



ISSN **QK1934880**  
 CN11-4545/TG  
 CODEN:CRXAAK

# 材料热处理学报

CAILIAO RECHULI XUEBAO

TRANSACTIONS OF MATERIALS AND HEAT TREATMENT



**CMES**

中国机械工程学会主办

第40卷 第 **7** 期

Vol.40 No.7

**2019**

ISSN 1009-6264



9 771009 626195



## 目 次

### 综述

Mg-Zn-Zr 系生物镁合金研究现状及展望 ..... 李 欢,文九巴,贺俊光,刘 亚,师慧娜,徐大召( 1 )

### 复合材料

碳化活化温度对生物质基多孔碳/硫复合正极材料电化学性能的影响 .....

..... 吴 健,张 琪,刘家琴,吴玉程( 10 )

退火和固溶处理对 SiC<sub>p</sub>/7055Al 复合材料组织及性能的影响 ..... 王海涛,唐彬彬,金培鹏,王金辉( 18 )

### 有色金属合金材料

7050 合金电流场时效析出行为 ..... 董 宇,费文慧,王新宇,何立子,崔建忠,贾品峰( 26 )

固溶处理对 P 变质 Al-30%Si 合金微观组织和性能的影响 .....

..... 卢楠方,程和法,黄笑梅,夏明旷,秦晓雄( 33 )

Be 添加对 TC4 钛合金组织和性能的影响 ..... 叶 茜,景 然,孙悦颖,王少华,解念锁( 40 )

铜模喷铸 K424 合金的组织及沉淀相析出行为 ..... 雷四雄,杨 伟,郑 行( 45 )

热处理温度对 B2 型 Zr<sub>36</sub>Co<sub>44</sub> 合金显微组织及力学性能影响 ..... 李培友( 53 )

铜/铝固态界面金属间化合物的生长行为 ..... 马恒波,任柯旭,邱然锋,石红信( 60 )

Mo<sub>5</sub>SiB<sub>2</sub> 相合金 700 ℃ 氧化行为 ..... 杨颜萍,魏世忠,潘昆明,徐流杰,周玉成,李秀青( 68 )

La<sub>2</sub>O<sub>3</sub> 含量对 Mo<sub>2</sub>NiB<sub>2</sub> 金属陶瓷微观组织及断裂性能的影响 .....

..... 李文虎,周佩德,艾桃桃,张 良,冯小明( 77 )

### 黑色金属合金材料

弛豫时间对 1200 MPa 级热轧双相钢组织性能的影响 ..... 吴 腾,吴 润,邓雨微,刘 斌,梁 文( 82 )

回火温度对 Cr-Mo 钢衬板显微组织与力学性能的影响 .....

..... 张森斐,王文焱,刁晓刚,程艳艳,谢敬佩,刘亚洲( 88 )

GCr15 轴承钢先共析渗碳体的相变规律 .....	宁玉亮,何 康,刘年富,李祥龙,李烈军,霍向东( 94 )
临界退火工艺对 0.3C-5Mn-3Al 超细晶钢显微组织的影响 .....	朱延山,张继明,曲锦波,罗 咪(101)
等温淬火工艺对等温淬火球墨铸铁组织及耐磨性能的影响 .....	
.....	路宁安,霍晓阳,张锦志,米国发,王有超(109)
轮轨材料滚动摩擦条件下的波磨形成过程 .....	冯嘉雨,刘德义,刘鹏涛,赵秀娟,任瑞铭(117)

## 材料表面改性

LD 钢 TiAlN 涂层的制备及性能 .....	肖 明,胡树兵(124)
含石墨烯摩擦层对 TC11 合金摩擦学性能的影响 .....	周 银,王树奇,赵振江,许 胜,王 健(132)

## 材料模拟计算

基于三维热加工图的 X12 合金的热变形行为 .....	杨喜晴,陈学文,王继业,刘佳琪,张家银(140)
Cr8 钢动态再结晶行为及元胞自动机模拟 .....	王继业,陈学文,杨喜晴(149)
单轴压缩下 U75V 钢动态力学行为及其修正 J-C 本构模型 .....	汪振兴,田晓耕,干 聪,魏兵辉(156)

