

表面技术

SURFACE TECHNOLOGY

ISSN 1001-3660

CN 50-1083/TG

2023年10月
第52卷 第10期

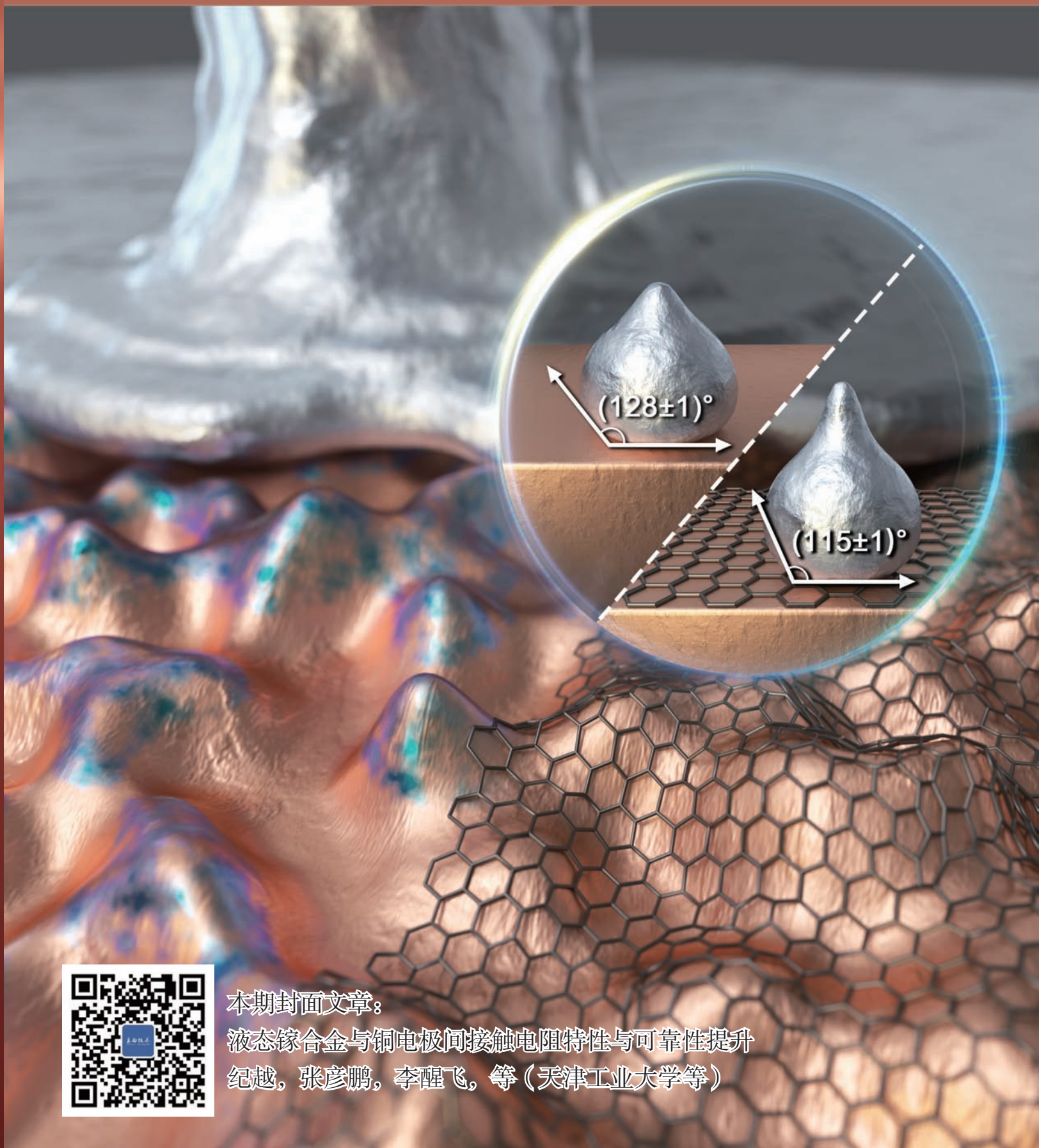
Vol.52 No.10

表面技术

第五十二卷

第十期

二〇二三年十月



本期封面文章:

液态镓合金与铜电极间接接触电阻特性与可靠性提升
纪越, 张彦鹏, 李醒飞, 等(天津工业大学等)

