附件 1-1

中国计量大学新增硕士研究生指导教师申请表（校内）

申请学位点：材料科学与工程

一、基本情况

姓　名	康巧玲	性 别	女	出生年月	1992.06
最高学位及授予单位		理学博士学位，南京大学			
最高学历（包括毕业时间、学校、院（系））		博士研究生学历（2021 年 6 月、南京大学、化学与化工学院）			
职称，获得职称年月		讲师，2021 年 7 月			
主要研究方向		能源转化与储存领域材料的研究			
主要经历（包括学历和工作经历，从大学开始）					
自何年月	至何年月	部 门		任　职	
2011.09	2015.06	陕西科技大学		本科	
2015.09	2018.06	陕西科技大学		硕士	
2018.09	2021.06	南京大学		博士	
2021.07	至今	中国计量大学		讲师	

二、近五年立项主持的代表性科研项目（限填 3 项）

项目名称及编号	项目来源 （项目类型）	起止时间	合同经费 （万元）	本人排名 /总人数	学院 审核人
无					

三、近五年发表的代表性学术论文（限填 5 篇）

序号	论文名称	刊物名称	发表时间	SCI、SSCI、EI 收录情况	本人排名/总人数	学院审核人
1	Intrinsic activity modulation and structural design on NiFe alloy catalysts for efficient oxygen evolution reaction	Chemical Science	2021. 02	SCI（一区）	第一作者（1/5）	
2	A universal strategy for carbon-supported transition metal phosphides as high-performance bi-functional electrocatalysts towards efficient overall water splitting	ACS Applied Materials & Interfaces.	2020. 04	SCI（一区）	第一作者（1/5）	
3	Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active HER performances.	Journal of Power Sources	2020.07	SCI（一区）	第一作者（1/4）	
4	Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts.	Nanoscale	2020.02	SCI（一区）	第一作者（1/5）	
5	Effect of wall thickness of hollow TiO_2 spheres on properties of polyacrylate film: thermal insulation, UV-shielding and mechanical property	Progress in Organic Coatings	2017.11	SCI（二区）	第一作者（1/4）	
6						

四、近五年出版的学术专著（只填写专著，限填 1 项）

序号	专著名称	出版社名称，时间	本人排名/总人数	学院审核人
1	无			

五、近五年获省部级及以上科研成果奖（限填 1 项）

序号	获奖名称	授予单位，获奖等级，时间	本人排名/ 总人数	学院 审核人
1	无			

六、近五年本人为第一发明人授权的有效期内发明专利（限填 2 项）

序号	专利名称 （国别及专利号）	授权 时间	技术转让到账经费(万元)	本人排名/ 总人数	学院 审核人
1	无				
专利技术转让到校总经费：			（万元）		

七、近五年参与制定并颁布实施的规程/规范/标准（限填 2 项）

序号	成果名称（编号）	发布单位	发布时间及类别	本人排名/ 总人数）	学院 审核人
	无				

本人以上填写内容真实性、准确性无误，工作中未有学术不端行为，自觉践行“四个统一”，做学生成长成才的指导者和引路人。

申请人签名：　　年　　月　　日

申请人所在基层党组织对申请者工作表现和师德师风的意见：

党支部书记签名：　　年　　月　　日

申请人所在学院意见： 分管院长签名：　　（学院盖章） 年　　月　　日
研究生院审核意见： 年　　月　　日

佐 证 材 料

一、近五年立项主持的代表性科研项目，包括：合同首页、参加人员页、经费页、签名盖章页。

二、近五年发表的代表性学术论文，包括：检索证明（需包含作者信息、期刊信息、发表时间、论文发表当年的中科院分区）、封面、目录、正文首页、刊号。

三、近五年出版的学术专著，包括：封面、目录、相关内容。

四、近五年获省部级及以上科研成果奖：获奖证书。

五、近五年授权发明专利：专利证书，专利有效证明。

六、近五年主持制定并颁布实施的规程/规范/标准：相关材料全文

文献检索报告
Retrieval Report

中国计量大学图书馆 CJLULIB

单号：RT-2021-0766

附件一：经检索《Science Citation Index Expanded》，下述论文被 SCI-E 收录。（检索时间2021年12月3日）

第 1 条，共 5 条:
出版物类型: J
文献类型: Article
标题: Intrinsic activity modulation and structural design of NiFe alloy catalysts for an efficient oxygen evolution reaction
作者: Kang, QL (Kang, Qiaoling); Lai, DW (Lai, Dawei); Tang, WY (Tang, Wenyin); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, Sch Chem & Chem Engn, State Key Lab Coordinat Chem,Coordinat Chem Inst, Nanjing 210023, Peoples R China.; [Lai, Dawei; Tang, Wenyin; Gao, Feng] Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, Sch Chem & Chem Engn, State Key Lab Coordinat Chem,Coordinat Chem Inst, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
来源出版物: CHEMICAL SCIENCE **卷:** 12 **期:** 11 **页:** 3818-3835 **DOI:** 10.1039/d0sc06716d **出版年:** 2021 **出版日期:** MAR 21
入藏号: WOS:000632580200002
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JCR 期刊分区: CHEMISTRY, MULTIDISCIPLINARY [Q1] 22/178 (2020); CHEMISTRY, MULTIDISCIPLINARY [Q1] 21/177 (2019); CHEMISTRY, MULTIDISCIPLINARY [Q1] 19/172 (2018); CHEMISTRY, MULTIDISCIPLINARY [Q1] 18/171 (2017); CHEMISTRY, MULTIDISCIPLINARY [Q1] 17/166 (2016); CHEMISTRY, MULTIDISCIPLINARY [Q1] 14/163 (2015); CHEMISTRY, MULTIDISCIPLINARY [Q1] 14/157 (2014); CHEMISTRY, MULTIDISCIPLINARY [Q1] 14/148 (2013); CHEMISTRY, MULTIDISCIPLINARY [Q1] 14/152 (2012); CHEMISTRY, MULTIDISCIPLINARY [Q1] 14/154 (2011); CHEMISTRY, MULTIDISCIPLINARY [Q4] 146/147 (2010);
中科院期刊分区: 小类(基础版) (2020) 化学综合 [2]; 小类(基础版) (2019) 化学综合 [2]; 小类(基础版) (2018) 化学综合 [2]; 小类(基础版) (2017) 化学综合 [2]; 小类(基础版) (2016) 化学综合 [2]; 小类(基础版) (2015) 化学综合 [2]; 小类(基础版) (2014) 化学综合 [2]; 小类(基础版) (2013) 化学综合 [2]; 小类(基础版) (2012) 化学综合 [2]; 小类(基础版) (2011) 化学综合 [4]; 小类(升级版) (2020) 化学综合 [1]; 小类(升级版) (2019) 化学综合 [2]; 大类(基础版) (2020) 化学 [1] Top 期刊; 大类(基础版) (2019) 化学 [1] Top 期刊; 大类(基础版) (2018) 化学 [1] Top 期刊; 大类(基础版) (2017) 化学 [1] Top 期刊; 大类(基础版) (2016) 化学 [1] Top 期刊; 大类(基础版) (2015) 化学 [1] Top 期刊; 大类(基础版) (2014) 化学 [1] Top 期刊; 大类(基础版) (2013) 化学 [1] Top 期刊; 大类(基础版) (2012) 化学 [2]; 大类(基础版) (2011) 化学 [4]; 大类(升级版) (2020) 化学 [1] Top 期刊; 大类(升级版) (2019) 化学 [1] Top 期刊;

第 2 条，共 5 条:
出版物类型: J
文献类型: Article
标题: Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances
作者: Kang, QL (Kang, Qiaoling); Qin, YZ (Qin, Yezhi); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Lu, Qingyi] Nanjing Univ, Coordinat Chem Inst, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Qin, Yezhi; Gao, Feng] Nanjing Univ, Dept Mat Sci & Engn, Collaborat Innovat Ctr Adv Microstruct, Coll Engn & Appl Sci,Jiangsu Key Lab Artificial F, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Coordinat Chem Inst, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Dept Mat Sci & Engn, Collaborat Innovat Ctr Adv Microstruct, Coll Engn & Appl Sci,Jiangsu Key Lab Artificial F, Nanjing 210093, Peoples R China.
来源出版物: JOURNAL OF POWER SOURCES **卷:** 476 **页:** 7 **DOI:** 10.1016/j.jpowsour.2020.228706 **出版年:** 2020 **出版日期:** NOV 15
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JCR 期刊分区: CHEMISTRY, PHYSICAL [Q1] 28/162 (2020); ELECTROCHEMISTRY [Q1] 4/29 (2020); ENERGY & FUELS [Q1] 13/114 (2020); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 45/333 (2020); ELECTROCHEMISTRY [Q1] 3/27 (2019); ENERGY & FUELS [Q1] 10/112 (2019); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 38/314 (2019); CHEMISTRY, PHYSICAL [Q1] 27/159 (2019); CHEMISTRY, PHYSICAL [Q1] 26/148 (2018); ELECTROCHEMISTRY [Q1] 3/26 (2018); ENERGY & FUELS [Q1] 11/103 (2018); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 32/293 (2018); CHEMISTRY, PHYSICAL [Q1] 26/147 (2017); ELECTROCHEMISTRY [Q1] 3/28 (2017); ENERGY & FUELS [Q1] 9/97 (2017); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 34/285 (2017); CHEMISTRY, PHYSICAL [Q1] 22/146 (2016); ELECTROCHEMISTRY [Q1] 2/29 (2016); ENERGY & FUELS [Q1] 8/92 (2016); MATERIALS SCIENCE,

MULTIDISCIPLINARY [Q1] 31/275 (2016); CHEMISTRY, PHYSICAL [Q1] 22/144 (2015); ELECTROCHEMISTRY [Q1] 2/27 (2015); ENERGY & FUELS [Q1] 8/88 (2015); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 26/271 (2015); ELECTROCHEMISTRY [Q1] 2/28 (2014); ENERGY & FUELS [Q1] 6/89 (2014); ELECTROCHEMISTRY [Q1] 2/27 (2013); ENERGY & FUELS [Q1] 8/83 (2013); ELECTROCHEMISTRY [Q1] 3/26 (2012); ENERGY & FUELS [Q1] 9/81 (2012); ELECTROCHEMISTRY [Q1] 2/27 (2011); ENERGY & FUELS [Q1] 9/81 (2011); ELECTROCHEMISTRY [Q1] 2/26 (2010); ENERGY & FUELS [Q1] 10/79 (2010); ELECTROCHEMISTRY [Q1] 3/24 (2009); ENERGY & FUELS [Q1] 9/71 (2009); ELECTROCHEMISTRY [Q1] 3/22 (2008); ENERGY & FUELS [Q1] 4/67 (2008); ENERGY & FUELS [Q1] 5/64 (2007); ELECTROCHEMISTRY [Q2] 8/23 (2007); ELECTROCHEMISTRY [Q1] 2/22 (2006); ENERGY & FUELS [Q1] 2/62 (2006); ELECTROCHEMISTRY [Q1] 3/21 (2005); ENERGY & FUELS [Q1] 4/63 (2005); ELECTROCHEMISTRY [Q1] 4/20 (2004); ENERGY & FUELS [Q1] 3/61 (2004); ENERGY & FUELS [Q1] 3/62 (2003); ELECTROCHEMISTRY [Q2] 5/15 (2003); ENERGY & FUELS [Q1] 3/63 (2002); ELECTROCHEMISTRY [Q2] 7/15 (2002); ENERGY & FUELS [Q1] 6/66 (2001); ELECTROCHEMISTRY [Q3] 8/15 (2001); ENERGY & FUELS [Q1] 9/66 (2000); ELECTROCHEMISTRY [Q3] 10/16 (2000); ENERGY & FUELS [Q1] 6/64 (1999); ELECTROCHEMISTRY [Q3] 8/14 (1999); ENERGY & FUELS [Q1] 14/67 (1998); ELECTROCHEMISTRY [Q4] 10/13 (1998); ENERGY & FUELS [Q1] 6/58 (1997); ELECTROCHEMISTRY [Q3] 6/9 (1997);

