



“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

CN43-1104/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

**2**

2013  
VOL.33



# 矿冶工程

KUANGYE GONGCHENG

双月刊 公开发行人 1981 年创刊  
第 33 卷 第 2 期(总第 150 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  
协办单位: 国家金属矿产资源综合利用工程技术研究中心  
编辑出版: 《矿冶工程》杂志编辑部

## 《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  
高 宏  
广 告: 温倩仪  
编 务: 梅 芝

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

印 刷 者: 湖南竭诚印务有限公司  
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

刊 号: ISSN 0253-6099  
CN43-1104/TD

出版日期: 2013 年 04 月  
广告经营许可证: 湘工商广字 142 号  
广告代理: 北京志诚广域信息咨询中心  
(010)57892238, 57892239  
国内定价: 10.00 元

## 目 次

### 采 矿

- 三维矿岩崩落块度模拟技术在某铜矿中的应用  
..... 陈忠强, 王李管, 冯兴隆, 熊书敏, 刘 浪(1)
- 指数平滑法在基坑深层位移预测中的应用 ... 熊 莎, 贺跃光, 姬 方, 戴满蕾(5)
- 双竖直井开采美国沙漠峰深层地热数值模拟 ... 曾玉超, 苏 正, 吴能友, 王晓星(8)
- 基于极限平衡法与强度折减法的高边坡过程稳定性分析  
..... 罗根传, 胡庆国, 谭积青(14)
- 磷石膏再结晶体力学特性试验研究 ..... 高 洁, 赵国彦(18)
- 急倾斜复杂矿体采场结构参数优化研究 ..... 马元军, 胡毅夫, 吴伟伟(22)
- 采空区上方高速公路允许移动变形指标研究 ..... 贺跃光, 熊 莎, 吴盛才(27)
- 湘南地区高液限红粘土土性指标概率统计分析 ..... 蒋 鑫, 贺建清, 罗 婉(31)
- 基于投影寻踪自回归模型的一次爆破成井效果预测研究  
..... 范作鹏, 李启月, 徐 敏, 王卫华(36)

### 选 矿

- BP 系列捕收剂对氧化钨和脉石矿物浮选性能研究 ..... 刘建东, 孙 伟(40)
- 铜锌硫化矿浮选分离过程及动力学分析 ... 邱廷省, 邱仙辉, 尹艳芬, 匡敬忠(44)
- 高压浓密机在梅山尾矿浓缩中的应用 ..... 黄保平(48)
- 从锌冶炼渣中回收银的试验研究 ..... 黄汝杰, 谢建宏, 刘振辉(52)
- 新型阻垢剂阻垢性能及其应用研究 ..... 曾 娟, 余侃萍, 杨国超, 肖国光(56)
- 采用重-浮联合流程分离辉铋矿和黄铜矿的试验研究  
..... 李汉文, 胡 真, 汪 泰, 王成行, 宋宝旭, 邹坚坚(59)
- 昆钢转炉炉渣干式磁选抛尾精矿的湿式精选技术研究  
..... 白荣林, 屠建春, 徐晓军, 成 建, 业 超(63)
- 某鳞片状镜铁矿制备云母氧化铁颜料工艺研究 ..... 王全亮, 冯其明(67)
- 弓长岭某磁选厂工艺流程优化研究 ..... 陈中航, 赵通林, 陈广振(71)
- 复杂难选铜铅锌多金属矿石的选矿工艺技术改造与生产实践  
..... 唐志中, 李志伟, 宋翔宇(74)

### 冶 金

- 硝酸浸出失效催化剂提取银的实验研究  
... 范兴祥, 董海刚, 吴跃东, 付光强, 刘 杨, 赵家春, 吴晓峰, 管林寒, 李博捷, 童伟锋(78)
- 难选褐铁矿氯化离析焙烧-磁选研究 ..... 王在谦, 唐 云, 舒聪伟, 张 覃(81)
- 硫氰酸铵法提金工艺研究 ..... 宋岷蔚, 刘 菁, 俞海平(84)
- 含钒石煤富氧焙烧工艺研究 ..... 戴 曦, 吴永谦, 邹建辉, 陈田庄, 周康洁(88)
- 混合菌多样性分析及其浸出高砷金矿条件的优化  
..... 袁学武, 谢学辉, 范凤霞, 朱文祥, 刘 娜, 柳建设(91)
- 回转窑处理中低品位锰矿试验研究 ..... 郭永楠, 薛生晖, 黎红兵, 邹廷信(97)
- 氨法一步沉淀法制备碱式碳酸锌结晶行为特征  
..... 杨永斌, 张 鑫, 李 骞, 姜 涛, 白国华(101)
- 高效萃取剂 AD100 从粗硫酸镍溶液中回收铜的研究  
..... 吴 展, 李 伟, 陈志华, 宁 瑞(105)