目次 CONTENTS

研究综述 Research Review

1 碳量子点的摩擦学研究进展

Research Progress of Carbon Quantum Dot in Tribology

赵聪慧, 张传祥, 张晓琪, 凡玉方

ZHAO Cong-hui, ZHANG Chuan-xiang, ZHANG Xiao-qi, FAN Yu-fang

20 金属表面减摩方法研究综述

Research Review on Surface Antifricion Methods of Metals

国增磊, 李敏, 王淑峰, 迟静, 陈琳琳, 梁斌, 薛均贤, 杜中鹏, 郭智新

GUO Zeng-lei, LI Min, WANG Shu-feng, CHI Jing, CHEN Lin-lin,

LIANG Bin, XUE Jun-xian, DU Zhong-peng, GUO Zhi-xin

32 阴极等离子电解沉积技术简介及其研究进展

Introduction and Research Progress of Cathode Plasma Electrodeposition Technology

庄宁, 卢帅, 张博威, 赵梦雅, 黄康, 张展, 何业东, 吴俊升

ZHUANG Ning, LU Shuai, ZHANG Bo-wei, ZHAO Meng-ya,

HUANG Kang, ZHANG Zhan, HE Ye-dong, WU Jun-sheng

48 钼及钼合金表面高温防护涂层的研究进展

Research Progress of High Temperature Protective Coatings on Molybdenum and Molybdenum Alloy

张亚龙, 王茜, 李倩, 张亮, 张峻巍, 李继东, 金辉, 陈东旭

ZHANG Ya-long, WANG Qian, LI Qian, ZHANG Liang,

ZHANG Jun-wei, LI Ji-dong, JIN Hui, CHEN Dong-xu

64 天然活性物质在海洋防污中的研究进展

Research Progress of Natural Active Substances in Marine Antifouling

刘俊, 郑恒, 高子涵, 胡丹妮, 张甜

LIU Jun, ZHENG Heng, GAO Zi-han, HU Dan-ni, ZHANG Tian

75 氧化锆粉体的制备及其在热障涂层中的应用

Preparation of Zirconium Oxide Powder and Its Application in Thermal Barrier Coating

郭德林, 孙华键, 孙兆新, 樊世冲, 侯良朋, 李如庆, 杨明辉, 孙金钊, 殷凤仕

GUO De-lin, SUN Hua-jian, SUN Zhao-xin, FAN Shi-chong, HOU Liang-peng,

LI Ru-qing, YANG Ming-hui, SUN Jin-zhao, YIN Feng-shi

99 荧光探针在涂层中的应用及机理研究进展

Progress of Application and Mechanism of Fluorescent Probes in Coating

杜娟, 魏士钧, 石玉超, 刘礼平, 汪鸿宇, 宋海鹏

DU Juan, WEI Shi-jun, SHI Yu-chao, LIU Li-ping,

WANG Hong-yu, SONG Hai-peng

115 环境友好型达克罗处理技术的现状及研究进展

Present Situation and Research Progress of Environment-friendly Dacromet Treatment Technology

李红玲

LI Hong-ling

124 螺纹丝锥表面处理研究进展

Research Progress on Surface Treatment of Thread Tap

陈汪林, 李喆, 黄勇浩, 邓阳, 李聪, 孟显娜, 李苏洋

CHEN Wang-lin, LI Zhe, HUANG Yong-hao, DENG Yang,

LI Cong, MENG Xian-na, LI Su-yang

摩擦磨损与润滑 Friction, Wear and Lubrication

141 纳米磁性流体与表面织构对钛合金的协同减摩作用机制

Synergistic Friction-reducing Mechanism of Nano-magnetic Fluid Lubrication on Grooved Surface Texture of Titanium Alloy

王优强, 赵涛, 莫君, 刘新福, 何彦

WANG You-qiang, ZHAO Tao, MO Jun, LIU Xin-fu, HE Yan

151 TA15 钛合金高温摩擦磨损性能研究

Tribological Properties of TA15 Titanium Alloy at Different High Temperatures

刘彬, 李晟, 毛玉刚, 李鹏飞, 李亮亮, 孟宪凯, 王赛兰, 吴嘉诚

LIU Bin, LI Sheng, MAO Yu-gang, LI Peng-fei, LI Liang-liang,

MENG Xian-kai, WANG Sai-lan, WU Jia-cheng

160 大气等离子喷涂 FeCoCrNiAl 高熵合金涂层的高温摩擦磨损性能

Friction and Wear Properties of FeCoCrNiAl High Entropy Alloy Coatings Prepared by Atmospheric Plasma Spraying at High Temperature