中科院期刊分区: 小类(基础版) (2020) 能源与燃料 [2]; 小类(基础版) (2020) 电化学 [2]; 小类(基础版) (2020) 物理化学 [3]; 小类(基础版) (2020) 材料科学：综合 [2]; 小类(基础版) (2019) 能源与燃料 [2]; 小类(基础版) (2019) 电化学 [2]; 小类(基础版) (2019) 物理化学 [2]; 小类(基础版) (2019) 材料科学：综合 [2]; 小类(基础版) (2018) 能源与燃料 [2]; 小类(基础版) (2018) 电化学 [2]; 小类(基础版) (2018) 物理化学 [2]; 小类(基础版) (2018) 材料科学：综合 [2]; 小类(基础版) (2017) 能源与燃料 [2]; 小类(基础版) (2017) 电化学 [1]; 小类(基础版) (2017) 物理化学 [2]; 小类(基础版) (2017) 材料科学：综合 [2]; 小类(基础版) (2016) 能源与燃料 [2]; 小类(基础版) (2016) 电化学 [2]; 小类(基础版) (2016) 物理化学 [2]; 小类(基础版) (2016) 材料科学：综合 [2]; 小类(基础版) (2015) 能源与燃料 [2]; 小类(基础版) (2015) 电化学 [2]; 小类(基础版) (2014) 能源与燃料 [2]; 小类(基础版) (2014) 电化学 [2]; 小类(基础版) (2013) 能源与燃料 [2]; 小类(基础版) (2013) 电化学 [2]; 小类(基础版) (2012) 能源与燃料 [2]; 小类(基础版) (2012) 电化学 [2]; 小类(基础版) (2011) 能源与燃料 [2]; 小类(基础版) (2011) 电化学 [2]; 小类(基础版) (2010) 能源与燃料 [2]; 小类(基础版) (2010) 电化学 [2]; 小类(升级版) (2020) 能源与燃料 [2]; 小类(升级版) (2020) 电化学 [2]; 小类(升级版) (2020) 物理化学 [2]; 小类(升级版) (2020) 材料科学：综合 [2]; 小类(升级版) (2019) 能源与燃料 [2]; 小类(升级版) (2019) 电化学 [2]; 小类(升级版) (2019) 物理化学 [2]; 小类(升级版) (2019) 材料科学：综合 [2]; 大类(基础版) (2020) 工程技术 [1] Top 期刊; 大类(基础版) (2019) 工程技术 [1] Top 期刊; 大类(基础版) (2018) 工程技术 [1] Top 期刊; 大类(基础版) (2017) 工程技术 [1] Top 期刊; 大类(基础版) (2016) 工程技术 [1] Top 期刊; 大类(基础版) (2015) 工程技术 [1] Top 期刊; 大类(基础版) (2014) 工程技术 [1] Top 期刊; 大类(基础版) (2013) 工程技术 [1] Top 期刊; 大类(基础版) (2012) 工程技术 [1] Top 期刊; 大类(基础版) (2011) 工程技术 [1] Top 期刊; 大类(基础版) (2010) 工程技术 [1] Top 期刊; 大类(升级版) (2020) 工程技术 [2] Top 期刊; 大类(升级版) (2019) 工程技术 [1] Top 期刊;

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文献类型: Article

标题: A Universal Strategy for Carbon-Supported Transition Metal Phosphides as High-Performance Bifunctional Electrocatalysts towards Efficient Overall Water Splitting

作者: Kang, QL (Kang, Qiaoling); Li, MY (Li, Mengyuan); Shi, JW (Shi, Jiangwei); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)

作者地址: [Kang, Qiaoling; Li, Mengyuan; Shi, Jiangwei; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Gao, Feng] Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.

通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.

来源出版物: ACS APPLIED MATERIALS & INTERFACES **卷:** 12 **期:** 17 **页:** 19447-19456 **DOI:** 10.1021/acsami.0c00795 **出版年:** 2020 **出版日期:** APR 29

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JCR 影响因子: 9.229 (2020); 8.758 (2019); 8.456 (2018); 8.097 (2017); 7.504 (2016); 7.145 (2015); 6.723 (2014); 5.900 (2013); 5.008 (2012); 4.525 (2011); 2.925 (2010);

JCR 期刊分区: MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 44/333 (2020); NANOSCIENCE & NANOTECHNOLOGY [Q1] 21/106 (2020); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 33/314 (2019); NANOSCIENCE & NANOTECHNOLOGY [Q1] 18/103 (2019); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 27/293 (2018); NANOSCIENCE & NANOTECHNOLOGY [Q1] 16/94 (2018); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 26/285 (2017); NANOSCIENCE & NANOTECHNOLOGY [Q1] 15/92 (2017); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 22/275 (2016); NANOSCIENCE & NANOTECHNOLOGY [Q1] 12/87 (2016); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 25/271 (2015); NANOSCIENCE & NANOTECHNOLOGY [Q1] 14/83 (2015); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 23/260 (2014); NANOSCIENCE & NANOTECHNOLOGY [Q1] 12/80 (2014); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 26/251 (2013); NANOSCIENCE & NANOTECHNOLOGY [Q1] 16/73 (2013); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 26/241 (2012); NANOSCIENCE & NANOTECHNOLOGY [Q2] 18/69 (2012); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 27/232 (2011); NANOSCIENCE & NANOTECHNOLOGY [Q2] 18/66 (2011); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 38/225 (2010); NANOSCIENCE & NANOTECHNOLOGY [Q2] 24/64 (2010); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q4] 213/214 (2009); NANOSCIENCE & NANOTECHNOLOGY [Q4] 59/59 (2009);

中科院期刊分区: 小类(基础版) (2020) 纳米科技 [2]; 小类(基础版) (2020) 材料科学：综合 [2]; 小类(基础版) (2019) 纳米科技 [2]; 小类(基础版) (2019) 材料科学：综合 [2]; 小类(基础版) (2018) 纳米科技 [2]; 小类(基础版) (2018) 材料科学：综合 [2]; 小类(基础版) (2017) 纳米科技 [2]; 小类(基础版) (2017) 材料科学：综合 [2]; 小类(基础版) (2016) 纳米科技 [2]; 小类(基础版) (2016) 材料科学：综合 [2]; 小类(基础版) (2015) 纳米科技 [3]; 小类(基础版) (2015) 材料科学：综合 [2]; 小类(基础版) (2014) 纳米科技 [3]; 小类(基础版) (2014) 材料科学：综合 [2]; 小类(基础版) (2013) 纳米科技 [3]; 小类(基础版) (2013) 材料科学：综合 [2]; 小类(基础版) (2012) 纳米科技 [3]; 小类(基础版) (2012) 材料科学：综合 [2]; 小类(基础版) (2011) 纳米科技 [3]; 小类(基础版) (2011) 材料科学：综合 [3]; 小类(基础版) (2010) 纳米科技 [4]; 小类(基础版) (2010) 材料科学：综合 [4]; 小类(升级版) (2020) 纳米科技 [2]; 小类(升级版) (2020) 材料科学：综合 [2]; 小类(升级版) (2019) 纳米科技 [2]; 小类(升级版) (2019) 材料科学：综合 [2]; 大类(基础版) (2020) 工程技术 [1] Top 期刊; 大类(基础版) (2019) 工程技术 [1] Top 期刊; 大类(基础版) (2018) 工程技术 [1] Top 期刊; 大类(基础版) (2017) 工程技术 [1] Top 期刊; 大类(基础版) (2016) 工程技术 [1] Top 期刊; 大类(基础版) (2015) 工程技术 [1] Top 期刊; 大类(基础版) (2014) 工程技术 [1] Top 期刊; 大类(基础版) (2013) 工程技术 [1] Top 期刊; 大类(基础版) (2012) 工程技术 [1] Top 期刊; 大类(基础版) (2011) 工程技术 [2]; 大类(基础版) (2010) 工程技术 [4]; 大类(升级版) (2020) 材料科学 [1] Top 期刊; 大类(升级版) (2019) 材料科学 [1] Top 期刊;

第 4 条，共 5 条:

