



“中国期刊方阵”双效期刊
中国科学引文数据库(CSCD)收录期刊
全国中文核心期刊
RCCSE中国核心学术期刊
中国知网(CNKI)收录期刊
万方数据(CHINAINFO)收录期刊
维普资讯(VIP INFORMATION)收录期刊
国外多家知名数据库收录期刊

ISSN 0253-6099
CN 43-1104/TD

矿冶工程

MINING AND METALLURGICAL ENGINEERING

主办单位：长沙矿冶研究院有限责任公司 中国金属学会

ISSN 0253-6099



6

2021年12月
VOL.41

万方数据

矿冶工程

KUANGYE GONGCHENG

双月刊 公开发行 1981年创刊
第41卷 第6期(总第202期)

主管单位:长沙矿冶研究院有限责任公司
主办单位:长沙矿冶研究院有限责任公司
中国金属学会
编辑出版:矿冶工程杂志(长沙)有限公司

《矿冶工程》杂志编委会

编委主任:李茂林

国内编委:(按姓氏笔画排序)

干勇 习小明 王天义 毛桂庭
古德生 左铁镛 冯夏庭 朴东鹤
刘宝琛 刘炯天 阳宁 孙伟
孙传尧 杜维吾 杨斌 杨应亮
李茂林 肖可颂 吴冲浒 何发钰
何继善 邱冠周 余永富 张覃
张一敏 张国旺 张新明 陈雯
金展鹏 周廉 周克崧 桂卫华
翁宇庆 黄白云 黄晓燕 黄健柏
盛忠杰 蒋开喜 覃事彪 曾维勇
谢建国 雷平喜 薛生晖

国际编委:(按姓名字母排序)

Andy Fourie(澳大利亚)

Dongke Zhang(澳大利亚)

Jan Dean Miller(美国)

Ugur Ozbay(美国)

Zhenghe Xu(徐政和)(加拿大)

《矿冶工程》杂志编辑部

主 编:曾维勇

副 主 编:刘洪萍

编 辑:黄小芳 周 杨

地址:湖南省长沙市麓山南路966号

电话:(0731)88657070,88657176,88657173

传真:(0731)88657186

邮编:410012

网址: <http://www.kygczz.com>

E-mail: kuangyegongchengzz@163.com

印 刷 者:湖南鑫成印刷有限公司

国内发行:湖南省长沙市报刊发行局

国内订购:全国各地邮局

国外发行:中国国际图书贸易总公司

(北京399信箱)

