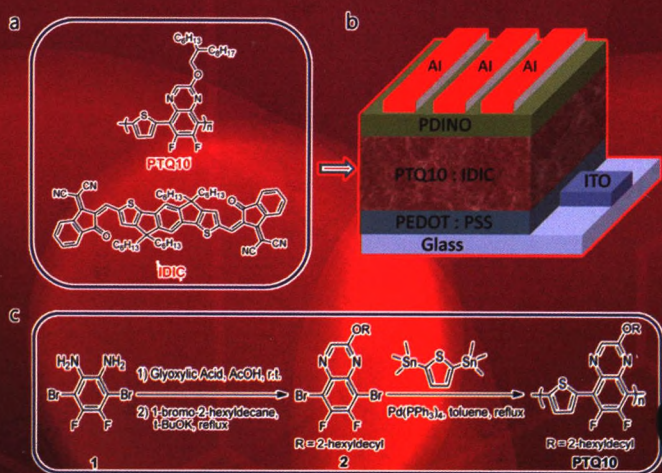
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第34卷 第11期 Vol. 34 No. 11 2018

庆祝李永舫院士七十华诞专刊

Special Issue in Honor of Academician Yongfang Li on the Occasion of His 70th Birthday

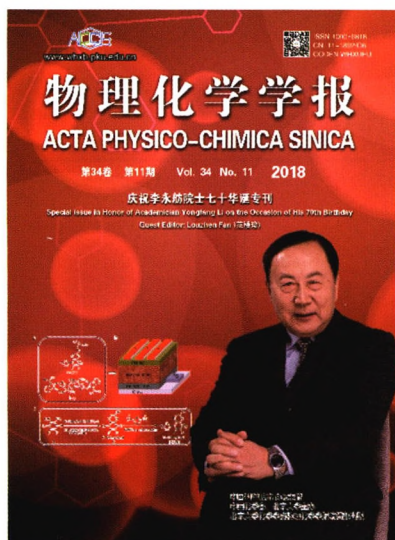
Guest Editor: Louzhen Fan (范楼珍)



万方数据

中国科学技术协会主管
中国化学会、北京大学主办
北京大学化学学院物理化学学报编辑部出版

COVER



This special issue is dedicated to Dr. LI Yongfang, Professor at the Institute of Chemistry, Chinese Academy of Sciences (ICCAS) and at Soochow University, on the occasion of his 70th birthday. It consists of 3 highlights and 11 papers, in the fields of electrochemistry, conducting polymers, organic solar cells, and related photovoltaic materials. Moreover, it pays tribute to Professor LI's pursuit of realism and pragmatism and to his perseverance in his academic endeavors.

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- 用于聚合物太阳能电池的低成本高效聚合物给体光伏材料(Low Cost and High Efficiency Polymer Donor Photovoltaic Materials for Polymer Solar Cells) ····· 刘忠范(LIU Zhongfan) (1193)
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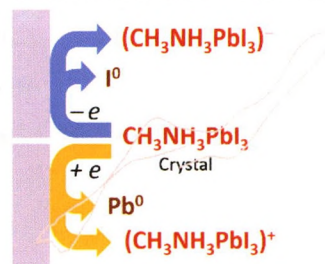
通讯 COMMUNICATION

钙钛矿 $\text{CH}_3\text{NH}_3\text{PbI}_3$ 晶体的电化学

杨春和, 唐爱伟, 滕枫, 蒋克健

Electrochemistry of Perovskite $\text{CH}_3\text{NH}_3\text{PbI}_3$ Crystals

YANG Chunhe, TANG Aiwei, TENG Feng, JIANG Kejian



Perovskite $\text{CH}_3\text{NH}_3\text{PbI}_3$ is not electrochemically stable; coupling reactions occur during the redox processes. The degradation reactions result from the reduction of lead ions and oxidation of iodide ions in the perovskite crystal.