王跃明, 李晨龙, 韩旭航, 黄杰, 朱建勇, 解路, 刘秀波

WANG Yue-ming, LI Chen-long, HAN Xu-hang,

HUANG Jie, ZHU Jian-yong, XIE Lu, LIU Xiu-bo

171 TA1 钛合金的表面复合强化与磨损行为研究

Surface Composite Strengthening and Wear Behavior of TA1 Titanium Alloy

刘港, 刘静, 代燕, 杨峰, 陈丽

LIU Gang, LIU Jing, DAI Yan, YANG Feng, CHEN Li

腐蚀与防护 Corrosion and Protection

181 7B04 铝合金及其螺接件的微观腐蚀机制及耐久性研究

Microscopic Corrosion Mechanism and Durability of 7B04 Aluminum Alloy and Its Screw Joint

汪凤琴, 苏艳, 钟勇, 左鹏程, 庄宁, 吴俊升, 张博威

WANG Feng-qin, SU Yan, ZHONG Yong, ZUO Peng-cheng,

ZHUANG Ning, WU Jun-sheng, ZHANG Bo-wei

194 超声滚压对 6061 铝合金晶间腐蚀行为的影响

Effect of Ultrasonic Rolling on Intergranular Corrosion Behavior of 6061 Aluminum Alloy

胡钟遥, 石维, 向嵩

HU Zhong-yao, SHI Wei, XIANG Song

206 高 Cl⁻环空保护液中超级 13Cr 油管点腐蚀行为研究

Pitting Corrosion Behavior of Super 13Cr Tubing in High Chloride-containing Annulus Protection Fluid

霍宏博, 宋闯, 刘婉颖, 刘东东, 张羽臣, 何世明

HUO Hong-bo, SONG Chuang, LIU Wan-ying, LIU Dong-dong, ZHANG Yu-chen, HE Shi-ming

220 高强铝合金在海洋大气环境与拉伸疲劳载荷协同作用下的腐蚀损伤行为对比研究

Comparative Study on Corrosion Damage Behavior of High Strength Aluminum Alloys under Synergistic Effect of Marine Atmospheric Environment and Tensile Fatigue Load

吴护林, 罗来正, 刘春苗, 赵方超, 王彬, 王键坤, 刘溅洪, 符朝旭

WU Hu-lin, LUO Lai-zheng, LIU Chun-miao, ZHAO Fang-chao,

WANG Bin, WANG Jian-kun, LIU Jian-hong, FU Zhao-xu

229 含席夫碱结构碳点缓蚀剂的简易可扩展制备及性能研究

Facile Preparation and Characterization of Carbon Dots with Schiff Base Structures Toward an Efficient Corrosion Inhibitor

李雪琪, 何闯, 于珂珂, 罗启灵, 龙武剑

LI Xue-qi, HE Chuang, YU Ke-ke, LUO Qi-ling, LONG Wu-jian

241 Na₂WO₄ 含量对镁合金微弧氧化膜层颜色和耐蚀性的影响

Effect of Na₂WO₄ Content on Color and Corrosion Resistance of Micro-arc Oxidation Coating on Magnesium Alloy

祝海涛, 孙金峰, 孟永强, 王立伟, 彭珍珍, 汪殿龙

ZHU Hai-tao, SUN Jin-feng, MENG Yong-qiang,

WANG Li-wei, PENG Zhen-zhen, WANG Dian-long

250 钢表面电火花沉积合成 W-Mo 高熔点复合涂层

High Melting Point Composite Coating of W-Mo Alloy Synthesized by Electrospark Deposition on Steel Surface

李忠盛, 吴护林, 陈海涛, 丛大龙, 张敏, 何庆兵, 彭冬
LI Zhong-sheng, WU Hu-lin, CHEN Hai-tao, CONG Da-long,
ZHANG Min, HE Qing-bing, PENG Dong