出版物类型: J

文献类型: Article

标题: Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts
作者: Kang, QL (Kang, Qiaoling); Li, MY (Li, Mengyuan); Wang, ZR (Wang, Zengrui); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
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通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Jiangsu Key Lab Artificial Funct Mat, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Coll Engn & Appl Sci, Nanjing 210093, Peoples R China.
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JCR 期刊分区: CHEMISTRY, MULTIDISCIPLINARY [Q1] 32/178 (2020); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 62/333 (2020); NANOSCIENCE & NANOTECHNOLOGY [Q2] 29/106 (2020); PHYSICS, APPLIED [Q1] 23/160 (2020); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 50/314 (2019); NANOSCIENCE & NANOTECHNOLOGY [Q1] 25/103 (2019); PHYSICS, APPLIED [Q1] 23/155 (2019); CHEMISTRY, MULTIDISCIPLINARY [Q1] 28/177 (2019); CHEMISTRY, MULTIDISCIPLINARY [Q1] 26/172 (2018); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 41/293 (2018); NANOSCIENCE & NANOTECHNOLOGY [Q1] 20/94 (2018); PHYSICS, APPLIED [Q1] 18/148 (2018); CHEMISTRY, MULTIDISCIPLINARY [Q1] 25/171 (2017); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 30/285 (2017); NANOSCIENCE & NANOTECHNOLOGY [Q1] 18/92 (2017); PHYSICS, APPLIED [Q1] 15/146 (2017); CHEMISTRY, MULTIDISCIPLINARY [Q1] 21/166 (2016); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 23/275 (2016); NANOSCIENCE & NANOTECHNOLOGY [Q1] 13/87 (2016); PHYSICS, APPLIED [Q1] 13/148 (2016); CHEMISTRY, MULTIDISCIPLINARY [Q1] 18/163 (2015); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 23/271 (2015); NANOSCIENCE & NANOTECHNOLOGY [Q1] 12/83 (2015); PHYSICS, APPLIED [Q1] 12/145 (2015); CHEMISTRY, MULTIDISCIPLINARY [Q1] 19/157 (2014); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 21/260 (2014); NANOSCIENCE & NANOTECHNOLOGY [Q1] 10/80 (2014); PHYSICS, APPLIED [Q1] 12/144 (2014); CHEMISTRY, MULTIDISCIPLINARY [Q1] 19/148 (2013); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 20/251 (2013); NANOSCIENCE & NANOTECHNOLOGY [Q1] 12/73 (2013); PHYSICS, APPLIED [Q1] 14/136 (2013); CHEMISTRY, MULTIDISCIPLINARY [Q1] 20/152 (2012); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 19/241 (2012); NANOSCIENCE & NANOTECHNOLOGY [Q1] 12/69 (2012); PHYSICS, APPLIED [Q1] 13/128 (2012); CHEMISTRY, MULTIDISCIPLINARY [Q1] 21/154 (2011); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 18/232 (2011); NANOSCIENCE & NANOTECHNOLOGY [Q1] 11/66 (2011); PHYSICS, APPLIED [Q1] 10/125 (2011); CHEMISTRY, MULTIDISCIPLINARY [Q1] 27/147 (2010); MATERIALS SCIENCE, MULTIDISCIPLINARY [Q1] 27/225 (2010); NANOSCIENCE & NANOTECHNOLOGY [Q1] 15/64 (2010); PHYSICS, APPLIED [Q1] 13/118 (2010);
中科院期刊分区: 小类(基础版) (2020) 纳米科技 [3]; 小类(基础版) (2020) 物理：应用 [2]; 小类(基础版) (2020) 材料科学：综合 [2]; 小类(基础版) (2020) 化学综合 [2]; 小类(基础版) (2019) 纳米科技 [3]; 小类(基础版) (2019) 物理：应用 [2]; 小类(基础版) (2019) 材料科学：综合 [2]; 小类(基础版) (2019) 化学综合 [2]; 小类(基础版) (2018) 纳米科技 [2]; 小类(基础版) (2018) 物理：应用 [2]; 小类(基础版) (2018) 材料科学：综合 [2]; 小类(基础版) (2018) 化学综合 [2]; 小类(基础版) (2017) 纳米科技 [2]; 小类(基础版) (2017) 物理：应用 [2]; 小类(基础版) (2017) 材料科学：综合 [2]; 小类(基础版) (2017) 化学综合 [2]; 小类(基础版) (2016) 纳米科技 [2]; 小类(基础版) (2016) 物理：应用 [2]; 小类(基础版) (2016) 材料科学：综合 [2]; 小类(基础版) (2016) 化学综合 [2]; 小类(基础版) (2015) 纳米科技 [2]; 小类(基础版) (2015) 物理：应用 [2]; 小类(基础版) (2015) 材料科学：综合 [2]; 小类(基础版) (2015) 化学综合 [2]; 小类(基础版) (2014) 纳米科技 [3]; 小类(基础版) (2014) 物理：应用 [2]; 小类(基础版) (2014) 材料科学：综合 [2]; 小类(基础版) (2014) 化学综合 [3]; 小类(基础版) (2013) 纳米科技 [3]; 小类(基础版) (2013) 物理：应用 [2]; 小类(基础版) (2013) 材料科学：综合 [2]; 小类(基础版) (2013) 化学综合 [3]; 小类(基础版) (2012) 纳米科技 [3]; 小类(基础版) (2012) 物理：应用 [2]; 小类(基础版) (2012) 材料科学：综合 [2]; 小类(基础版) (2012) 化学综合 [2]; 小类(基础版) (2011) 纳米科技 [3]; 小类(基础版) (2011) 物理：应用 [2]; 小类(基础版) (2011) 材料科学：综合 [2]; 小类(基础版) (2011) 化学综合 [3]; 小类(升级版) (2020) 纳米科技 [2]; 小类(升级版) (2020) 物理：应用 [2]; 小类(升级版) (2020) 材料科学：综合 [2]; 小类(升级版) (2020) 化学综合 [2]; 小类(升级版) (2019) 纳米科技 [2]; 小类(升级版) (2019) 物理：应用 [2]; 小类(升级版) (2019) 材料科学：综合 [2]; 小类(升级版) (2019) 化学综合 [2]; 大类(基础版) (2020) 工程技术 [1] Top 期刊; 大类(基础版) (2019) 工程技术 [1] Top 期刊; 大类(基础版) (2018) 工程技术 [1] Top 期刊; 大类(基础版) (2017) 工程技术 [1] Top 期刊; 大类(基础版) (2016) 工程技术 [1] Top 期刊; 大类(基础版) (2015) 工程技术 [1] Top 期刊; 大类(基础版) (2014) 工程技术 [1] Top 期刊; 大类(基础版) (2013) 工程技术 [1] Top 期刊; 大类(基础版) (2012) 工程技术 [1] Top 期刊; 大类(基础版) (2011) 工程技术 [1] Top 期刊; 大类(升级版) (2020) 材料科学 [2] Top 期刊; 大类(升级版) (2019) 材料科学 [2] Top 期刊;

第 5 条，共 5 条:
出版物类型: J
文献类型: Article
标题: Effect of wall thickness of hollow TiO2 spheres on properties of polyacrylate film: Thermal insulation, UV-shielding and mechanical property
作者: Kang, QL (Kang, Qiaoling); Bao, Y (Bao, Yan); Li, M (Li, Miao); Ma, JZ (Ma, Jianzhong)
作者地址: [Kang, Qiaoling; Bao, Yan; Li, Miao; Ma, Jianzhong] Shaanxi Univ Sci & Technol, Coll Bioresources Chem & Mat Engn, Xian 710021, Shaanxi, Peoples R China.; [Bao, Yan] Shaanxi Res Inst Agr Prod Proc Technol, Xian 710021, Shaanxi, Peoples R China.
通讯作者地址: Bao, Y; Ma, JZ (corresponding author), Shaanxi Univ Sci & Technol, Coll Bioresources Chem & Mat Engn, Xian 710021, Shaanxi, Peoples R China.
来源出版物: PROGRESS IN ORGANIC COATINGS **卷:** 112 **页:** 153-161 **DOI:** 10.1016/j.porgcoat.2017.04.045 **出版年:** 2017 **出版日期:** NOV
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语种: English
电子邮件地址: baoyan@sust.edu.cn; majz@sust.edu.cn
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ISSN: 0300-9440
JCR 影响因子: 5.161 (2020); 4.469 (2019); 3.420 (2018); 2.955 (2017); 2.858 (2016); 2.632 (2015); 2.358 (2014); 2.302 (2013); 1.848 (2012); 1.977 (2011); 1.862 (2010); 1.669 (2009); 1.375 (2008); 1.540 (2007); 1.591 (2006); 1.535 (2005); 1.214 (2004); 0.958 (2003); 0.799 (2002); 0.588 (2001); 0.612 (2000); 0.741 (1999); 0.323 (1998); 0.368 (1997);
JCR 期刊分区: MATERIALS SCIENCE, COATINGS & FILMS [Q1] 2/21 (2020); CHEMISTRY, APPLIED [Q1] 15/69 (2020); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 2/21 (2019); CHEMISTRY, APPLIED [Q1] 14/71 (2019); CHEMISTRY, APPLIED [Q1] 15/71 (2018); MATERIALS SCIENCE, COATINGS & FILMS

[Q1] 2/20 (2018); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 3/19 (2017); CHEMISTRY, APPLIED [Q2] 21/72 (2017); CHEMISTRY, APPLIED [Q1] 15/72 (2016); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 3/19 (2016); CHEMISTRY, APPLIED [Q1] 17/72 (2015); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 3/18 (2015); CHEMISTRY, APPLIED [Q1] 17/72 (2014); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 3/17 (2014); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 3/18 (2013); CHEMISTRY, APPLIED [Q2] 18/71 (2013); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 4/17 (2012); CHEMISTRY, APPLIED [Q2] 24/71 (2012); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 3/18 (2011); CHEMISTRY, APPLIED [Q2] 21/71 (2011); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 4/18 (2010); CHEMISTRY, APPLIED [Q2] 22/70 (2010); CHEMISTRY, APPLIED [Q2] 23/64 (2009); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 5/17 (2009); CHEMISTRY, APPLIED [Q2] 25/61 (2008); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 6/16 (2008); CHEMISTRY, APPLIED [Q2] 20/62 (2007); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 5/18 (2007); MATERIALS SCIENCE, COATINGS & FILMS [Q1] 4/16 (2006); CHEMISTRY, APPLIED [Q2] 18/58 (2006); CHEMISTRY, APPLIED [Q2] 18/59 (2005); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 5/19 (2005); CHEMISTRY, APPLIED [Q2] 19/58 (2004); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 7/19 (2004); CHEMISTRY, APPLIED [Q2] 23/57 (2003); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 7/16 (2003); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 6/17 (2002); CHEMISTRY, APPLIED [Q3] 30/59 (2002); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 8/16 (2001); CHEMISTRY, APPLIED [Q3] 36/58 (2001); CHEMISTRY, APPLIED [Q3] 29/55 (2000); MATERIALS SCIENCE, COATINGS & FILMS [Q3] 9/16 (2000); CHEMISTRY, APPLIED [Q2] 24/49 (1999); MATERIALS SCIENCE, COATINGS & FILMS [Q2] 7/14 (1999); CHEMISTRY, APPLIED [Q3] 30/47 (1998); MATERIALS SCIENCE, COATINGS & FILMS [Q3] 9/14 (1998); CHEMISTRY, APPLIED [Q4] 34/44 (1997); MATERIALS SCIENCE, COATINGS & FILMS [Q4] 10/13 (1997);

中科院期刊分区: 小类(基础版) (2020) 材料科学：膜 [2]; 小类(基础版) (2020) 应用化学 [2]; 小类(基础版) (2019) 材料科学：膜 [2]; 小类(基础版) (2019) 应用化学 [3]; 小类(基础版) (2018) 材料科学：膜 [2]; 小类(基础版) (2018) 应用化学 [3]; 小类(基础版) (2017) 材料科学：膜 [2]; 小类(基础版) (2017) 应用化学 [3]; 小类(基础版) (2016) 材料科学：膜 [2]; 小类(基础版) (2016) 应用化学 [2]; 小类(基础版) (2015) 材料科学：膜 [2]; 小类(基础版) (2015) 应用化学 [3]; 小类(基础版) (2014) 材料科学：膜 [2]; 小类(基础版) (2014) 应用化学 [3]; 小类(基础版) (2013) 材料科学：膜 [2]; 小类(基础版) (2013) 应用化学 [3]; 小类(基础版) (2012) 材料科学：膜 [3]; 小类(基础版) (2012) 应用化学 [3]; 小类(基础版) (2011) 材料科学：膜 [3]; 小类(基础版) (2011) 应用化学 [3]; 小类(基础版) (2010) 材料科学：膜 [3]; 小类(基础版) (2010) 应用化学 [3]; 小类(升级版) (2020) 材料科学：膜 [2]; 小类(升级版) (2020) 应用化学 [2]; 小类(升级版) (2019) 材料科学：膜 [2]; 小类(升级版) (2019) 应用化学 [2]; 大类(基础版) (2020) 工程技术 [2]; 大类(基础版) (2019) 工程技术 [2]; 大类(基础版) (2018) 工程技术 [2]; 大类(基础版) (2017) 工程技术 [2]; 大类(基础版) (2016) 工程技术 [2]; 大类(基础版) (2015) 工程技术 [2]; 大类(基础版) (2014) 工程技术 [2]; 大类(基础版) (2013) 工程技术 [3]; 大类(基础版) (2012) 工程技术 [3]; 大类(基础版) (2011) 工程技术 [3]; 大类(基础版) (2010) 工程技术 [3]; 大类(升级版) (2020) 材料科学 [2]; 大类(升级版) (2019) 材料科学 [1] Top 期刊;