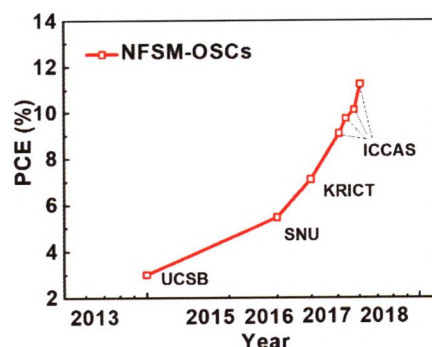
Acta Phys. -Chim. Sin. **2018**, 34 (11), 1197–1201

基于非富勒烯受体的溶液加工型全小分子太阳能电池研究进展

何畅, 侯剑辉

Advances in Solution-Processed All-Small-Molecule Organic Solar Cells with Non-Fullerene Electron Acceptors

HE Chang, HOU Jianhui



Acta Phys. -Chim. Sin. **2018**, 34 (11), 1202–1210

We present an introduction of specific requirements for small molecules donors in the NF-SM-OSCs.

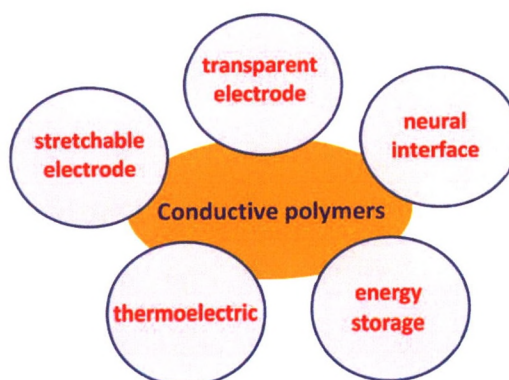
综述 REVIEW

导电高分子的最近进展

欧阳建勇

Recent Advances of Intrinsically Conductive Polymers

OUYANG Jianyong



Acta Phys. -Chim. Sin. **2018**, 34 (11), 1211–1220

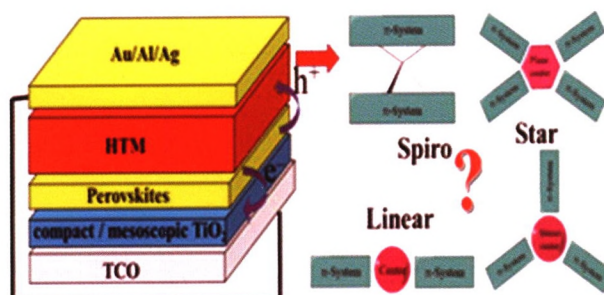
This paper provides a brief review on the enhancement of the electrical conductivity of intrinsically conductive polymers and their application as electrodes and in thermoelectric conversion, supercapacitors and batteries.

钙钛矿太阳能电池中小分子空穴传输材料的研究进展

张婧, 何有军, 闵杰

Recent Progress in Hybrid Perovskite Solar Cells Based on *p*-Type Small Molecules as Hole Transporting Materials

ZHANG Jing, HE Youjun, MIN Jie



Acta Phys. -Chim. Sin. **2018**, 34 (11), 1221–1238

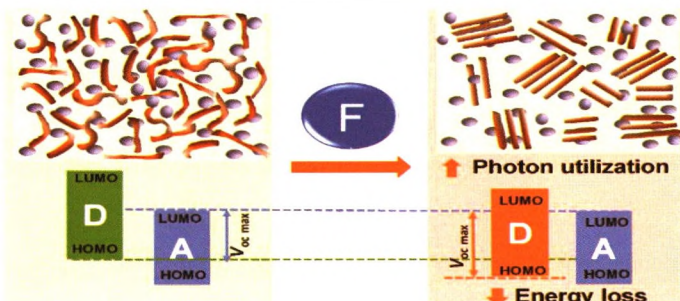
An overview of the organic molecule hole transporting material applied for perovskites solar cells and the structural effects on device performance have been discussed in detail.