### 材 料

- 热喷涂制备 MoSi<sub>2</sub> 高温结构材料的工艺研究  
..... 王 平, 熊 翔, 闵小兵, 谢 路, 王跃明, 朱元昌(108)
- 锂离子电池 Li<sub>2</sub>Ni<sub>x</sub>Mn<sub>1-x</sub>SiO<sub>4</sub> (x=0.4~0.7) 正极材料的电化学性能  
..... 胡传跃, 郭 军, 文 瑾(112)
- 微量元素铈对 Al-Li-Cu-Mg-Ag-Zr 合金强化和断裂机制的影响  
..... 余 成, 尹登峰(116)
- 锂离子电池正极材料镍钴锰酸锂中镍、钴、锰含量测定 ..... 徐金玲(120)

期刊基本参数: CN43-1104/TD \* 1981 \* b \* A4 \* 124 \* zh \* P \* ¥10.00 \* 4000 \* 31 \* 2013 - 04

# MINING AND METALLURGICAL ENGINEERING

(Bimonthly, Started in 1981)

Vol. 33 No2 (Sum 150) April 2013

Sponsored by THE CHINESE  
SOCIETY FOR METALS,  
CHANGSHA RESEARCH  
INSTITUTE OF MINING  
AND METALLURGY CO., LTD

Assisted by the NATIONAL  
ENGINEERING RESEARCH  
CENTRE FOR COMPREHENSIVE  
UTILIZATION MINERAL  
RESOURCES

Chief Editor: ZENG Wei-yong  
Subeditor: LIU Hong-ping  
Editor: HUANG Xiao-fang, GAO Hong  
Art Editor: WEN Qian-yi  
Assistant Editor: MEI Zhi

Edited and Published by  
Editorial Office of MINING  
AND METALLURGICAL  
ENGINEERING  
Address: No966, Lushan South Road,  
Changsha, Hunan 410012, China  
Tel: (0731) 88657176, 88657186, 88657070  
Fax: (0731) 88657186  
Website: <http://kygc.net>  
E-mail: [kuangyegongchengzz@163.com](mailto:kuangyegongchengzz@163.com)

Distributed by China International  
Book Trading Corporation  
(P. O. Box 399, Beijing, China)

Code No Q4212

Publication Code ISSN 0253-6099  
CN43-1104/TD

## CONTENTS

### MINING

- Application of 3D Simulation of Fragment Size in Block Caving in a Copper Mine  
..... CHEN Zhong-qiang, WANG Li-guan, FENG Xing-long, XIONG Shu-min, LIU Lang (1)
- Application of Exponential Smoothing to Prediction of Deep Displacement in Foundation Pit  
..... XIONG Sha, HE Yue-guang, JI Fang, DAI Xiao-lei (5)
- Numerical Simulation of Deep Geothermal Energy Mining by Two-vertical Wells System at Desert Peak Field, USA  
..... ZENG Yu-chao, SU Zheng, WU Neng-you, WANG Xiao-xing (8)
- Process Stability Analysis for High Slope Based on Limit Equilibrium Method and Strength Reduction Finite Element Method  
..... LUO Gen-zhuan, HU Qing-guo, TAN Ji-qing (14)
- Experimental Research on Mechanical Properties of Recrystallized Solid of Phosphogypsum  
..... GAO Jie, ZHAO Guo-yan (18)
- Optimization of Stope Structural Parameters of Steep Complex Deposit  
..... MA Yuan-jun, HU Yi-fu, WU Wei-wei (22)
- Studies on Indicators for Tolerable Displacement and Deformation of Expressway above Mined-out Area  
..... HE Yue-guang, XIONG Sha, WU Sheng-cai (27)
- Probability Statistic Analysis for Soil Properties Indexes of High Liquid Limit Red Clay in Southern Hunan  
..... JIANG Xin, HE Jian-qing, LUO Wan (31)
- Effect Prediction for Shaft Excavation by One Blasting Based on Projection Pursuit Auto-regression Model  
..... FANG Zuo-peng, LI Qi-yue, XU Min, WANG Wei-hua (36)