259 脱脂对镀锌汽车板涂装性能影响

Effect of Degreasing on Coating Performance of Galvanized Automobile Sheet

龙袁, 郝玉林, 蔡宁, 周纪名, 姚士聪, 曹建平, 刘华赛, 李学涛, 杨建伟
LONG Yuan, HAO Yu-lin, CAI Ning, ZHOU Ji-ming, YAO Shi-cong,
CAO Jian-ping, LIU Hua-sai, LI Xue-tao, YANG Jian-wei

表面功能化 Surface Functionalization

267 液态镓合金与铜电极间接接触电阻特性与可靠性提升

Characteristics and Reliability Improvement of Contact Resistance between Liquid Gallium Alloy and Copper Electrode

纪越, 张彦鹏, 李醒飞, 张志佳
JI Yue, ZHANG Yan-peng, LI Xing-fei, ZHANG Zhi-jia

278 掺杂 Bi 的 β -Cu₂Se 薄膜的微观结构与热电性能

Microstructure and Thermoelectric Properties of Bi-doped β -Cu₂Se Film

周政旭, 陈雨, 宋贵宏, 胡方, 吴玉胜, 尤俊华
ZHOU Zheng-xu, CHEN Yu, SONG Gui-hong, HU Fang, WU Yu-sheng, YOU Jun-hua

287 二氧化硅层对氧化石墨烯表面生长碳纳米管的影响

Effect of Silicon Dioxide Layer on the Growth of Carbon Nanotubes on the Surface of Graphene Oxide
朱静泊, 邹杨君, 唐小天, 闫兵, 岳建岭, 刘愚, 黄小忠
ZHU Jing-bo, ZOU Yang-jun, TANG Xiao-tian, YAN Bing,
YUE Jian-ling, LIU Yu, HUANG Xiao-zhong

295 梯度润湿性图案化表面的制备及其输运性能研究

Fabrication of Gradient Wetting Patterned Surface and Its Performance in Transportation

刘前凯, 张杰, 孙鹏程, 王建平, 赵威, 杨吟飞, 赵国龙, 陈妮, 李亮, 何宁, 郝秀清
LIU Qian-kai, ZHANG Jie, SUN Peng-cheng, WANG Jian-ping, ZHAO Wei,
YANG Yin-fei, ZHAO Guo-long, CHEN Ni, LI Liang, HE Ning, HAO Xiu-qing

304 微液滴/注液表面黏附行为的主被动控制及机理

Active/Passive Control and Mechanism of the Adhesion Behaviors of Droplet/Liquid-infused Surface
张学仁, 张亚锋, 顾兴士, 余家欣
ZHANG Xue-ren, ZHANG Ya-feng, GU Xing-shi, YU Jia-xin

313 受猪笼草启发的多孔微腔低冰黏附防除冰表面

Low Ice Adhesion Deicing/Anti-icing Surface of Porous Microcavity Inspired by Nepenthes

向科峰, 尹欢, 宋岳干, 杨益, 李国强, 赖林
XIANG Ke-feng, YIN Huan, SONG Yue-gan, YANG Yi, LI Guo-qiang, LAI Lin

热喷涂与冷喷涂技术 Thermal Spraying and Cold Spraying Technology

321 超音速火焰喷涂镍基涂层颗粒沉积特性的数值模拟

Numerical Simulation of Particle Deposition Behavior of Ni-based Coatings by High-velocity Oxy-fuel Spraying

许耀飞, 刘思思, 杨正航, 姜胜强, 刘金刚
XU Yao-fei, LIU Si-si, YANG Zheng-hang, JIANG Sheng-qiang, LIU Jin-gang

335 预热温度对机匣等离子喷涂铝硅可磨耗封严涂层应力场影响的数值模拟

Effect of Substrate Preheating Temperature on Residual Stress of Aluminum-Silicon Abrasion-Sealing Coatings by Plasma Spraying

苏宇航, 温祯洪, 罗军明, 崔世宇
SU Yu-hang, WEN Zhen-hong, LUO Jun-ming, CUI Shi-yu

350 TaSi₂ 改性 ZrB₂/SiC 复合粉末制备及涂层抗氧化性能研究

Preparation of ZrB₂/SiC Composite Powder Modified by TaSi₂ and the Antioxidant Property of Its Coating

刘昌鹏, 雷伟, 冉旭东, 张菲玥
LIU Chang-peng, LEI Wei, RAN Xu-dong, ZHANG Fei-yue

表面强化技术 Surface Strengthening Technology

360 B 和 Si 掺杂对 CrAlN 涂层结构和切削钛合金寿命的影响

Effects of B and Si Doping on CrAlN Coating Structure and Tool Life of Cutting Titanium Alloy