氟化策略：高效有机光伏材料的设计与应用

邓丹, 周二军, 魏志祥

Fluorination: An Effective Molecular Design Strategy for Efficient Photovoltaic Materials

DENG Dan, ZHOU Erjun, WEI Zhixiang



Fluorination effects on molecular properties and morphology are summarized. Its application in the design of efficient OSCs is discussed.

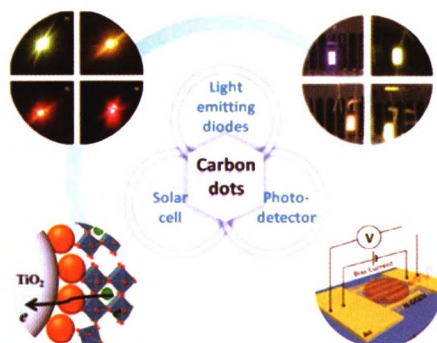
Acta Phys. -Chim. Sin. **2018**, 34 (11), 1239–1249

基于碳量子点的光电器件应用新进展

贺平, 袁方龙, 王子飞, 谭占鳌, 范楼珍

Growing Carbon Quantum Dots for Optoelectronic Devices

HE Ping, YUAN Fanglong, WANG Zifei, TAN Zhanao, FAN Louzhen



We summarize the latest progress in the researches on CQDs relating to photoelectric devices and project their future direction.

Acta Phys. -Chim. Sin. **2018**, 34 (11), 1250–1263

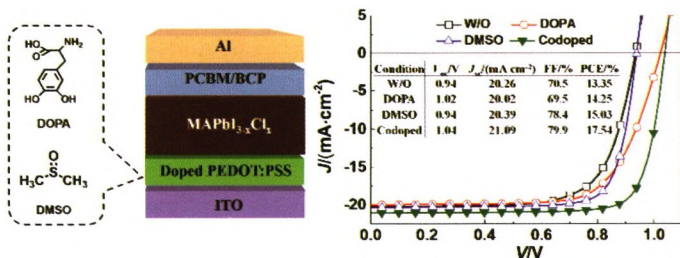
论文 ARTICLE

左旋多巴和 *N,N*-二甲基亚砜共掺杂 PEDOT:PSS 作为空穴传输层的高性能 *p-i-n* 型钙钛矿太阳能电池

黄鹏, 元利刚, 李耀文, 周祎, 宋波

L-3,4-dihydroxyphenylalanine and Dimethyl Sulfoxide Codoped PEDOT:PSS as a Hole Transfer Layer: towards High-Performance Planar *p-i-n* Perovskite Solar Cells

HUANG Peng, YUAN Ligang, LI Yaowen, ZHOU Yi, SONG Bo



DOPA and DMSO codoped PEDOT:PSS as HTL could effectively tune its work function, resulting in a high PCE of 17.54%.

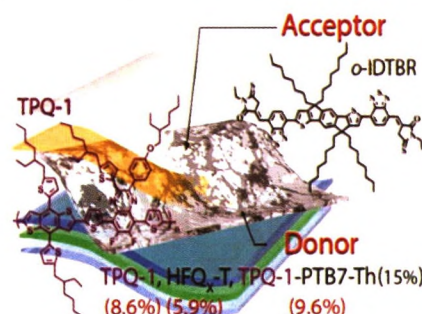
Acta Phys. -Chim. Sin. **2018**, 34 (11), 1264–1271

基于侧链不对称喹喔啉聚合物的高效非富勒烯太阳能电池

袁俊, 刘晔, 朱灿, 沈平, 万梅秀, 冯柳柳, 邹应萍

Asymmetric Quinoxaline-Based Polymer for High Efficiency Non-Fullerene Solar Cells

YUAN Jun, LIU Ye, ZHU Can, SHEN Ping, WAN Meixiu, FENG Liuliu, ZOU Yingping



A Qx-based polymer with asymmetric side-chains (TPQ-1) was synthesized. TPQ-1: o-IDTBR based devices exhibited a PCE of 8.6%. After the addition of a 15% mass fraction of PTB7-Th, a PCE of 9.6% was demonstrated.