## 其他

选择性激光烧结石墨件的抗氧化性能 .....	
.....	吴海华,陈 奎,孙 瑜,任超群,王 俊,主 悔,黄才华,李立军(165)
Ag 颗粒含量对 SnAgCu 基复合钎料组织及性能的影响 .....	
.....	何 凯,陈益平,程东海,胡德安,邓呈敏,薛行雁,李正兵(172)

## CONTENTS

- Current research status and prospect of Mg-Zn-Zr series bio-magnesium alloys .....  
 ..... LI Huan, WEN Jiu-ba, HE Jun-guang, LIU Ya, SHI Hui-na, XU Da-zhao( 1 )
- Influence of carbonization-activation temperature on electrochemical performance of porous biomass-derived carbon/sulfur composite cathode material ..... WU Jian, ZHANG Qi, LIU Jia-qin, WU Yu-cheng( 10 )
- Effects of annealing and solid solution treatment on microstructure and properties of SiC<sub>p</sub>/7055Al composites .....  
 ..... WANG Hai-tao, TANG Bin-bin, JIN Pei-peng, WANG Jin-hui( 18 )
- Aging precipitation behavior of 7050 alloy under applied current .....  
 ..... DONG Yu, FEI Wen-hui, WANG Xin-yu, HE Li-zi, CUI Jian-zhong, JIA Pin-feng( 26 )
- Effect of solution treatment on microstructure and mechanical properties of P-modified Al-30%Si alloy .....  
 ..... LU Nan-fang, CHENG He-fa, HUANG Xiao-mei, XIA Ming-kuang, QIN Xiao-xiong( 33 )
- Effect of Be addition on microstructure and mechanical properties of TC4 alloy .....  
 ..... YE Xi, JING Ran, SUN Yue-ying, WANG Shao-hua, XIE Nian-suo( 40 )
- Microstructure formation and precipitation behavior of quenched K424 alloy by copper mould spray casting .....  
 ..... LEI Si-xiong, YANG Wei, ZHENG Hang( 45 )
- Effect of heat treatment temperature on microstructure and mechanical properties of B2-type Zr<sub>56</sub>Co<sub>44</sub> alloys .....  
 ..... LI Pei-you( 53 )
- Growth behavior of intermetallic compounds at Cu/Al solid state interface .....  
 ..... MA Heng-bo, REN Ke-xu, QIU Ran-feng, SHI Hong-xin( 60 )
- Oxidation behavior of Mo<sub>5</sub>SiB<sub>2</sub> alloy at 700 °C .....  
 ..... YANG Yan-ping, WEI Shi-zhong, PAN Kun-ming, XU Liu-jie, ZHOU Yu-cheng, LI Xiu-qing( 68 )
- Effect of La<sub>2</sub>O<sub>3</sub> content on microstructure and fracture properties of Mo<sub>2</sub>NiB<sub>2</sub> cermet .....  
 ..... LI Wen-hu, ZHOU Pei-de, AI Tao-tao, ZHANG Liang, FENG Xiao-ming( 77 )
- Effect of relaxation time on microstructure and mechanical properties of 1200 MPa hot rolled dual phase steel .....  
 ..... WU Teng, WU Run, DENG Yu-wei, LIU Bin, LIANG Wen( 82 )
- Effect of tempering temperature on microstructure and mechanical properties of Cr-Mo steel liner .....  
 ..... ZHANG Miao-fei, WANG Wen-yan, DIAO Xiao-gang, CHENG Yan-yan, XIE Jing-pei, LIU Ya-zhou( 88 )