附件二：经检索《Social Sciences Citation Index》，下述论文被 SSCI 收录。（检索时间2021年12月3日）

暂无记录

附件三：经检索《Conference Proceedings Citation Index - Science》，下述论文被 CPCI-S 收录。（检索时间2021年12月3日）

暂无记录

附件四：经检索《Conference Proceedings Citation index - Social Science&Humanalities》，下述论文被 CPCI-SSH 收录。（检索时间2021年12月3日）

暂无记录

附件五：经检索《Engineering Index》，下述论文被 EI 收录。（检索时间2021年12月3日）

暂无记录

附件六：经检索《Science Citation Index Expanded》，下述论文被 SCI-E 引用。（检索时间2021年12月3日）

#	作者	标题	来源出版物	出版物类型	入藏号	SCI-E 引用	
						总引	他引
1	**Kang, QL**; Lai, DW; Tang, WY; Lu, QY; Gao, F	Intrinsic activity modulation and structural design of NiFe alloy catalysts for an efficient oxygen evolution reaction	***CHEMICAL SCIENCE*** 2021, 12 (11): 3818-3835.	J Article	WOS:000632580200002	1	1
2	**Kang, QL**; Qin, YZ; Lu, QY; Gao, F	Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances	***JOURNAL OF POWER SOURCES*** 2020, 476: 228706.	J Article	WOS:000582482700026	3	3
3	**Kang, QL**; Li, MY; Shi, JW; Lu, QY; Gao, F	A Universal Strategy for Carbon-Supported Transition Metal Phosphides as High-Performance Bifunctional Electrocatalysts towards Efficient Overall Water Splitting	***ACS APPLIED MATERIALS & INTERFACES*** 2020, 12 (17): 19447-19456.	J Article	WOS:000529924800022	25	23

4	**Kang, QL**; Li, MY; Wang, ZR; Lu, QY; Gao, F	Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts	***NANOSCALE*** 2020, 12 (8): 5159-5169.	J Article	WOS:000519117800035	6	6
5	**Kang, QL**; Bao, Y; Li, M; Ma, JZ	Effect of wall thickness of hollow TiO2 spheres on properties of polyacrylate film: Thermal insulation, UV-shielding and mechanical property	***PROGRESS IN ORGANIC COATINGS*** 2017, 112: 153-161.	J Article	WOS:000412787900019	10	5
					合计	45	38

被引文献 1
出版物类型: J
文献类型: Article
标题: Intrinsic activity modulation and structural design of NiFe alloy catalysts for an efficient oxygen evolution reaction
作者: Kang, QL (Kang, Qiaoling); Lai, DW (Lai, Dawei); Tang, WY (Tang, Wenyin); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, Sch Chem & Chem Engn, State Key Lab Coordinat Chem,Coordinat Chem Inst, Nanjing 210023, Peoples R China.; [Lai, Dawei; Tang, Wenyin; Gao, Feng] Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, Sch Chem & Chem Engn, State Key Lab Coordinat Chem,Coordinat Chem Inst, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
来源出版物: CHEMICAL SCIENCE **卷:** 12 **期:** 11 **页:** 3818-3835 **DOI:** 10.1039/d0sc06716d **出版年:** 2021 **出版日期:** MAR 21
入藏号: WOS:000632580200002
PubMed ID: 34163652
核心合集中的 "被引频次": 1
语种: English
电子邮件地址: qylu@nju.edu.cn; fgao@nju.edu.cn
IDS 号: RC1RX
ISSN: 2041-6520
eISSN: 2041-6539

施引文献：SCI-E 总引 1 次，其中他引 1 次

第 1 条，共 1 条:
标题: Synthesis of ultrafine Co/CoO nanoparticle-embedded N-doped carbon framework magnetic material and application for 4-nitrophenol catalytic reduction
作者: Wang, DS (Wang, Dongsheng); Xu, L (Xu, Liang); Zeng, FM (Zeng, Fanming); Hu, XL (Hu, Xiaoli); Liu, BL (Liu, Bailing); Li, C (Li, Chun); Su, ZM (Su, Zhongmin); Sun, J (Sun, Jing)
来源出版物: NEW JOURNAL OF CHEMISTRY **卷:** 45 **期:** 31 **页:** 13751-13754 **出版年:** 2021 **出版日期:** AUG 21

被引文献 2
出版物类型: J
文献类型: Article
标题: Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances
作者: Kang, QL (Kang, Qiaoling); Qin, YZ (Qin, Yezhi); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Lu, Qingyi] Nanjing Univ, Coordinat Chem Inst, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Qin, Yezhi; Gao, Feng] Nanjing Univ, Dept Mat Sci & Engn, Collaborat Innovat Ctr Adv Microstruct, Coll Engn & Appl Sci,Jiangsu Key Lab Artificial F, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Coordinat Chem Inst, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Dept Mat Sci & Engn, Collaborat Innovat Ctr Adv Microstruct, Coll Engn & Appl Sci,Jiangsu Key Lab Artificial F, Nanjing 210093, Peoples R China.
来源出版物: JOURNAL OF POWER SOURCES **卷:** 476 **页:** 7 **DOI:** 10.1016/j.jpowsour.2020.228706 **出版年:** 2020 **出版日期:** NOV 15
入藏号: WOS:000582482700026
核心合集中的 "被引频次": 4
语种: English
电子邮件地址: qylu@nju.edu.cn; fgao@nju.edu.cn
IDS 号: OH3PW
ISSN: 0378-7753
eISSN: 1873-2755

施引文献：SCI-E 总引 3 次，其中他引 3 次

第 1 条，共 3 条:
标题: Fabrication of CNTs supported binary nanocomposite with multiple strategies to boost electrochemical activities
作者: Aadil, M (Aadil, Muhammad); Zulfiqar, S (Zulfiqar, Sonia); Shahid, M (Shahid, Muhammad); Agboola, PO (Agboola, Philips O.); Al-Khalli, NF (Al-Khalli, Najeeb Faud); Warsi, MF (Warsi, Muhammad Farooq); Shakir, I (Shakir, Imran)
来源出版物: ELECTROCHIMICA ACTA **卷:** 383 **页:** 10 **出版年:** 2021 **出版日期:** JUL 1

第 2 条，共 3 条:

标题: Vanadium carbide nanodots anchored on N doped carbon nanosheets fabricated by spatially confined synthesis as a high-efficient electrocatalyst for hydrogen evolution reaction
作者: Peng, XY (Peng, Xinyan); Huang, C (Huang, Chao); Zhang, B (Zhang, Biao); Liu, YH (Liu, Yunhong)
来源出版物: JOURNAL OF POWER SOURCES **卷:** 490 **页:** 6 **出版年:** 2021 **出版日期:** APR 1

第 3 条，共 3 条:
标题: Melamine-assisted synthesis of ultrafine Mo2C/Mo2N@N-doped carbon nanofibers for enhanced alkaline hydrogen evolution reaction activity
作者: Chen, J (Chen, Jing); Pan, AQ (Pan, Anqiang); Zhang, WC (Zhang, Wenchao); Cao, XX (Cao, Xinxin); Lu, R (Lu, Rou); Liang, SQ (Liang, Shuquan); Cao, GZ (Cao, Guozhong)
来源出版物: SCIENCE CHINA-MATERIALS **卷:** 64 **期:** 5 **页:** 1150-1158 **出版年:** 2021 **出版日期:** MAY

被引文献 3
出版物类型: J
文献类型: Article
标题: A Universal Strategy for Carbon-Supported Transition Metal Phosphides as High-Performance Bifunctional Electrocatalysts towards Efficient Overall Water Splitting
作者: Kang, QL (Kang, Qiaoling); Li, MY (Li, Mengyuan); Shi, JW (Shi, Jiangwei); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Li, Mengyuan; Shi, Jiangwei; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Gao, Feng] Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
来源出版物: ACS APPLIED MATERIALS & INTERFACES **卷:** 12 **期:** 17 **页:** 19447-19456 **DOI:** 10.1021/acsami.0c00795 **出版年:** 2020 **出版日期:** APR 29
入藏号: WOS:000529924800022
PubMed ID: 32242652
核心合集中的 "被引频次": 27
语种: English
电子邮件地址: qylu@nju.edu.cn; fgao@nju.edu.cn
IDS 号: LJ1IA
ISSN: 1944-8244
eISSN: 1944-8252

施引文献：SCI-E 总引 25 次，其中他引 23 次

第 1 条，共 25 条:
标题: Design and fabrication of Fe2O3/FeP heterostructure for oxygen evolution reaction electrocatalysis
作者: Ahmad, I (Ahmad, Iqbal); Ahmed, J (Ahmed, Jawad); Batool, S (Batool, Saima); Zafar, MN (Zafar, Muhammad Nadeem); Hanif, A (Hanif, Amna); Zahidullah; Nazar, MF (Nazar, Muhammad Faizan); Ul-Hamid, A (Ul-Hamid, Anwar); Jabeen, U (Jabeen, Uzma); Dahshan, A (Dahshan, Alaa); Idrees, M (Idrees, Muhammad); Shehzadi, SA (Shehzadi, Syeda Aalia)
来源出版物: JOURNAL OF ALLOYS AND COMPOUNDS **卷:** 894 **页:** 9 **出版年:** 2022 **出版日期:** FEB 15

第 2 条，共 25 条:
标题: Facile synthesis of bimetallic Ni-Fe phosphide as robust electrocatalyst for oxygen evolution reaction in alkaline media
作者: Wu, DT (Wu, Dongting); Kong, AQ (Kong, Aiqun); Li, W (Li, Wei); Fu, Y (Fu, Yan); Zhang, JL (Zhang, Jinli)
来源出版物: INTERNATIONAL JOURNAL OF HYDROGEN ENERGY **卷:** 46 **期:** 80 **页:** 39844-39854 **出版年:** 2021 **出版日期:** NOV 18

第 3 条，共 25 条:
标题: Ce-Doped Ni-S nanosheets on Ni foam supported NiMoO4 micropillars: fast electrodeposition, improved electrocatalytic activity and ultralong durability for the oxygen evolution reaction in various electrolytes
作者: Wang, FF (Wang, Fangfang); Liu, ZH (Liu, Zihao); Zhang, KJ (Zhang, Kuanjian); Zha, QQ (Zha, Qingqing); Ni, YH (Ni, Yonghong)
来源出版物: DALTON TRANSACTIONS **页:** 11 **出版年:** 2021 **出版日期:** NOV 2021

