



“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  
中国科技核心期刊  
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



**2**

2022年4月  
VOL 42

# 目次

## 采 矿

- 基于数值模拟的高压采场卸压方案研究 ..... 马春德,谭观霜,侯奎奎,谢伟斌,徐家庆(1)
- 地下开采转露天复采复杂采空区顶板厚度的研究 ..... 孙世国,邓王倩,刘维东,邵树森,肖 剑(5)
- 基于 Sea-thru 和 Mask R-CNN 的深海多金属结核图像处理 ..... 邓君兰,董澧辉,宋 伟,赵小兵,刘同木,庞云天(9)
- 庙岭金矿采空区混合强度充填方法研究 ..... 徐卫东,张永亮,陈晓利,杨 勇,吴 迪(14)
- 考虑温度影响的充填料浆水平管流特性研究 ..... 甘德清,常英杰,张友志,薛振林,刘志义(19)
- 嗣后充填多矿柱同时回采充填体侧向位移研究 ..... 张爱卿,李金云,吴爱祥,王贻明(24)
- 基于 SVR 的隧道掘进光面爆破效果预测模型 ..... 谢超群,李启月,刘玉丰,魏新傲,曾海登(28)
- 露天转地下房柱法开采扰动下采场稳定性研究 ..... 王孟来,李小双,王运敏,李启航(32)
- 作业工况及喷射方式对气举输出的影响 ..... 唐川林,庾 磊,王霞光,胡 东,王 舒,夏美丽(38)
- 基于 GA-BP 神经网络的采空区地表沉降预测模型 ..... 阳 俊,曾维伟(42)

## 选 矿

- 球磨-细筛回路循环负荷对某钨矿石磨矿产品粒度分布的影响 ..... 李瑞杰,李茂林,施 佳,崔 瑞(46)
- 离心选矿机重选回收细粒级钨锡矿物的试验研究 ..... 张 婷,李 平,冯 博,李振飞(51)
- 山东某铁矿提铁降硫试验研究 ..... 刘 旭,杨 晓,彭泽友(55)
- 某低品位钼矿浮选回收试验研究 ..... 宋 鑫,刘润清,陈 臣,张庆鹏,孙 伟,王长涛,翟启林(59)
- 胶磷矿预先脱泥-浮选试验研究 ..... 李 宁,刘润哲(63)
- 湖南某多金属矿钨锡同步浮选回收试验研究 ..... 付广钦,周晓彤,邓丽红,赵 刚,尚兴科(66)
- 新型捕收剂浮选山东某伴生铜矿试验研究 ..... 张立刚,欧阳崇钟,李文风(70)
- 江西某难选铜钼矿浮选试验研究 ..... 林清泉,戴智飞,曾令明,童佳诚,林智炜(73)
- 兰坪低品位天青石矿浮选工艺研究 ..... 张 茂(77)

## 冶 金

- 锂云母复合盐焙烧-水浸提取锂铷铯 ..... 朱 军,徐翌童,郭 梅,俞 娟,曹 欢(80)
- 剪切解络-超滤分离金属关键指标预测与验证 ..... 侯 奔,高 静,邱运仁,王春育(85)
- 氧化铝厂赤泥制备脱硫剂及其脱硫性能研究 ..... 张腾飞,康泽双,刘中凯,闫 琨,杨洪山(89)
- 2-膦酸丁烷-1,2,4-三羧酸用于稀土酸浸液络合沉淀除铝研究  
..... 龙光武,李金辉,温耀儒,褚宇航,刘晋彪,王瑞祥,徐志峰(93)
- 红土镍矿冶炼技术的全球专利信息分析 ..... 余海军,谢英豪,李爱霞(96)
- 砷碱渣/高砷铋烟尘协同脱砷及有价金属回收 ..... 王文祥,王晓阳,方红生,周裕高,苏秋琼(102)
- 高氯高铁型四氯化钛除钒尾渣焙烧提钒工艺研究 ..... 堵伟桐,姜丛翔,陈 卓,居殿春,徐玉松(106)
- 低品位氧化铜矿浸出液赤铁矿法除铁 ..... 王益昭,何贵香,付怀飞,潘彩健,蒋学先,范旷生(110)
- 湿法炼锌过程中纳米级二氧化硅除氟技术工艺研究 ..... 段良洪,郭远贵,刘 伟,王敏杰,曹文法,尹健夫(113)
- 冶炼烟尘中氟、氯、溴和碘测定方法研究 ..... 张晓娟,魏 伟,杨 林,符招弟(117)