王羽中, 史耀耀, 张国飞, 贺云鹏

WANG Yu-zhong, SHI Yao-yao, ZHANG Guo-fei, HE Yun-peng

367 非平衡磁控溅射 CrTiAlN 涂层的制备及空蚀性能研究

Preparation and Cavitation Erosion Resistance of CrTiAlN Coatings by Unbalanced Magnetron Sputtering

刘铭悦, 黄志全, 张习羽, Ann Zammit, Joseph Buhagiar, Glenn Cassar, 王建明, 陈坚

LIU Ming-yue, HUANG Zhi-quan, ZHANG Xi-yu, Ann Zammit,

Joseph Buhagiar, Glenn Cassar, WANG Jian-ming, CHEN Jian

376 偏压梯度 TiAlN 涂层对 TC4 钛合金振动与拉伸疲劳性能的影响与机理

Effect and Mechanism of Bias-graded TiAlN Coatings on Vibration and Tensile Fatigue Properties of TC4 Titanium Alloy

曹鑫, 王静静, 李聪健, 何卫锋, 汪路路, 何磊

CAO Xin, WANG Jing-jing, LI Cong-jian, HE Wei-feng, WANG Lu-lu, HE Lei

384 等离子熔覆 TiC/Fe 基熔覆层显微组织及碳化物演变机理分析

Analysis of Microstructure and Carbide Evolution Mechanism of TiC/Fe-Based Cladding Coating by Plasma Cladding

尹燕, 何明明, 李辉, 赵奎安, 刘颖波, 张瑞华

YIN Yan, HE Ming-ming, LI Hui, ZHAO Kui-an, LIU Ying-bo, ZHANG Rui-hua

394 氧化石墨烯对纳米金属陶瓷复合镀层组织性能影响

Effect of Graphene Oxide on Microstructure and Properties of Nano-cermet Composite Coatings

李智, 刘崇宇, 葛毓立, 宋万彤, 胡德枫

LI Zhi, LIU Chong-yu, GE Yu-li, SONG Wan-tong, HU De-feng

403 Fe-Zn 相图不同相区温度合金化镀锌层生长过程模拟

Simulation of the Growth Process of Galvannealed Coatings at Different Zone Temperature in Fe-Zn Phase Diagram

刘诗文, 孟宪陆, 赵彦, 吴广新, 张捷宇

LIU Shi-wen, MENG Xian-lu, ZHAO Yan, WU Guang-xin, ZHANG Jie-yu

411 激光冲击强化 TC4 钛合金强化层弹塑性本构参数反演分析

Reverse Analysis of Elasto-plastic Constitutive Parameters of Strengthening Layer for Laser Shock Processing TC4 Titanium Alloys

王淑娜, 伏培林, 李嘉伟, 张旭, 阚前华

WANG Shu-na, FU Pei-lin, LI Jia-wei, ZHANG Xu, KAN Qian-hua

422 钛催渗低温离子渗氮对 304 不锈钢组织性能的影响

Effect of Low Temperature Plasma Nitriding with Ti Catalyst on the Microstructure and Properties of 304 Stainless Steel

李润涛, 孙斐, 汪丹丹, 魏坤霞, 杨卫民, 胡静

LI Run-tao, SUN Fei, WANG Dan-dan, WEI Kun-xia, YANG Wei-min, HU Jing

430 GCr15SiMn 贝氏体轴承钢超声滚压表层组织与性能

Effect of Ultrasonic Rolling Process on Surface Microstructures and Properties of GCr15SiMn Bainitic Bearing Steel

安容升, 程志, 潘金芝, 陈春焕, 刘鹏涛, 任瑞铭

AN Rong-sheng, CHENG Zhi, PAN Jin-zhi, CHEN Chun-huan,

LIU Peng-tao, REN Rui-ming

439 基于分布位错法研究多条微裂纹对偏折主裂纹的影响

Effect of Multiple Micro-cracks on Kinked Macro-cracks Based on the Distributed Dislocation Method

王强胜, 张启洞, 蒋哲亮, 李乐毅, 江晓禹

WANG Qiang-sheng, ZHANG Qi-dong,

JIANG Zhe-liang, LI Le-yi, JIANG Xiao-yu