第 4 条，共 25 条:
标题: Recent developments on transition metal-based electrocatalysts for application in anion exchange membrane water electrolysis
作者: Sulaiman, RRR (Raja Sulaiman, Raja Rafidah); Wong, WY (Wong, Wai Yin); Loh, KS (Loh, Kee Shyuan)
来源出版物: INTERNATIONAL JOURNAL OF ENERGY RESEARCH **页:** 36 **出版年:** 2021 **出版日期:** OCT 2021

第 5 条，共 25 条:
标题: MWCNTs-CoP hybrids for dual-signal electrochemical immunosensing of carcinoembryonic antigen based on overall water splitting
作者: Cao, L (Cao, Lin); Tan, YM (Tan, Yueming); Deng, WF (Deng, Wenfang); Xie, QJ (Xie, Qingji)
来源出版物: TALANTA **卷:** 233 **页:** 7 **出版年:** 2021 **出版日期:** OCT 1

第 6 条，共 25 条:
标题: Material libraries for electrocatalytic overall water splitting
作者: Sun, L (Sun, Lan); Luo, QM (Luo, Qiaomei); Dai, ZF (Dai, Zhengfei); Ma, F (Ma, Fei)
来源出版物: COORDINATION CHEMISTRY REVIEWS **卷:** 444 **页:** 37 **出版年:** 2021 **出版日期:** OCT 1

第 7 条，共 25 条:
标题: FeNiP nanoparticle/N,P dual-doped carbon composite as a trifunctional catalyst towards high-performance zinc-air batteries and overall water electrolysis
作者: Chen, WD (Chen, Wendi); Chang, SM (Chang, Shengming); Yu, HP (Yu, Heping); Li, WM (Li, Wenming); Zhang, H (Zhang, Hui); Zhang, ZY (Zhang, Zhongyi)
来源出版物: NANOSCALE **卷:** 13 **期:** 40 **页:** 17136-17146 **出版年:** 2021 **出版日期:** OCT 21

第 8 条，共 25 条:

标题: Earth-Abundant Fe and Ni Dually Doped Co2P for Superior Oxygen Evolution Reactivity and as a Bifunctional Electrocatalyst toward Renewable Energy-Powered Overall Alkaline Water Splitting
作者: Li, JT (Li, Jiangtian); Chu, D (Chu, Deryn); Baker, DR (Baker, David R.); Leff, A (Leff, Asher); Zheng, P (Zheng, Peng); Jiang, RZ (Jiang, Rongzhong)
来源出版物: ACS APPLIED ENERGY MATERIALS **卷:** 4 **期:** 9 **页:** 9969-9981 **出版年:** 2021 **出版日期:** SEP 27

第 9 条，共 25 条:
标题: Fabrication of Cerium-Doped CoMoP/MoP@C Heterogeneous Nanorods with High Performance for Overall Water Splitting
作者: Chen, TY (Chen, Tianyun); Fu, YY (Fu, Yingyan); Liao, WH (Liao, Wenhao); Zhang, YQ (Zhang, Yaqi); Qian, M (Qian, Min); Dai, HJ (Dai, Haojiang); Tong, XF (Tong, Xianfeng); Yang, QH (Yang, Qinghua)
来源出版物: ENERGY & FUELS **卷:** 35 **期:** 17 **页:** 14169-14176 **出版年:** 2021 **出版日期:** SEP 2

第 10 条，共 25 条:
标题: Carbon-Based Composites as Electrocatalysts for Oxygen Evolution Reaction in Alkaline Media
作者: Stelmachowski, P (Stelmachowski, Pawel); Duch, J (Duch, Joanna); Sebastian, D (Sebastian, David); Lazaro, MJ (Lazaro, Maria Jesus); Kotarba, A (Kotarba, Andrzej)
来源出版物: MATERIALS **卷:** 14 **期:** 17 **页:** 44 **出版年:** 2021 **出版日期:** SEP

第 11 条，共 25 条:
标题: High loading of NiFe active sites on a melamine formaldehyde carbon-based aerogel towards efficient bi-functional electrocatalysis for water splitting
作者: Chen, Z (Chen, Zhi); Zhang, S (Zhang, Shu); Yang, J (Yang, Jian); Chen, C (Chen, Cheng); Song, YC (Song, Yaochen); Xu, CL (Xu, Caili); Wu, MQ (Wu, Mengqiang); Liao, JX (Liao, Jiaxuan)
来源出版物: SUSTAINABLE ENERGY & FUELS **卷:** 5 **期:** 19 **页:** 4973-4980 **出版年:** 2021 **出版日期:** OCT 7

第 12 条，共 25 条:
标题: Active Site Identification and Interfacial Design of a MoP/N-Doped Carbon Catalyst for Efficient Hydrogen Evolution Reaction
作者: Lin, MT (Lin, Mengting); Lu, RH (Lu, Ruihu); Luo, W (Luo, Wen); Xu, N (Xu, Nuo); Zhao, Y (Zhao, Yan); Mai, LQ (Mai, Liqiang)
来源出版物: ACS APPLIED ENERGY MATERIALS **卷:** 4 **期:** 6 **页:** 5486-5492 **出版年:** 2021 **出版日期:** JUN 28

第 13 条，共 25 条:
标题: Flower-like tungsten-doped Fe-Co phosphides as efficient electrocatalysts for the hydrogen evolution reaction
作者: Zhang, Q (Zhang, Qian); Tang, SH (Tang, Shuihua); Shen, LH (Shen, Lieha); Yang, WX (Yang, Weixiang); Tang, Z (Tang, Zhen); Yu, LM (Yu, Limei)
来源出版物: CRYSTENGCOMM **卷:** 23 **期:** 26 **页:** 4724-4731 **出版年:** 2021 **出版日期:** JUL 14

第 14 条，共 25 条:
标题: Recent Advances in Multimetal and Doped Transition-Metal Phosphides for the Hydrogen Evolution Reaction at Different pH values
作者: El-Refaei, SM (El-Refaei, Sayed M.); Russo, PA (Russo, Patricia A.); Pinna, N (Pinna, Nicola)
来源出版物: ACS APPLIED MATERIALS & INTERFACES **卷:** 13 **期:** 19 **页:** 22077-22097 **出版年:** 2021 **出版日期:** MAY 19

第 15 条，共 25 条:
标题: Rational design of FeOx-MoP@MWCNT composite electrocatalysts toward efficient overall water splitting
作者: Wang, AJ (Wang, Aijian); Shen, XL (Shen, Xiaoliang); Wang, Y (Wang, Yun); Wang, Q (Wang, Qi); Cheng, LX (Cheng, Laixiang); Chen, XD (Chen, Xiaodong); Lv, CC (Lv, Cuncai); Zhu, WH (Zhu, Weihua); Li, LH (Li, Longhua)
来源出版物: CHEMICAL COMMUNICATIONS **卷:** 57 **期:** 50 **页:** 6149-6152 **出版年:** 2021 **出版日期:** JUN 25

第 16 条，共 25 条:
标题: Phase-Modulation of Iron/Nickel Phosphides Nanocrystals "Armored" with Porous P-Doped Carbon and Anchored on P-Doped Graphene Nanohybrids for Enhanced Overall Water Splitting
作者: Wang, L (Wang, Lei); Fan, JY (Fan, Jiayao); Liu, Y (Liu, Ying); Chen, MY (Chen, Mingyu); Lin, Y (Lin, Yue); Bi, HC (Bi, Hengchang); Liu, BX (Liu, Bingxue); Shi, NE (Shi, Naien); Xu, DD (Xu, Dongdong); Bao, JC (Bao, Jianchun); Han, M (Han, Min)
来源出版物: ADVANCED FUNCTIONAL MATERIALS **卷:** 31 **期:** 30 **页:** 13 **出版年:** 2021 **出版日期:** JUL

第 17 条，共 25 条:
标题: Facile formation of Fe-doped NiCoP hollow nanocages as bifunctional electrocatalysts for overall water splitting
作者: He, B (He, Bin); Peng, CQ (Peng, Chun-Qing); Ye, F (Ye, Feng); Gao, HW (Gao, Hai-Wen); Wang, Y (Wang, Yang); Tang, YW (Tang, Ya-Wen); Hao, QL (Hao, Qing-Li); Liu, HK (Liu, Hong-Ke); Su, Z (Su, Zhi)
来源出版物: CRYSTENGCOMM **卷:** 23 **期:** 21 **页:** 3861-3869 **出版年:** 2021 **出版日期:** JUN 7

第 18 条，共 25 条: **(自引)**
标题: Intrinsic activity modulation and structural design of NiFe alloy catalysts for an efficient oxygen evolution reaction
作者: Kang, QL (Kang, Qiaoling); Lai, DW (Lai, Dawei); Tang, WY (Tang, Wenyin); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
来源出版物: CHEMICAL SCIENCE **卷:** 12 **期:** 11 **页:** 3818-3835 **出版年:** 2021 **出版日期:** MAR 21

第 19 条，共 25 条:
标题: Solvothermal preparation of nickel-iron phosphides hollow nanospheres derived from metal-organic frameworks for water oxidation reaction
作者: Wang, C (Wang, Chao); Chai, L (Chai, Le); Luo, C (Luo, Chao); Liu, SL (Liu, Shuling)
来源出版物: APPLIED SURFACE SCIENCE **卷:** 540 **页:** 8 **出版年:** 2021 **出版日期:** FEB 28
子辑: 1

第 20 条，共 25 条:
标题: Three-Dimensional Ordered Macroporous NiFe2O4 Self-Supporting Electrode with Enhanced Mass Transport for High-Efficiency Oxygen Evolution Reaction
作者: Wang, KW (Wang, Kaiwen); Jin, RH (Jin, Ronghui); Liu, YH (Liu, Yuhua); Ai, J (Ai, Jing); Liu, ZP (Liu, Zhipeng); Li, XT (Li, Xiaotian); Li, N (Li, Nan)
来源出版物: ACS APPLIED ENERGY MATERIALS **卷:** 4 **期:** 1 **页:** 268-274 **出版年:** 2021 **出版日期:** JAN 25

第 21 条，共 25 条:
标题: CoP and Ni2P implanted in a hollow porous N-doped carbon polyhedron for pH universal hydrogen evolution reaction and alkaline overall water splitting
作者: Zhang, R (Zhang, Run); Zhu, RL (Zhu, Ruolin); Li, Y (Li, Ye); Hui, Z (Hui, Zhi); Song, YY (Song, Yuyan); Cheng, YL (Cheng, Yongliang); Lu, JJ (Lu, Jinjun)

来源出版物: NANOSCALE **卷:** 12 **期:** 46 **页:** 23851-23858 **出版年:** 2020 **出版日期:** DEC 14

第 22 条，共 25 条:
标题: Hierarchical hollow sea-urchin-like Ni-Co diselenide encapsulated in N-doped carbon networks as an advanced core-shell bifunctional electrocatalyst for fabrication of nonenzymatic glucose and hydrogen peroxide sensors
作者: Rahmati, Z (Rahmati, Zeinab); Roushani, M (Roushani, Mahmoud); Hosseini, H (Hosseini, Hadi)
来源出版物: SENSORS AND ACTUATORS B-CHEMICAL **卷:** 324 **页:** 12 **出版年:** 2020 **出版日期:** DEC 1