国内邮发代号:42—58

国外邮发代号:Q4212

国内统一连续出版物号:CN 43-1104/TD

国际标准连续出版物号:ISSN 0253-6099

出版日期:2021年12月

广告经营许可证:长广发登第007号

国内定价:9.00元

目 次

矿产资源绿色高效综合利用专题

- 酸预处理对六方晶系磁黄铁矿浮选行为的影响及作用机理
..... 袁致涛,王俊祥,孟庆有,杜雨生(1)
- 某低品位难选菱铁矿磁化焙烧-磁选试验研究 刘旭(6)
- 氧化对毒砂可浮性的影响 李洪祥,代淑娟,赵英杰(10)
- 高磷鲕状铁氧化物球气基还原-磁选提铁降磷研究 ... 吴世超,孙体昌,张乐(13)
- 含水杨羟肟酸捕收剂废水对铅锑锌硫化矿浮选行为的影响
..... 黄伟泰,顾帼华,王艳红,巫奎东(16)
- 铁矿石碳热还原过程中铅锌脱除及含铁物相的演变规律
..... 张晓雪,罗立群,郑波涛,魏晨曦(21)
- 江西某金矿伴生伊利石选矿试验研究
..... 李可文,张彦起,苏晓堂,周力,王琪,宋涛(26)
- 锡石多金属硫化矿磨矿技术效率模型预测研究
..... 朱朋岩,杨金林,马少健,帅智超(30)
- 云南某复杂硫、氧混合铅锌矿浮选实验研究
..... 毛志丹,谢克强,孔德全,苏开萌,袁晓磊(34)
- 拜耳法赤泥磁化焙烧理论与实践问题探讨
..... 毛润,张鹏飞,胡超杰,张汉泉(38)
- 低钙高品位稀土精矿浮选试验研究 李娜,秦玉芳,王其伟(43)
- 硫砷铜矿、蓝辉铜矿与铜蓝表面选择性氧化浮选分离研究
..... 黄志华,胡业民,金凯,袁文彬,覃文庆,张雁生(47)
- 酒钢粉矿复合团聚磁种磁化磁选试验研究
..... 陈铁军,陈兴,刘伟,展仁礼,张涛(52)
- 铝离子对长石和绿帘石浮选的影响及其作用机理 曾维伟,刘旭(56)
- 从攀西地区含钨钒钛磁铁矿尾矿中回收钨研究
..... 王浚杰,肖军辉,张焯毓,江路,唐娟(61)
- TIMA测试技术在白云鄂博矿床钨工艺矿物学中的应用
..... 杨波,杨莉,沈茂森,刘涛,孟文祥,于宏东(65)
- 钙镁质磷矿尾矿浮选试验研究 张晋,贺爱平,李国栋,葛英勇(69)
- 蒙古国某稀土矿矿石工艺矿物学特征
..... 孟文祥,柳建勇,盛晓雅,杨波,杨莉,敖鑫,庞学武(73)
- 某低品位细粒嵌布硫化铜矿选矿工艺研究 ... 张曙光,简胜,唐鑫,王少东(77)
- 某微细粒难选铁矿尾矿选矿工艺研究 胡芳,陈泽宗(81)
- 湖南某难选高钙白钨矿选矿技术研究
..... 罗良飞,刘忠义,赵文坡,李文凤,许海峰(84)
- 镜铁矿粉矿回转窑磁化焙烧-磁选试验研究 李慧春,沈忠,梁秀艳(89)
- 大西沟菱褐铁矿表面磁化焙烧-强磁选新工艺研究
..... 彭泽友,刘旭,陈雯,刘小银,瞿思思(93)
- 外磁系与内磁系永磁筒式磁选机对比研究 张祖刚(96)
- 提高金矿选矿技术指标研究 白成庆,姚凯,潘仁球,颜顺德(101)
- 国外某细粒级海滨砂矿多金属综合回收选矿工艺研究
..... 张华,潘炳,李欣,袁福(104)
- 刚果(金)某难选含碳硫化铜矿浮选探索试验研究 ... 黄刚,杜廷雷,齐超越(109)
- 太钢东山石灰石矿矿产资源节约集约与综合利用 杨志勇,王鑫彦(112)

MINING AND METALLURGICAL ENGINEERING

(Bimonthly, Started in 1981)

Vol.41 No.6 (Sum 202) December 2021

Responsible by

Changsha Research Institute of
Mining and Metallurgy Co Ltd

Sponsored by

Changsha Research Institute of
Mining and Metallurgy Co Ltd,
The Chinese Society for Metals

Edited and Published by

Mining & Metallurgical Engineering
Journal Publication (Changsha) Co Ltd

Chief Editor: ZENG Wei-yong

Deputy Editor: LIU Hong-ping

Editor: HUANG Xiao-fang

ZHOU Yang

Address: No.966, Lushan South Road,

Changsha 410012, Hunan, PRC

Tel: (0731)88657070,88657176,88657173

Fax: (0731)88657186

Website: <http://www.kygczz.com>

E-mail: kuangyegongchengzz@163.com

Distributed by China International

Book Trading Corporation

(P.O.Box 399, Beijing, PRC)