## 材 料

- 太阳能电池钙钛矿材料模拟计算研究 ..... 李达耀,金成国,黄伟新(120)
- 挖掘机油齿用 40Cr 钢的半锻造余热淬火工艺研究 ..... 谢志勇,朱娟芬,李 鑫,张计谋,吴 进,赵明纯(125)
- 铜基合金水套综合热导率仿真分析 ..... 王志刚,王瑞祥,徐明明,张红亮(128)
- 轧制温度对大应变轧制 Al-4.5Cu-1.5Mg-0.1Sc 合金组织与性能的影响 ... 杨春洋,孙有平,何江美,翟传田,李旺珍(132)
- 基于 YOLO 网络的无酸除磷带钢表面缺陷实时检测 ..... 宋紫棋,毛桂庭,侯 奔(136)
- 预热对集装箱用异种铝合金管-板焊残余应力的影响 ..... 王新宇,章陈浩,王孟君(141)
- TiAl/不锈钢瞬时液相扩散连接接头界面组织及力学性能 ..... 王红亮,谢圣中,杨庆山,刘智雄(146)

# CONTENTS

## MINING

- Pressure Relief Scheme of High-Pressure Stope Based on Numerical Simulation  
..... MA Chun-de, TAN Guan-shuang, HOU Kui-kui, XIE Wei-bin, XU Jia-qing(1)
- Roof Thickness of Complex Goaf in Transition from Underground to Open-Pit Mining  
..... SUN Shi-guo, DENG Wang-qian, LIU Wei-dong, SHAO Shu-sen, XIAO Jian(5)
- Processing of Seabed Polymetallic Nodule Images Based on Sea-thru and Mask R-CNN  
..... DENG Jun-lan, DONG Li-hui, SONG Wei, ZHAO Xiao-bing, LIU Tong-mu, PANG Yun-tian(9)
- Backfilling with Different Strength for Mined-out Area in Miaoling Gold Mine  
..... XU Wei-dong, ZHANG Yong-liang, CHEN Xiao-li, YANG Yong, WU Di(14)
- Flow Characteristics of Backfilling Slurry in Horizontal Pipe Under Influence of Temperature  
..... GAN De-qing, CHANG Ying-jie, ZHANG You-zhi, XUE Zhen-lin, LIU Zhi-yi(19)
- Lateral Displacement of Backfill Body in Multiple Pillars Extraction After Cut and Fill Mining  
..... ZHANG Ai-qing, LI Jin-yun, WU Ai-xiang, WANG Yi-ming(24)
- Prediction Model of Smooth Blasting Effect in Tunnel Excavation Based on SVR  
..... XIE Chao-qun, LI Qi-yue, LIU Yu-feng, WEI Xin-ao, ZENG Hai-deng(28)
- Stope Stability Under Disturbance in Transition of Open-Pit to Underground Room and Pillar Mining  
..... WANG Meng-lai, LI Xiao-shuang, WANG Yun-ming, LI Qi-hang(32)
- Influence of Working Condition and Injection Mode on Air Lifting  
..... TANG Chuan-lin, TUO Lei, WANG Xia-guang, HU Dong, WANG Shu, XIA Mei-li(38)
- A Surface Subsidence Prediction Model for Underground Goafs Based on GA-BP Neural Network ... YANG Jun, ZENG Wei-wei(42)

## MINERAL PROCESSING

- Influence of Circulating Load in Ball Milling-Fine Screening Loop on Size Distribution of Tungsten Ore Grinding Product  
..... LI Rui-jie, LI Mao-lin, SHI Jia, CUI Rui(46)
- Application of Gravity Separation by Centrifugal Concentrator in Recovering Fine Tungsten-Tin Minerals  
..... ZHANG Ting, LI Ping, FENG Bo, LI Zhen-fei(51)
- Experimental Study on Iron Extraction and Sulfur Reduction for Iron Ore from Shandong Province  
..... LIU Xu, YANG Xiao, PENG Ze-you(55)
- Experimental Research on Flotation Recovery of Low-Grade Molybdenum Ore  
..... SONG Xin, LIU Run-qing, CHEN Chen, ZHANG Qing-peng, SUN Wei, WANG Chang-tao, ZHAI Qi-lin(59)
- Optimization of Pre-desliming and Flotation Flowsheet for Collophane Beneficiation ..... LI Ning, LIU Run-zhe(63)
- Synchronized Recovery of Tungsten and Tin Resources from Polymetallic Ore in Hunan  
..... FU Guang-qin, ZHOU Xiao-tong, DENG Li-hong, ZHAO Gang, SHANG Xing-ke(66)
- New Flotation Collector CYC-20 for Beneficiation of Associated Copper Minerals from a Shandong Iron Mine  
..... ZHANG Li-gang, OUYANG Chong-zhong, LI Wen-feng(70)
- Experimental Study on Flotation of Refractory Copper-Molybdenum Ore from Jiangxi  
..... LIN Qing-quan, DAI Zhi-fei, ZENG Ling-ming, TONG Jia-cheng, LIN Zhi-wei(73)
- Flotation Technique for Low-Grade Celestite Ore from Lanping ..... ZHANG Mao(77)