第 23 条，共 25 条: **(自引)**
标题: Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances
作者: Kang, QL (Kang, Qiaoling); Qin, YZ (Qin, Yezhi); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
来源出版物: JOURNAL OF POWER SOURCES **卷:** 476 **页:** 7 **出版年:** 2020 **出版日期:** NOV 15

第 24 条，共 25 条:
标题: Increasing Electrocatalytic Oxygen Evolution Efficiency through Cobalt-Induced Intrastructural Enhancement and Electronic Structure Modulation
作者: Zhang, X (Zhang, Xin); Zhang, L (Zhang, Lei); Zhu, YX (Zhu, Yuanxin); Li, ZY (Li, Ziyao); Wang, Y (Wang, Yong); Wagberg, T (Wagberg, Thomas); Hu, GZ (Hu, Guangzhi)
来源出版物: CHEMSUSCHEM **卷:** 14 **期:** 1 **页:** 467-478 **出版年:** 2021 **出版日期:** JAN 7

第 25 条，共 25 条:
标题: A review of the electrocatalysts on hydrogen evolution reaction with an emphasis on Fe, Co and Ni-based phosphides
作者: Ge, ZH (Ge, Zhenhua); Fu, B (Fu, Bin); Zhao, JP (Zhao, Jinping); Li, X (Li, Xing); Ma, B (Ma, Bo); Chen, YT (Chen, Yantao)
来源出版物: JOURNAL OF MATERIALS SCIENCE **卷:** 55 **期:** 29 **页:** 14081-14104 **出版年:** 2020 **出版日期:** OCT

被引文献 4
出版物类型: J
文献类型: Article
标题: Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts
作者: Kang, QL (Kang, Qiaoling); Li, MY (Li, Mengyuan); Wang, ZR (Wang, Zengrui); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Li, Mengyuan; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Wang, Zengrui; Gao, Feng] Nanjing Univ, Jiangsu Key Lab Artificial Funct Mat, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Coll Engn & Appl Sci, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Jiangsu Key Lab Artificial Funct Mat, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Coll Engn & Appl Sci, Nanjing 210093, Peoples R China.
来源出版物: NANOSCALE **卷:** 12 **期:** 8 **页:** 5159-5169 **DOI:** 10.1039/c9nr10236a **出版年:** 2020 **出版日期:** FEB 28
入藏号: WOS:000519117800035
PubMed ID: 32073082
核心合集中的 "被引频次": 5
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电子邮件地址: qylu@nju.edu.cn; fgao@nju.edu.cn
IDS 号: KT6IK
ISSN: 2040-3364
eISSN: 2040-3372

施引文献：SCI-E 总引 6 次，其中他引 6 次

第 1 条，共 6 条:
标题: Constructing the Fe/Cr double (oxy)hydroxides on Fe3O4 for boosting the electrochemical oxygen evolution in alkaline seawater and domestic sewage
作者: Li, L (Li, Lu); Zhang, GW (Zhang, Gengwei); Wang, B (Wang, Bin); Yang, SC (Yang, Shengchun)
来源出版物: APPLIED CATALYSIS B-ENVIRONMENTAL **卷:** 302 **页:** 11 **出版年:** 2022 **出版日期:** MAR

第 2 条，共 6 条:
标题: Dual synergistic effects between Co and Mo2C in Co/Mo2C heterostructure for electrocatalytic overall water splitting
作者: Yuan, SS (Yuan, Shisheng); Xia, MS (Xia, Maosheng); Liu, ZP (Liu, Zhipeng); Wang, KW (Wang, Kaiwen); Xiang, LJ (Xiang, Lijuan); Huang, GQ (Huang, Guoqing); Zhang, JY (Zhang, Junyu); Li, N (Li, Nan)
来源出版物: CHEMICAL ENGINEERING JOURNAL **卷:** 430 **页:** 8 **出版年:** 2022 **出版日期:** FEB 15
子辑: 1

第 3 条，共 6 条:
标题: Template-free fabrication of MoP nanoparticles encapsulated in N-doped hollow carbon spheres for efficient alkaline hydrogen evolution
作者: Li, J (Li, Jin); Huang, H (Huang, He); Cao, XX (Cao, Xinxiang); Wu, HH (Wu, Hong-Hui); Pan, KM (Pan, Kunming); Zhang, QB (Zhang, Qiaobao); Wu, NT (Wu, Naiteng); Liu, XM (Liu, Xianming)
来源出版物: CHEMICAL ENGINEERING JOURNAL **卷:** 416 **页:** 12 **出版年:** 2021 **出版日期:** JUL 15

第 4 条，共 6 条:
标题: Current progress of molybdenum carbide-based materials for electrocatalysis: potential electrocatalysts with diverse applications
作者: Li, YQ (Li, Yanqiang); Yin, ZH (Yin, Zehao); Liu, X (Liu, Xuan); Cui, M (Cui, Ming); Chen, SR (Chen, Siru); Ma, TL (Ma, Tingli)
来源出版物: MATERIALS TODAY CHEMISTRY **卷:** 19 **页:** 22 **出版年:** 2021 **出版日期:** MAR

第 5 条，共 6 条:
标题: One-pot synthesis of molybdenum carbide/N-doped carbon nanotube composite using nitrilotriacetic acid for efficient hydrogen evolution
作者: Jo, HM (Jo, Hyeong Min); Kim, Y (Kim, Youngkwon); Youn, DH (Youn, Duck Hyun)

来源出版物: JOURNAL OF ALLOYS AND COMPOUNDS **卷:** 855 **页:** 7 **出版年:** 2021 **出版日期:** FEB 25
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第 6 条，共 6 条:
标题: Hetero carbon structures derived from waste plastics as an efficient electrocatalyst for water splitting and high-performance capacitors
作者: Mir, RA (Mir, Rameez Ahmad); Singla, S (Singla, Shivani); Pandey, OP (Pandey, O. P.)
来源出版物: PHYSICA E-LOW-DIMENSIONAL SYSTEMS & NANOSTRUCTURES **卷:** 124 **页:** 11 **出版年:** 2020 **出版日期:** OCT

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标题: Effect of wall thickness of hollow TiO2 spheres on properties of polyacrylate film: Thermal insulation, UV-shielding and mechanical property
作者: Kang, QL (Kang, Qiaoling); Bao, Y (Bao, Yan); Li, M (Li, Miao); Ma, JZ (Ma, Jianzhong)
作者地址: [Kang, Qiaoling; Bao, Yan; Li, Miao; Ma, Jianzhong] Shaanxi Univ Sci & Technol, Coll Bioresources Chem & Mat Engn, Xian 710021, Shaanxi, Peoples R China.; [Bao, Yan] Shaanxi Res Inst Agr Prod Proc Technol, Xian 710021, Shaanxi, Peoples R China.
通讯作者地址: Bao, Y; Ma, JZ (corresponding author), Shaanxi Univ Sci & Technol, Coll Bioresources Chem & Mat Engn, Xian 710021, Shaanxi, Peoples R China.
来源出版物: PROGRESS IN ORGANIC COATINGS **卷:** 112 **页:** 153-161 **DOI:** 10.1016/j.porgcoat.2017.04.045 **出版年:** 2017 **出版日期:** NOV
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标题: Transparent, thermal insulation and UV-shielding coating for energy efficient glass window
作者: Bao, Y (Bao, Yan); Guo, RY (Guo, Ruyue); Kang, QL (Kang, Qiaoling); Liu, C (Liu, Chao); Zhang, WB (Zhang, Wenbo); Zhu, Q (Zhu, Qian)
来源出版物: CERAMICS INTERNATIONAL **卷:** 47 **期:** 17 **页:** 24597-24606 **出版年:** 2021 **出版日期:** SEP 1

第 2 条，共 10 条: (自引)
标题: Hierarchical Flower-Like Hollow SiO2@TiO2 Spheres with Enhanced Thermal Insulation and Ultraviolet Resistance Performances for Building Coating
作者: Bao, Y (Bao, Yan); Guo, RY (Guo, Ruyue); Ma, JZ (Ma, Jianzhong)
来源出版物: ACS APPLIED MATERIALS & INTERFACES **卷:** 12 **期:** 21 **页:** 24250-24261 **出版年:** 2020 **出版日期:** MAY 27

第 3 条，共 10 条: (自引)
标题: Hollow flower-like ZnO: Synthesis, growth mechanism and application in polyacrylate
作者: Bao, Y (Bao, Yan); Gao, L (Gao, Lu); Feng, CP (Feng, Caiping); Ma, JZ (Ma, Jianzhong); Zhang, WB (Zhang, Wenbo); Liu, C (Liu, Chao); Simion, D (Simion, Demetra)
来源出版物: ADVANCED POWDER TECHNOLOGY **卷:** 31 **期:** 5 **页:** 1975-1984 **出版年:** 2020 **出版日期:** MAY

第 4 条，共 10 条:
标题: TEOS and Na2SiO3 as silica sources: study of synthesis and characterization of hollow silica nanospheres as nano thermal insulation materials
作者: Yang, YR (Yang, Yerong); Li, FX (Li, Fangxian); Xiao, M (Xiao, Min); Zhang, ZB (Zhang, Zhibo); Wei, JX (Wei, Jiangxiong); Hu, J (Hu, Jie); Yu, QJ (Yu, Qijun)
来源出版物: APPLIED NANOSCIENCE **卷:** 10 **期:** 6 **页:** 1833-1844 **出版年:** 2020 **出版日期:** JUN

第 5 条，共 10 条:
标题: Fabrication of hollow silica nanosphere and its application for thermal insulation coating
作者: Hu, P (Hu, Pei); Ai, D (Ai, Dan); Jiang, X (Jiang, Xiang); Zhang, XY (Zhang, Xinya)
来源出版物: JOURNAL OF THERMOPLASTIC COMPOSITE MATERIALS **卷:** 33 **期:** 2 **页:** 198-213 **出版年:** 2020 **出版日期:** FEB

第 6 条，共 10 条:
标题: Preparation and Characterization of Mesoporous TiO2 Sphere/g-C3N4 Nanosheets for Photocatalytic Behaviors
作者: Seong, DB (Seong, Dong Beom); Park, SJ (Park, Soo-Jin)
来源出版物: JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY **卷:** 19 **期:** 10 **页:** 6247-6255 **出版年:** 2019 **出版日期:** OCT

第 7 条，共 10 条:
标题: Hollow-Structured Materials for Thermal Insulation
作者: Hu, F (Hu, Feng); Wu, SY (Wu, Siyu); Sun, YG (Sun, Yugang)
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第 8 条，共 10 条: (自引)
标题: Polyelectrolyte complex from cationized casein and sodium alginate for fragrance controlled release
作者: Zhang, YX (Zhang, Yuanxia); Ma, JZ (Ma, Jianzhong); Xu, QN (Xu, Qunna)
来源出版物: COLLOIDS AND SURFACES B-BIOINTERFACES **卷:** 178 **页:** 439-444 **出版年:** 2019 **出版日期:** JUN 1