International Distribution Code: Q4212

ISSN 0253-6099

CN 43-1104/TD
万方数据

CONTENTS

SPECIAL TOPIC OF COMPREHENSIVE UTILIZATION OF MINERAL RESOURCES

- Effect of Acid Pretreatment on Flotation Behavior of Hexagonal Pyrrhotite and Interaction Mechanism Therein YUAN Zhi-tao, WANG Jun-xiang, MENG Qing-you, DU Yu-sheng(1)
- Experimental Study on Magnetizing Roasting and Magnetic Separation of Refractory Lean Siderite Ore LIU Xu(6)
- Effect of Oxidation on Floatability of Arsenopyrite LI Hong-xiang, DAI Shu-juan, ZHAO Ying-jie(10)
- Iron Recovery and Dephosphorization of Oxidized Pellets of High-Phosphorus Oolitic Iron Ore Using Gas-Based Reduction and Magnetic Separation Technology ... WU Shi-chao, SUN Ti-chang, ZHANG Le(13)
- Influence of Wastewater Containing Salicylhydroxamic Acid on Flotation of Pb/Sb/Zn Sulfide Minerals HUANG Wei-qin, GU Guo-hua, WANG Yan-hong, WU Luan-dong(16)
- Removal of Lead and Zinc Impurities and Phase Evolution Laws of Ferriiferous Minerals Amidst Iron Ore Carbothermal Reduction ... ZHANG Xiao-xue, LUO Li-qun, ZHENG Bo-tao, WEI Chen-xi(21)
- Experimental Study on Beneficiation of Associated Illite in Gold Ore from Jiangxi LI Ke-wen, ZHANG Yan-qi, SU Xiao-tang, ZHOU Li, WANG Qi, SONG Tao(26)
- Prediction Model for Grinding Technical Efficiency of Cassiterite-Polymetallic Sulfide Ore ZHU Peng-yan, YANG Jin-lin, MA Shao-jian, SHUAI Zhi-chao(30)
- Flotation of Mixed Sulfide-Oxide Lead and Zinc Ore from Yunnan MAO Zhi-dan, XIE Ke-qiang, KONG De-guan, SU Kai-meng, YUAN Xiao-lei(34)
- Discussion on Theory and Practice of Magnetizing Roasting of Bayer Red Mud MAO Run, ZHANG Peng-fei, HU Chao-jie, ZHANG Han-quan(38)
- Flotation of High-Grade Rare Earth Concentrate with Low Calcium Content LI Na, QIN Yu-fang, WANG Qi-wei(43)
- Selective Surface Oxidation and Flotation Separation of Enargite, Digenite and Covellite HUANG Zhi-hua, HU Ye-min, JIN Kai, YUAN Wen-bin, QIN Wen-qing, ZHANG Yan-sheng(47)
- Magnetic Seeding Agglomeration and Magnetic Separation for Fine Ore in JISCO CHEN Tie-jun, CHEN Xing, LIU Wei, ZHAN Ren-li, ZHANG Tao(52)
- Effect and Mechanism of Al³⁺ on Flotation of Feldspar and Epidote ... ZENG Wei-wei, LIU Xu(56)
- Recovery of Scandium Resource from Sc-Bearing Vanadium-Titanium Magnetite Tailings in Pan-Xi Region WANG Jun-jie, XIAO Jun-hui, ZHANG Ye-yu, JIANG Lu, TANG Juan(61)
- Application of TIMA in Process Mineralogy Study of Niobium Minerals in Bayan Obo Deposit ... YANG Bo, YANG Li, SHEN Mao-sen, LIU Tao, MENG Wen-xiang, YU Hong-dong(65)
- Experimental Study on Flotation of Calcareous-Magnesian Apatite Tailings ZHANG Jin, HE Ai-ping, LI Guo-dong, GE Ying-yong(69)
- Process Mineralogical Characteristics of Ores in a Rare Earth Deposit in Mongolia MENG Wen-xiang, LIU Jian-yong, SHENG Xiao-ya, YANG Bo, YANG Li, AO Xin, PANG Xue-wu(73)
- Technical Research on Beneficiation of Low-Grade Finely-Disseminated Copper Sulfide Ore ZHANG Shu-guang, JIAN Sheng, TANG Xin, WANG Shao-dong(77)
- Recovering of Iron Resources from Refractory Tailings of Microfine Iron Ore HU Fang, CHEN Ze-zong(81)
- Beneficiation Technology for Refractory High-Calcium Scheelite Ore from Hunan LUO Liang-fei, LIU Zhong-yi, ZHAO Wen-po, LI Wen-feng, XU Hai-feng(84)
- Rotary Kiln Magnetic Roasting and Magnetic Separation Test of Powdery Specularite Ore LI Hui-chun, SHEN Zhong, LIANG Xiu-yan(89)
- New Technology of Surface Magnetization Roasting and High Intensity Magnetic Separation for Daxigou Siderite and Limonite Ores ... PENG Ze-you, LIU Xu, CHEN Wen, LIU Xiao-yin, QU Si-si(93)
- Comparative Study on Permanent Magnetic Drum Separators with External or Internal Magnetic Systems ZHANG Zu-gang(96)
- Improving Technical Index of Gold Ore Dressing by Modifying Reagent Regime BAI Cheng-qing, YAO Kai, PAN Ren-qiu, YAN Shun-de(101)
- Comprehensive Recovery of Multi-metallic Resources from Overseas Fine-Grained Beach Placer by Beneficiation Process ZHANG Hua, PAN Bing, LI Xin, YUAN Fu(104)
- Flotation of Refractory Carbaceous Copper Sulfide Ore from Democratic Republic of Congo HUANG Gang, DU Yan-lei, QI Yue-chao(109)
- Economical, Intensive and Comprehensive Utilization of Limestone Resources in Dongshan Limestone Mine of TISCO YANG Zhi-yong, WANG Xin-yan(112)