## METALLURGY

- Extraction of Lithium, Rubidium and Cesium from Lepidolite Using Composite Salt Roasting and Aqueous Leach Process  
..... ZHU Jun, XU Yi-tong, GUO Mei, YU Juan, CAO Huan(80)

- Prediction and Verification of Key Indexes of Metal Separation by Shearing Induced Decomplexation-Ultrafiltration  
 ..... HOU Ben, GAO Jing, QIU Yun-ren, WANG Chun-yu(85)
- Preparation and Performance of Desulfurizer from Red Mud of Alumina Plant  
 ..... ZHANG Teng-fei, KANG Ze-shuang, LIU Zhong-kai, YAN Kun, YANG Hong-shan(89)
- Aluminum Removal from Acid Leaching Solution of Rare Earth Ore by Complex Precipitation of 2-Phosphonobutane-1,2,4-Tricarboxylic Acid  
 ..... LONG Guang-wu, LI Jin-hui, WEN Yao-ru, CHU Yu-hang, LIU Jin-biao, WANG Rui-xiang, XU Zhi-feng(93)
- Analysis of Global Patent Information About Metallurgical Processing of Nickel Laterite  
 ..... YU Hai-jun, XIE Ying-hao, LI Ai-xia(96)
- Arsenic Removal and Valuable Metal Recovery from High Arsenic-and-Antimony Flue Dust by Using Arsenic-Alkali Residue  
 ..... WANG Wen-xiang, WANG Xiao-yang, FANG Hong-sheng, ZHOU Yu-gao, SU Qiu-qiong(102)
- Vanadium Extraction by Roasting from High Chlorine-and-Iron Titanium Tetrachloride Tailings After Vanadium Removal  
 ..... DU Wei-tong, JIANG Cong-xiang, CHEN Zhuo, JU Dian-chun, XU Yu-song(106)
- Iron Removal from Leach Solution of Low-Grade Copper Oxide Ore by Hematite Precipitation Process  
 ..... WANG Yi-zhao, HE Gui-xiang, FU Huai-fei, PAN Cai-jian, JIANG Xue-xian, FAN Kuang-sheng(110)
- Investigation of Fluorine Removal with Nanosilica During Zinc Hydrometallurgy Process  
 ..... DUAN Liang-hong, GUO Yuan-gui, LIU Wei, WANG Min-jie, CAO Wen-fa, YIN Jian-fu(113)
- Determination Method of Fluorine, Chlorine, Bromine and Iodine in Offgas Dust from Smelting Process  
 ..... ZHANG Xiao-juan, WEI Wei, YANG Lin, FU Zhao-di(117)

## MATERIALS

- Simulative Calculation of Perovskite Used for Solar Cells ..... LI Da-yao, JIN Cheng-guo, HUANG Wei-xin(120)
- Semi-forging-remnant-heat Quenching Technology for Excavator Dipper Teeth Produced from 40Cr Steel  
 ..... XIE Zhi-yong, ZHU Juan-fen, LI Xin, ZHANG Ji-mou, WU Jin, ZHAO Ming-chun(125)
- Simulation Analysis of Comprehensive Thermal Conductivity of Copper-Based Alloy Water Jacket  
 ..... WANG Zhi-gang, WANG Rui-xiang, XU Ming-ming, ZHANG Hong-liang(128)
- Effect of Temperature on Microstructure and Properties of Large-Strain Rolled Al-4.5Cu-1.5Mg-0.1Sc Alloy  
 ..... YANG Chun-yang, SUN You-ping, HE Jiang-mei, ZHAI Chuan-tian, LI Wang-zhen(132)
- Real-Time Detection of Surface Defects of Acid-Free Descaled Steel Strip Based on YOLO Network  
 ..... SONG Zi-qi, MAO Gui-ting, HOU Ben(136)
- Effect of Preheating on Residual Stress in Tube-to-Sheet Welding of Dissimilar Aluminum Alloy for Containers  
 ..... WANG Xin-yu, ZHANG Chen-hao, WANG Meng-jun(141)
- Interfacial Microstructure and Mechanical Properties of TiAl/Stainless Steel Transient Liquid Phase Diffusion Bonding Joints  
 ..... WANG Hong-liang, XIE Sheng-zhong, YANG Qing-shan, LIU Zhi-xiong(146)

## 中国知网版权声明

本刊已许可中国学术期刊(光盘版)电子杂志社在中国知网及其系列数据库产品中以数字化方式复制、汇编、发行、信息网络传播本刊全文。该社著作权使用费与本刊稿酬一并支付。作者向本刊提交文章发表的行为即视为同意本刊上述声明。