第 9 条，共 10 条:
标题: Hollow TiO2 flake prepared from TiO2 coated glass flake for solar heat protection and their thermal performance
作者: Kim, HJ (Kim, Hee Jung); Lee, HJ (Lee, Hyun Jin); Kim, DS (Kim, Dae-Sung)
来源出版物: MATERIALS & DESIGN **卷:** 150 **页:** 188-192 **出版年:** 2018 **出版日期:** JUL 15

第 10 条，共 10 条: (自引)
标题: Structural regulation of hollow spherical TiO2 by varying titanium source amount and their thermal insulation property
作者: Bao, Y (Bao, Yan); Kang, QL (Kang, Qiao Ling); Ma, JZ (Ma, Jian Zhong)

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2	**Kang, QL**; Qin, YZ; Lu, QY; Gao, F	Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances	***JOURNAL OF POWER SOURCES*** 2020, 476: 228706.	J Article	WOS:000582482700026	0	0
3	**Kang, QL**; Li, MY; Shi, JW; Lu, QY; Gao, F	A Universal Strategy for Carbon-Supported Transition Metal Phosphides as High-Performance Bifunctional Electrocatalysts towards Efficient Overall Water Splitting	***ACS APPLIED MATERIALS & INTERFACES*** 2020, 12 (17): 19447-19456.	J Article	WOS:000529924800022	0	0
4	**Kang, QL**; Li, MY; Wang, ZR; Lu, QY; Gao, F	Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts	***NANOSCALE*** 2020, 12 (8): 5159-5169.	J Article	WOS:000519117800035	0	0
5	**Kang, QL**; Bao, Y; Li, M; Ma, JZ	Effect of wall thickness of hollow TiO2 spheres on properties of polyacrylate film: Thermal insulation, UV-shielding and mechanical property	***PROGRESS IN ORGANIC COATINGS*** 2017, 112: 153-161.	J Article	WOS:000412787900019	0	0
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作者: Kang, QL (Kang, Qiaoling); Lai, DW (Lai, Dawei); Tang, WY (Tang, Wenyin); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, Sch Chem & Chem Engn, State Key Lab Coordinat Chem,Coordinat Chem Inst, Nanjing 210023, Peoples R China.; [Lai, Dawei; Tang, Wenyin; Gao, Feng] Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
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出版物类型: J
文献类型: Article
标题: Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances
作者: Kang, QL (Kang, Qiaoling); Qin, YZ (Qin, Yezhi); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)

作者地址: [Kang, Qiaoling; Lu, Qingyi] Nanjing Univ, Coordinat Chem Inst, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Qin, Yezhi; Gao, Feng] Nanjing Univ, Dept Mat Sci & Engn, Collaborat Innovat Ctr Adv Microstruct, Coll Engn & Appl Sci,Jiangsu Key Lab Artificial F, Nanjing 210093, Peoples R China.
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出版物类型: J
文献类型: Article
标题: A Universal Strategy for Carbon-Supported Transition Metal Phosphides as High-Performance Bifunctional Electrocatalysts towards Efficient Overall Water Splitting
作者: Kang, QL (Kang, Qiaoling); Li, MY (Li, Mengyuan); Shi, JW (Shi, Jiangwei); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Li, Mengyuan; Shi, Jiangwei; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Gao, Feng] Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Coll Engn & Appl Sci, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Jiangsu Key Lab Artificial Fu, Nanjing 210093, Peoples R China.
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文献类型: Article
标题: Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts
作者: Kang, QL (Kang, Qiaoling); Li, MY (Li, Mengyuan); Wang, ZR (Wang, Zengrui); Lu, QY (Lu, Qingyi); Gao, F (Gao, Feng)
作者地址: [Kang, Qiaoling; Li, Mengyuan; Lu, Qingyi] Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; [Wang, Zengrui; Gao, Feng] Nanjing Univ, Jiangsu Key Lab Artificial Funct Mat, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Coll Engn & Appl Sci, Nanjing 210093, Peoples R China.
通讯作者地址: Lu, QY (corresponding author), Nanjing Univ, Collaborat Innovat Ctr Adv Microstruct, State Key Lab Coordinat Chem, Coordinat Chem Inst,Sch Chem & Chem Engn, Nanjing 210023, Peoples R China.; Gao, F (corresponding author), Nanjing Univ, Jiangsu Key Lab Artificial Funct Mat, Collaborat Innovat Ctr Adv Microstruct, Dept Mat Sci & Engn,Coll Engn & Appl Sci, Nanjing 210093, Peoples R China.
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标题: Effect of wall thickness of hollow TiO2 spheres on properties of polyacrylate film: Thermal insulation, UV-shielding and mechanical property
作者: Kang, QL (Kang, Qiaoling); Bao, Y (Bao, Yan); Li, M (Li, Miao); Ma, JZ (Ma, Jianzhong)
作者地址: [Kang, Qiaoling; Bao, Yan; Li, Miao; Ma, Jianzhong] Shaanxi Univ Sci & Technol, Coll Bioresources Chem & Mat Engn, Xian 710021, Shaanxi, Peoples R China.; [Bao, Yan] Shaanxi Res Inst Agr Prod Proc Technol, Xian 710021, Shaanxi, Peoples R China.
通讯作者地址: Bao, Y; Ma, JZ (corresponding author), Shaanxi Univ Sci & Technol, Coll Bioresources Chem & Mat Engn, Xian 710021, Shaanxi, Peoples R China.

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Waste leather-derived (Cr, N)-co-doped carbon cloth coupling with Mo_2C nanoparticles as a self-supported electrode for highly active hydrogen evolution reaction performances

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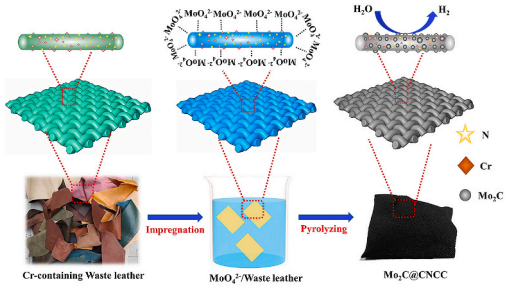
HIGHLIGHTS

- A "changing harm for treasure" route is proposed to create great electrocatalysts.
- Cr-containing waste leather is used for (Cr, N)-co-doped carbon cloth (CNCC).
- Loading Mo_2C nanoparticles on CNCC results in a self-supported HER electrode.
- The self-supported Mo_2C@CNCC electrode exhibits great HER performances.
- Cr is unbeneficial for waste leather treatment but beneficial for HER performance.

GRAPHICAL ABSTRACT



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ABSTRACT

In leather industry, it is a big challenge to deal with tons of waste leathers, especially those containing chromium. On the other hand, non-precious cost-effective hydrogen evolution reaction (HER) electrocatalysts are of considerable demands for environmentally-friendly energy production. Herein, in order to meet these two challenges, we creatively utilized chromium-containing waste leathers to fabricate high performance non-precious HER catalysts. Leather consists of collagen bundles; high temperature annealing of Cr-containing waste leather results in the formation of (Cr, N)-co-doped carbon cloth (CNCC). Molybdenum carbide nanoparticles can be simultaneously coupled onto CNCC (Mo_2C@CNCC) by loading Mo oxyanions on waste leather through wet impregnation before annealing. The resulted Mo_2C@CNCC is self-supported and can be directly applied as HER electrode, which exhibits outstanding electrocatalytic HER performances in alkaline media with low overpotential (113 mV at 10 mA/cm^2) and long-term stability (more than 70 h). The existence of Cr in waste leather is unbeneficial for waste leather disposition, but plays an important role to enhance the HER performances. This simple "changing harm for the treasure" route provides a new green concept for dealing with waste leather and creating high performance electrocatalysts.

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Research Article

A Universal Strategy for Carbon-Supported Transition Metal Phosphides as High-Performance Bifunctional Electrocatalysts towards Efficient Overall Water Splitting

Qiaoling Kang, Mengyuan Li, Jiangwei Shi, Qingyi Lu,* and Feng Gao*

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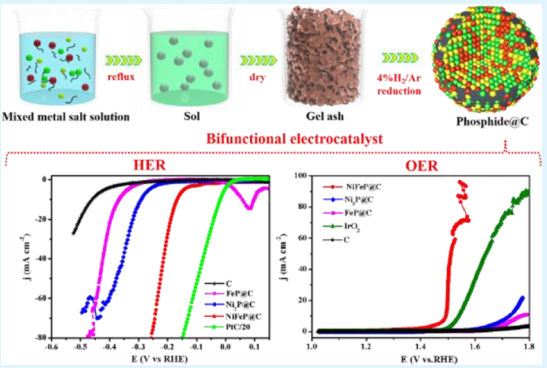
ABSTRACT: Exploring cost-effective and general approaches for highly active and stable bifunctional transition metal phosphide (TMP) electrocatalysts towards overall water splitting is greatly desirable and challenging. Herein, a general strategy combining sol−gel and a carbonization-assisted route was proposed to facilely fabricate a series of TMP nanoparticles, including CoP, MoP, FeP, Cu_2P, Ni_2P, PtP_2, FeNiP, CoNiP, and FeCoNiP, coupled in an amorphous carbon matrix with one-step carbon composite formation. The resultant NiFeP@C exhibits excellent activities as a bifunctional electrocatalyst toward oxygen evolution reaction (OER) and hydrogen evolution reaction (HER) with low overpotentials of 260 and 160 mV, respectively, at 10 mA/cm^2 in 1 M KOH solution. With the NiFeP@C electrocatalyst as both electrode materials, an integrated electrolyzer can deliver 47.0 mA/cm^2 of current density at 1.60 V, better than the assembled Pt/C20||IrO_2 counterpart. The encapsulation of NiFeP nanoparticles in the carbon matrix effectively prevents their corrosion and leads to almost unfading catalytic activities for more than 20 h for either the HER, OER, or overall water splitting, outperforming recently reported bifunctional electrocatalysts. The coexistence of Ni, Fe, P, and C would have synergetic effects to accelerate charge transfer and promote electrocatalytic activity. This universal strategy for TMP-based composites opens up a new avenue to explore TMPs as multifunctional materials for various applications.



KEYWORDS: *universal strategy, metallic phosphide, oxygen evolution reaction, hydrogen evolution reaction, overall water splitting*

INTRODUCTION

Nowadays, water electrolysis is widely considered as a sustainable and green technique for mass production of hydrogen, which is regarded to be a promising energy carrier due to its high energy efficiency and good pollution control.[1] In electrochemical water splitting, the oxygen evolution reaction (OER) and the hydrogen evolution reaction (HER) take place at the anode and the cathode to produce O_2 and H_2 gases, respectively. In order to effectively implement electrochemical water splitting, high-performance electrocatalysts for the OER and/or HER are prerequisite. So far, the electrocatalysts based on noble metals such as Ir/Ru and Pt are known best for the OER and HER; however, their poor stability and limited reserves severely restrict their large-scale applications. Moreover, it is difficult to efficiently operate water splitting in an integrated electrolyzer when using two kinds of catalysts for the respective half reactions due to the incongruity of the optimum pH environment. Thus, bifunctional catalysts that can perform well under same electrolyte conditions for both the half reactions are greatly desirable.[2] Until now, transition metals and their derivatives, including hydroxides, oxides, or chalcogenides, have been developed to be bifunctional water splitting electrocatalysts.[3−5] However, these cost-effective electrocatalysts often suffer from low conductivity and poor durability, and great improvements are still needed to make them be competitive with the precious-metal catalysts in water splitting efficiency.