Phase transformation behavior of proeutectoid cementite in GCr15 bearing steel .....	
.....	NING Yu-liang, HE Kang, LIU Nian-fu, LI Xiang-long, LI Lie-jun, HUO Xiang-dong( 94 )
Influence of intercritical annealing process on microstructure of 0.3C-5Mn-3Al ultra-fine grain steel .....	
.....	ZHU Yan-shan, ZHANG Ji-ming, QU Jin-bo, LUO Mi(101)
Effect of austempering process on microstructure and wear resistance of austempered ductile iron .....	
.....	LU Ning-an, HUO Xiao-yang, ZHANG Jin-zhi, MI Guo-fa, WANG You-chao(109)
Corrugation forming process of wheel and rail materials under rolling friction .....	
.....	FENG Jia-yu, LIU De-yi, LIU Peng-tao, ZHAO Xiu-juan, REN Rui-ming(117)
Preparation and properties of TiAlN coating on LD steel surface .....	XIAO Ming, HU Shu-bing(124)
Effect of tribo-layer containing graphene on tribological properties of TC11 alloy .....	
.....	ZHOU Yin, WANG Shu-qi, ZHAO Zhen-jiang, XU Sheng, WANG Jian(132)
Hot deformation behavior of X12 alloy based on three-dimensional hot working diagram .....	
.....	YANG Xi-qing, CHEN Xue-wen, WANG Ji-ye, LIU Jia-qi, ZHANG Jia-yin(140)
Dynamic recrystallization behavior and cellular automaton simulation of Cr8 steel .....	
.....	WANG Ji-ye, CHEN Xue-wen, YANG Xi-qing(149)
Dynamic mechanical behavior of U75V steel under uniaxial compression and its modified J-C constitutive model ...	
.....	WANG Zhen-xing, TIAN Xiao-geng, GAN Cong, WEI Bing-hui(156)
Oxidation resistance of selective laser sintered graphite parts .....	
.....	WU Hai-hua, CHEN Kui, SUN Yu, REN Chao-qun, WANG Jun, ZHU Hui, HUANG Cai-hua, LI Li-jun(165)
Effect of Ag particle content on microstructure and mechanical properties of SnAgCu-based composite solder .....	
.....	HE Kai, CHEN Yi-ping, CHENG Dong-hai, HU De-an, DENG Cheng-min, XUE Xing-yan, LI Zheng-bing(172)



# 材料热处理学报

## TRANSACTIONS OF MATERIALS AND HEAT TREATMENT

第 40 卷第 7 期 总第 229 期 2019 年 7 月 25 日(月刊,1980 年创刊)

Vol.40 No.7 July 25, 2019 (Monthly, Started in 1980)

主管单位:中国科学技术协会

主办单位:中国机械工程学会

主 编:周 玉

副 主 编:闫牧夫 顾剑锋 李 俏  
石 伟

编辑部主任:李 俏

编辑部副主任:付海峰

编辑出版:《材料热处理学报》编辑部

地 址:北京市海淀区学清路 18 号  
北京机电研究所院内(100083)

电 话:010-62914115,82415080

传 真:010-62914115

网 址:www.mhtcn.org

电子信箱:clrc1@vip.163.com

印 刷:北京科信印刷有限公司

刊 号:ISSN 1009-6264

CN 11-4545/TG

CODEN:CRXAAK

国内发行:北京报刊发行局

邮发代号:82-591

国内定价:50 元/册,全年:600 元

### Responsible Department:

China Association for Science and Technology

Sponsor: Chinese Mechanical Engineering Society

Chief Editor: ZHOU Yu

Vice Chief Editor: YAN Mu-fu, GU Jian-feng, LI Qiao, SHI Wei

Managing Editor: LI Qiao

Vice Managing Editor: FU Hai-feng

Edited and Published: Editorial Office of TRANSACTIONS OF  
MATERIALS AND HEAT TREATMENT

Address: No.18, Xueqing Road, Beijing 100083, China

Tel: 86-10-62914115, 82415080

Fax: 86-10-62914115

http: //www.mhtcn.org

E-mail: clrc1@vip.163.com

Code No.: ISSN 1009-6264

CN 11-4545/TG

CODEN: CRXAAK

Annual Rate: 600 USD(including postage by air)

全国中文核心期刊

中国科技核心期刊

中国科技论文统计与分析用刊

中国科技期刊 ChinaInfo 系统用刊

中国期刊方阵双效期刊

RCCSE 中国权威学术期刊(A<sup>+</sup>)

中国科学引文数据库(CSCD)来源期刊

中国期刊全文数据库(CJFD)用刊

中国期刊网、中国学术期刊全文收录期刊

荷兰 SCOPUS 数据收录期刊

美国《化学文摘》CA 文献源期刊

美国《剑桥科学文摘》CSA 文献源期刊

金属文摘 METADEX 文献源期刊

日本科技情报中心 JICST 文献源期刊

AJ、EMA 等收录期刊



敬请关注本刊微信公众号,可通过公众号查询稿件处理进度及过刊等。