矿冶工程

KUANGYE GONGCHENG

双月刊 公开发行 1981年创刊
第41卷 第6期(总第202期)

主管单位:长沙矿冶研究院有限责任公司
主办单位:长沙矿冶研究院有限责任公司
中国金属学会
编辑出版:矿冶工程杂志(长沙)有限公司

《矿冶工程》杂志编委会

编委主任:李茂林

国内编委:(按姓氏笔画排序)

干勇 习小明 王天义 毛桂庭
古德生 左铁镛 冯夏庭 朴东鹤
刘宝琛 刘炯天 阳宁 孙伟
孙传尧 杜维吾 杨斌 杨应亮
李茂林 肖可颂 吴冲浒 何发钰
何继善 邱冠周 余永富 张覃
张一敏 张国旺 张新明 陈雯
金展鹏 周廉 周克崧 桂卫华
翁宇庆 黄白云 黄晓燕 黄健柏
盛忠杰 蒋开喜 覃事彪 曾维勇
谢建国 雷平喜 薛生晖

国际编委:(按姓名字母排序)

Andy Fourie(澳大利亚)
Dongke Zhang(澳大利亚)
Jan Dean Miller(美国)
Ugur Ozbay(美国)
Zhenghe Xu(徐政和)(加拿大)

《矿冶工程》杂志编辑部

主 编:曾维勇
副 主 编:刘洪萍
编 辑:黄小芳 周 杨

地址:湖南省长沙市麓山南路966号
电话:(0731)88657070,88657176,88657173
传真:(0731)88657186
邮编:410012
网址: <http://www.kygczz.com>
E-mail: kuangyegongchengzz@163.com

印 刷 者:湖南鑫成印刷有限公司
国内发行:湖南省长沙市报刊发行局
国内订购:全国各地邮局
国外发行:中国国际图书贸易总公司
(北京399信箱)

国内邮发代号:42—58
国外邮发代号:Q4212
国内统一连续出版物号:CN 43-1104/TD
国际标准连续出版物号:ISSN 0253-6099

出版日期:2021年12月
广告经营许可证:长广发登第007号
国内定价:9.00元

目 次

采 矿

- 冻融作用下单裂隙类砂岩冻胀力与强度变化规律研究
..... 刘艳章,王瑾,尹东,何英博,葛伟杰,单梁(115)
- 岩石场地爆破振动衰减模型及减隔振效应研究
..... 何梦,陈金,张家兆,王府府,许相宗,李贺龙,张建经(120)
- 基于K折交叉验证的SVM隧道围岩分级判别
..... 汪学清,刘爽,李秋燕,马凯彬(126)
- 基于FLAC^{3D}的采矿方法优选及采场结构参数优化
..... 罗来和,夏国进,王沉,朱获天(129)
- 气力泵疏浚特性研究 胡东,何丽晏,林安源,度磊,王霞光(134)
- 谦比希铜矿膏体充填井下工业试验研究
..... 李辉,许斌,焦华喆,陈新明,杨柳华(138)
- 改流体放矿技术实验研究 吴宇轩,陶干强,张淦(141)

冶 金

- 石墨浮选精矿碱酸法制备高纯石墨
..... 肖骁,龙渊,刘瑜,张国旺,石立,赵湘(145)
- 攀枝花硫酸渣直接还原试验研究 李俊翰,孙宁(150)
- 基于共存理论的废线路板火法熔炼渣-铜平衡研究
..... 杨必文,李强,章小兵,王磊,王海北(153)
- 预氧化强化印尼海砂矿还原分离及机理研究
..... 胡程飞,易凌云,张楠,肖华荣,蔡威,黄柱成(161)
- 印尼某红土镍矿常压浸出实验研究
..... 付中梦,郑宇,巩勤学,王杜,刘勇奇(167)
- 高钙型低品位铜矿酸性浸出动力学研究
..... 高昭伟,曹成超,李耀山,孔德鸿,唐大才,刘远,王铎泰(170)
- 煤基氢冶金绿色短流程制钢新工艺探索性试验研究
..... 张小兵,王明华,寇明月(174)
- 某硫铁矿烧渣的硫脲法浸金银研究 廖阳平,刘有才,朱忠泗(178)
- 含铜金精矿铅盐预处理浸金技术研究 李光胜(182)
- 功能化杯芳烃衍生物的合成及其萃取性能研究
..... 杜佳炜,曹佐英,李云辉,石浩文,张立涵,张贵清(185)