Recently, transition metal phosphide (TMP) nanostructures have emerged to be a new class of water splitting catalysts due to their high reactivity and low cost.[6] Although some achievements have been accomplished with nanostructured monometallic phosphides (such as CoP and Ni_2P), their water splitting performances are still far from satisfactory.[7,8] Lately, it is revealed that incorporating foreign metal atoms into the crystal lattice of transition-metal-based materials can expediently tune the local coordination environment and electronic configuration and thus improve their electrocatalytic activities.[9,10] On the other hand, theoretical works have

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Agaric-derived N-doped carbon nanorod arrays@nanosheet networks coupled with molybdenum carbide nanoparticles as highly efficient pH-universal hydrogen evolution electrocatalysts†

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Non-precious, stable and efficient catalysts for the pH-universal hydrogen evolution reaction (HER) are highly desirable to meet the vast energy demands. Herein, we report a facile and scalable strategy using agaric as a precursor to construct a Mo_2C-based HER electrocatalyst consisting of ultrafine Mo_2C nanoparticles embedded within biomass-derived 3D N-doped carbon nanorod arrays@nanosheet networks (Mo_2C@N-CANs). This electrocatalyst is highly active for the pH-universal hydrogen evolution reaction and requires overpotentials of only 82 mV, 100 mV and 350 mV to drive a current density of –10 mA cm^{-2} in acidic, alkaline and neutral media, exhibiting stable operation for 3000 cycles and 24 h long-term stability. Theoretical calculations indicate that coupling Mo_2C, N and CANs into a hybrid results in producing wrinkles on carbon nanolayers, which changes the direction of sp^2 hybrid orbitals to push the Gibbs free energy toward zero. This result reinforces the presence of a synergy effect between Mo_2C and N-CANs in Mo_2C@N-CAN catalysts, which leads to their impressive HER performances.

1 Introduction

Hydrogen (H_2) is considered to be the most attractive sustainable energy source to replace traditional fossil fuels for future energy applications due to its high energy density and zero carbon emission.[1] Current industrial H_2 production is primarily generated through steam reforming of fossil fuels, which no doubt is accelerating the depletion of fossil fuels.[2] Electrochemical water splitting is an efficient and clean technology for sustainable hydrogen production.[3] In water electrolysis, in order to minimize overpotential and achieve fast kinetics for the hydrogen evolution reaction (HER), advanced electrocatalysts are highly desirable. Currently, platinum-based catalysts have been demonstrated to be most efficient for the HER, but their limited reserves and high price seriously impede their wide applications. Subsequently, great research interest has been devoted to developing alternative Pt-free electrocatalysts.[4]

To date, several Earth-abundant transition metal-based electrocatalysts, including carbides,[5,6] nitrides,[7,8] phosphides,[9,10] and sulfides,[11,12] have been developed and performed impressively in the HER in acidic media. However, efficient catalysts that work under different pH conditions are still needed for specific needs. For example, chloro-/water-alkali HER electrolyzers need catalysts that work well in basic media, while some microbial electrolysis cells require electrocatalysts that operate efficiently in a neutral environment. Thus, the development of electrocatalysts that perform well in a wide pH range is greatly desirable but still remains a great challenge. Molybdenum compounds, such as MoS_2, Mo_2B and Mo_2C, have been demonstrated to show excellent HER catalytic performances in alkaline media.[13,14] Among these molybdenum compounds, Mo_2C has been attracting increasing interest as a high-performance HER electrocatalyst due to its similar electronic structure to Pt.[15] In 2012, commercial Mo_2C microparticles were firstly reported to have good electrocatalytic HER activities in both acidic and alkaline media.[16] Thereafter, great efforts have been devoted to improving their catalytic performances. Previous research studies reveal that coupling Mo_2C-based catalysts into carbon-based materials, such as amorphous carbon, carbon nanotubes and graphene, is an effective

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Intrinsic activity modulation and structural design of NiFe alloy catalysts for an efficient oxygen evolution reaction

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NiFe alloy catalysts have received increasing attention due to their low cost, easy availability, and excellent oxygen evolution reaction (OER) catalytic activity. Although it is considered that the co-existence of Ni and Fe is essential for the high catalytic activity, the identification of active sites and the mechanism of OER in NiFe alloy catalysts have been controversial for a long time. This review focuses on the catalytic centers of NiFe alloys and the related mechanism in the alkaline water oxidation process from the perspective of crystal structure/composition modulation and structural design. Briefly, amorphous structures, metastable phases, heteroatom doping and *in situ* formation of oxyhydroxides are encouraged to optimize the chemical configurations of active sites toward intrinsically boosted OER kinetics. Furthermore, the construction of dual-metal single atoms, specific nanostructures, carbon material supports and composite structures are introduced to increase the abundance of active sites and promote mass transportation. Finally, a perspective on the future development of NiFe alloy electrocatalysts is offered. The overall aim of this review is to shed light on the exploration of novel electrocatalysts in the field of energy.

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1. Introduction

Given the limited fossil energy storage and the environment deterioration caused by fossil fuel consumption, shifting from fuel-based economic development to a sustainable and clean economy is an urgent need but a huge challenge at present.[1–8] Accordingly, electrochemical water splitting, producing H_2 at the cathode and O_2 at the anode has been widely researched as promising technology to solve the energy crisis.[9–13] However, due to the sluggish kinetics of the oxygen evolution reaction (OER), especially the huge dynamic barrier resulting from the four-step proton-coupled electron transfer process, effective catalysts are needed to narrow the gap between theoretical calculations and actual required potentials.[14–20] Although some noble metal-based materials, such as RuO_2 and IrO_2, have been demonstrated to be highly efficient OER electrocatalysts, their high cost and scarcity severely restrict their large-scale commercialization.[21–25] This serves as a strong driving force to stimulate the investigation of non-noble metal-based OER electrocatalysts.

Among the numerous reported 3d transition metal-based electrocatalysts, NiFe-based materials have been brought to the forefront due to their excellent electrocatalytic performances and low cost.[26–28] Remarkable achievements have been made regarding the use of transition metal alloys, which exhibit superior performances mainly originating from their inherent electronic and chemical properties.[29–31] Among them, the NiFe bimetallic alloy is one of the most promising candidates to expedite the kinetically sluggish OER owing to its low cost and intrinsic catalytic activity.[32,33] In past six years (2015–2020), the number of publications and relevant citations on NiFe alloy electrocatalysts have increased rapidly, as shown in Fig. 1a. Great efforts have been devoted to design alloy nanostructures with a large surface area, well-exposed active sites, and good electronic conductivity to lower the overpotential remarkably for oxygen evolution (Fig. 1b). The recently reported NiFe alloy catalysts exhibit superior catalytic activities, and thus are expected to replace expensive noble metal catalysts.[34,35] Meanwhile, the progressive insight into the structure–activity relationship has further revealed the properties and mechanism of NiFe alloy catalysts. Following recent achievements, it appears necessary to propose a comprehensive, authoritative, and critical review to emphasize their principles for electronic/structural modulation. In this perspective, we cover the impressive progress in explaining the active roles of NiFe alloy catalysts for OER catalysis together with the optimization of their intrinsic activity (including crystal structure modulation and composition optimization) and structure. Furthermore, we

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Effect of wall thickness of hollow TiO_2 spheres on properties of polyacrylate film: Thermal insulation, UV-shielding and mechanical property

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ABSTRACT

Hollow TiO_2 spheres were fabricated by calcining the polystyrene-titania composite microspheres prepared via a sol-gel process of titanium tetrabutoxide (TBT) using cationic polystyrene (PS) spheres as template. The wall thickness of hollow TiO_2 spheres was finely tuned between 13 nm and 94 nm by varying the amount of titania precursor from 0.43 wt% to 1.25 wt% based on polystyrene latex during the coating process. The thermal insulation, UV-shielding, and mechanical properties of polyacrylate (PA) film were obviously enhanced by introducing hollow TiO_2 spheres via physical blending method. Moreover, these properties exhibit a trend of first good and then become worse with the wall thickness of hollow TiO_2 spheres increasing. When the wall thickness of hollow TiO_2 spheres is 43 nm, the properties of polyacrylate/hollow TiO_2 composite film are optimum.

1. Introduction

According to the reports by International Energy Agency [1], buildings are responsible for about 40% of world energy used in 2014, which can be attributed to the poor thermal insulation characteristics of existing building elements [2]. The external thermal insulation compound system has become one of the most competitive systems to save energy in buildings [3]. However, the exterior wall thermal insulation mainly use polystyrene foam boards at present, which are very thick with the disadvantages of cumbersome, high cost, narrow construction scope [4]. Therefore, the construction industry had started seeking out a way to replace the thick-layer thermal insulation technique. The thin-layer thermal insulation coating has attracted intensely attention because of the efficient thermal insulation performance, simple construction and lower cost [5]. A variety of functional inorganic fillers including sepiolite, vermiculite, clay and metal oxide are normally loaded into the polymer matrix to prepare thin-layer thermal insulation coatings [6].

Inorganic hollow spheres with internal sizes ranging from nanometer to micrometer have been the focus of many researchers, and numerous corresponding synthetic techniques have emerged [7,8]. On a theoretical ground, hollow spheres have specific advantages such as low thermal conductivity and low density due to a large amount of air or other gas constrained [9]. Therefore, they are regarded as a new generation of thermal insulation materials [10], that aim at taking benefit from physical effects, such as the Knudsen effect, to reduce thermal conductivity of materials as much as possible [11], and have been gradually applied to thermal insulation coating materials in recent years [12,13]. However, only hollow glass microspheres [14] or hollow glass-ceramics [15] microspheres with internal sizes from several micrometers to tens of micrometers are used in practice at present [16–18]. In addition, there are some studies on thermal properties that were focused on aerogels [19]. Hollow glass microspheres and hollow glass-ceramics microspheres result in deterioration of other properties due to their big size. Aerogels are very costly and easy to aggregate. These points hinder their practical applications in many areas [20]. Moreover, the improvement of these materials to thermal insulation performance only depends on their low thermal conductivity because of their hollow structure in nature. In fact, high light reflection is also important for improving thermal insulation besides low thermal conductivity. However, combining high light reflection with low thermal conductivity to realize thermal insulation has never been reported.

On the one hand, hollow TiO_2 spheres possess superior light reflection and low thermal conductivity because of their hollow structure and the properties of TiO_2 itself. This makes them a very promising candidate for thermal insulation. On the other hand, one distinctive advantage of hollow TiO_2 spheres for thermal insulation application is their controllability, i.e. the particle size and porosity, the chemical composition and the packing manner/density [21]. It is a known fact that the size, morphology and structure of materials significantly

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