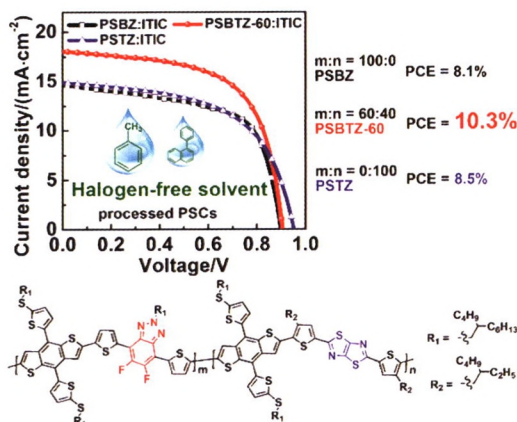
Acta Phys. -Chim. Sin. **2018**, 34 (11), 1272–1278

基于无规三元共聚物的非卤溶液加工型高效聚合物太阳能电池

国霞, 凡群平, 崔超华, 张志国, 张茂杰

Wide Bandgap Random Terpolymers for High Efficiency Halogen-Free Solvent Processed Polymer Solar Cells

GUO Xia, FAN Qunping, CUI Chaochua,
ZHANG Zhiguo, ZHANG Maojie



Acta Phys. -Chim. Sin. **2018**, 34 (11), 1279–1285

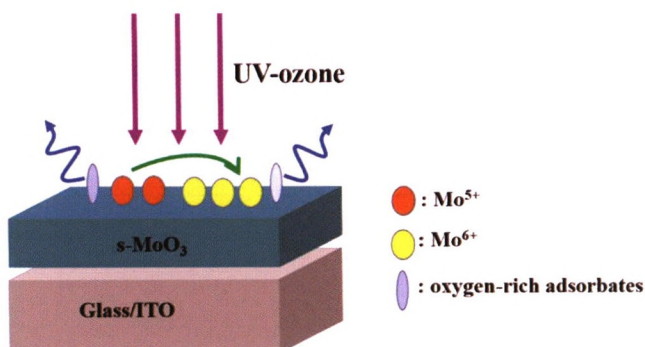
Halogen-free solvent processed PSCs based on wide bandgap random terpolymers as donor material exhibit 10.3% power conversion efficiency.

紫外臭氧处理增强溶液法 MoO₃ 薄膜的空穴注入能力

董丹, 闵志远, 刘俊, 何谷峰

Improved Hole Injection Property of Solution-Processed MoO₃ with UV-Ozone Treatment

DONG Dan, MIN Zhiyuan, LIU Jun, HE Gufeng



Acta Phys. -Chim. Sin. **2018**, 34 (11), 1286–1292

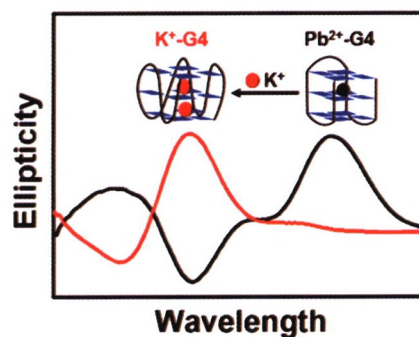
Different treatments are applied to solution-processed MoO₃ films to investigate their influences on the hole injection property of MoO₃.

钾离子浓度依赖的铅离子稳定 G-四链体构型转化

于泽, 李晓宏, 李运超, 叶明富

K⁺ Concentration-Dependent Conformational Change of Pb²⁺-Stabilized G-quadruplex

YU Ze, LI Xiaohong, LI Yunchao, YE Mingfu



Acta Phys. -Chim. Sin. **2018**, 34 (11), 1293–1298

K⁺ could induce transformation of antiparallel Pb²⁺-stabilized G-quadruplex into parallel 2K⁺-stabilized G-quadruplex. This transformation was strictly K⁺ concentration-dependent.

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