材 料

- 新型热机械处理对Al-Cu-Mg合金微观组织与综合性能的影响
..... 何俊龙,郑亚亚,任杰克,鲁成华,陈志国(189)
- 多向锻造变形和退火处理对AZ31镁合金微观组织和力学性能的影响
..... 聂志诚,张欣,刘筱(194)
- Ti₃C₂ MXene的制备及其电化学性能研究 李江鹏,张晓萍,伍凌(198)
- 激光熔覆工艺参数对高速钢涂层性能的影响
... 谭米雪,王臻,赵凤君,隋清莹,肖新宇,许淑溶,刘博,龚乐,刘军(202)
- PCBN车刀结构与切削用量的优化及试验研究
..... 邹娟,成照楠,邹芹,李艳国,罗永安,王明智,齐效文(207)
- 晶界特征对7020铝合金腐蚀行为的影响
..... 赵子林,唐建国,叶凌英,马文静,陈晓娇,古一(212)
- Cu/Mg比对Al-Cu-Mg-Ag合金耐腐蚀性能的影响
..... 颜鹏飞,刘志义,柏松,王建,赵娟刚,曹靖(218)
- 基于粒子群算法-模糊PID控制的前驱体材料反应釜pH值优化控制
..... 孙言谔,刘洋,刘飘,熊伟,邬青秀,李然,黄光耀(221)

期刊基本参数:CN43-1104/TD * 1981 * b * A4 * 225 * zh * P * ¥20.00 * 4000 * 53 * 2021-12

MINING AND METALLURGICAL ENGINEERING

(Bimonthly, Started in 1981)

Vol.41 No6 (Sum 202) December 2021

Responsible by

Changsha Research Institute of
Mining and Metallurgy Co Ltd

Sponsored by

Changsha Research Institute of
Mining and Metallurgy Co Ltd,
The Chinese Society for Metals

Edited and Published by

Mining & Metallurgical Engineering
Journal Publication (Changsha) Co Ltd

Chief Editor: ZENG Wei-yong

Deputy Editor: LIU Hong-ping

Editor: HUANG Xiao-fang

ZHOU Yang

Address: No966, Lushan South Road,

Changsha 410012, Hunan, PRC

Tel: (0731)88657070,88657176,88657173

Fax: (0731)88657186

Website: <http://www.kygczz.com>

E-mail: kuangyegongchengzz@163.com

Distributed by China International

Book Trading Corporation

(P.O.Box 399, Beijing, PRC)

International Distribution Code: Q4212

ISSN 0253-6099

万方数据
CN11-1104/TD

CONTENTS

MINING

- Experimental Study on Frost Heaving Pressure and Strength Variation of Single Crack Quasi-Sandstone Under Freeze-Thaw Process
..... LIU Yan-zhang, WANG Jin, YIN Dong, HE Ying-bo, GE Wei-jie, SHAN Liang(115)
- Attenuation Model and Isolation Effect of Blasting Vibration in Rock Site
... HE Meng, CHEN Jin, ZHANG Jia-zhao, WANG Hua-fu, XU Xiang-zong, LI He-long, ZHANG Jian-jing(120)
- Classification and Discrimination of Surrounding Rock of Tunnel Based on SVM of K-Fold Cross Validation
..... WANG Xue-qing, LIU Shuang, LI Qiu-yan, MA Kai-bin(126)
- Optimization of Mining Method and Stope Structure Parameters Based on FLAC^{3D}
..... LUO Lai-he, XIA Guo-jin, WANG Chen, ZHU Huo-tian(129)
- Dredging Performance of Airlift Pump
..... HU Dong, HE Li-yan, LIN An-yuan, TUO Lei, WANG Xia-guang(134)
- Underground Industrial Test of Paste Filling in Chambishi Copper Mine
..... LI Hui, XU Bin, JIAO Hua-zhe, CHEN Xin-ming, YANG Liu-hua(138)
- Experimental Study on Inserts Drawing Technique
..... WU Yu-xuan, TAO Gan-qiang, ZHANG Gan(141)

METALLURGY

- Preparation of High-Purity Graphite with Flotation Concentrate Using Improved Alkali-Acid Method
..... XIAO Xiao, LONG Yuan, LIU Yu, ZHANG Guo-wang, SHI Li, ZHAO Xiang(145)
- Experimental Study on Direct Reduction of Panzhihua's Pyrite Residue
..... LI Jun-han, SUN Ning(150)
- Research on Slag-Copper Equilibrium in Smelting of Waste Circuit Board Based on Coexistence Theory
..... YANG Bi-wen, LI Qiang, ZHANG Xiao-bing, WANG Lei, WANG Hai-bei(153)
- Mechanism for Reduction-Separation of Indonesia Iron Sand Intensified by Pre-oxidation Treatment
... HU Cheng-fei, YI Ling-yun, ZHANG Nan, XIAO Hua-rong, CAI Wei, HUANG Zhu-cheng(161)
- Experimental Study on Atmospheric Pressure Leaching of Lateritic Nickel Ore from Indonesia
..... FU Zhong-meng, ZHENG Yu, GONG Qin-xue, WANG Du, LIU Yong-qi(167)
- Leaching Kinetics of High-Calcium Low-Grade Copper Ore with Sulfuric Acid
... GAO Zhao-wei, CAO Cheng-chao, LI Yao-shan, KONG De-hong, TANG Da-cai, LIU Yuan, WANG Hua-tai(170)
- New Technology of Coal-Based Hydrogen Metallurgy for Green and Short-Flow Steelmaking
..... ZHANG Xiao-bing, WANG Ming-hua, KOU Ming-yue(174)
- Extraction of Gold and Silver from Pyrite Cinders by Thiourea Leaching
..... LIAO Yang-ping, LIU You-cai, ZHU Zhong-si(178)
- Pretreatment of Lead Salt in Copper-Bearing Gold Concentrate by Gold Leaching Technology
..... LI Guang-sheng(182)
- Synthesis and Extraction Behavior of Functionalized Calixarene Derivatives
... DU Jia-wei, CAO Zuo-ying, LI Yun-hui, SHI Hao-wen, ZHANG Li-han, ZHANG Gui-qing(185)

MATERIALS

- Effect of Novel Thermomechanical Treatment on Microstructure and Comprehensive Properties of Al-Cu-Mg Alloy ... HE Jun-long, ZHENG Ya-ya, REN Jie-ke, LU Cheng-hua, CHEN Zhi-guo(189)
- Effect of Multiple Forging and Annealing on Microstructure and Mechanical Properties of AZ31 Magnesium Alloy NIE Zhi-cheng, ZHANG Xin, LIU Xiao(194)
- Preparation and Electrochemical Properties of Ti₃C₂ MXene
..... LI Jiang-peng, ZHANG Xiao-ping, WU Ling(198)
- Effect of Process Parameters of Laser Cladding on High-Speed Steel Coating ... TAN Mi-xue, WANG Zhen, ZHAO Feng-jun, SUI Qing-xuan, XIAO Xin-yu, XU Shu-rong, LIU Bo, GONG Le, LIU Jun(202)
- Experimental Study on Optimization of Structure and Cutting Parameters of PCBN Turning Tool
... ZOU Juan, CHENG Zhao-nan, ZOU Qin, LI Yan-guo, LUO Yong-an, WANG Ming-zhi, QI Xiao-wen(207)
- Effect of Grain Boundary Characteristics on Corrosion Behavior of 7020 Aluminum Alloy
... ZHAO Zi-lin, TANG Jian-guo, YE Ling-ying, MA Wen-jing, CHEN Xiao-jiao, GU Yi(212)
- Effect of Cu/Mg Ratio on Corrosion Resistance of Al-Cu-Mg-Ag Alloy
... YAN Peng-fei, LIU Zhi-yi, BAI Song, WANG Jian, ZHAO Juan-gang, CAO Jing(218)
- pH Optimization for Precursor Reactor Based on Particle Swarm Optimization and Fuzzy PID Control
... SUN Yan-kai, LIU Yang, LIU Piao, XIONG Wei, WU Qing-xiu, LI Ran, HUANG Guang-yao(221)