### MINERAL PROCESSING

- Influence of BP-series Collector on Flotation Performance of Molybdenum Oxide and Gangue Minerals  
..... LIU Jian-dong, SUN Wei (40)
- Process Study and Kinetics Analysis for Flotation Separation of Chalcopyrite and Sphalerite  
..... QIU Ting-sheng, QIU Xian-hui, YIN Yan-fen, KUANG Jing-zhong (44)
- Application of High Pressure Thickener in Meishan Mineral Processing Plant for Tailings Thickening  
..... HUANG Bao-ping (48)
- Experiential Study on Silver Recovery from Hydrometallurgical Zinc Residue  
..... HUANG Ru-jie, XIE Jian-hong, LIU Zhen-hui (52)
- Study on Scale-inhibition Performance and Application of Scale Inhibitor HD-1  
..... ZENG Juan, YU Kan-ping, YANG Guo-chao, XIAO Guo-guang (56)
- Experimental Investigation on Separating Bismuthinite and Pyrites with Combined Process of Gravity Separation and Flotation  
..... LI Han-wen, HU Zhen, WANG Tai, WANG Cheng-hang, SONG Bao-xu, ZOU Jian-jian (59)
- Wet Separation Technology for Dry Magnetic Separation Concentrate of Converter Slag from Kunming Iron and Steel Group  
..... BAI Rong-lin, TU Jian-chun, XU Xiao-jun, CHEN Jian, YE Chao (63)
- Technology for Preparation of Micaceous Iron Oxide Pigments from Scaly Specularite  
..... WANG Quan-liang, FENG Qi-ming (67)
- Study on Flowsheet Optimization for Some Magnetic Separation Plant in Gongchangling  
..... CHEN Zhong-hang, ZHAO Tong-lin, CHEN Guang-zhen (71)
- Beneficiation Techniques Optimization and Production Practice of Refractory Multimetallic Copper-Lead-Zinc Ore  
..... TANG Zhi-zhong, LI Zhi-wei, SONG Xiang-yu (74)

### METALLURGY

- Experimental Study on Extracting Silver by Leaching Spent Catalyst with Nitric Acid  
..... FAN Xing-xiang, DONG Hai-gang, WU Yue-dong, FU Guang-qiang, LIU Yang, ZHAO Jia-chen, WU Xiao-feng, ZAN Lin-han, LI Bo-jie, TONG Wei-feng (78)
- Study on Chloridizing Segregation Roasting-Magnetic Separation for Refractory Limonite  
..... WANG Zai-qian, TANG Yun, SHU Cong-wei, ZHANG Qin (81)
- Technical Study on Gold Extraction by Ammonium Thiocyanate  
..... SONG Min-wei, LIU Jing, YU Hai-ping (84)
- Study on Oxygen-enriched Air Roasting Process for Vanadium-bearing Stone Coal  
..... DAI Xi, WU Yong-qian, WU Jian-hui, CHEN Tian-zhuang, ZHOU Kang-jie (88)
- Biodiversity Analysis for Bacterial Mixture and Optimization of Leaching High Arsenic-Containing Gold Ores  
..... YUAN Xue-wu, XIE Xue-hui, FAN Feng-xia, ZHU Wen-xiang, LIU Na, LIU Jian-she (91)
- Experimental Study on Rotary Kiln for Processing Medium-and Low-grade Manganese Ore  
..... GUO Yong-nan, XUE Sheng-hui, LI Hong-bing, ZOU Ting-xin (97)
- Characteristics of Crystallization Behavior of Basic Zinc Carbonate in Preparation by Ammonia Process  
..... YANG Yong-bin, ZHANG Xin, LI Qian, JIANG Tao, BAI Guo-hua (101)
- Study on Recovering Copper from Crude Nickel Sulfate Solution with High Efficient Extractant AD100  
..... WU Zhan, LI Wei, CHEN Zhi-hua, NING Rui (105)

### MATERIALS

- Hot Spraying Technique for MoSi<sub>2</sub>-based High-temperature Structural Materials  
..... WANG Ping, XIONG Xiang, MIN Xiao-bing, XIE Lu, WANG Yue-ming, ZHU Yuan-chang (108)
- Electrochemical Performance of Li<sub>2</sub>Ni<sub>x</sub>Mn<sub>1-x</sub>SiO<sub>4</sub> (x = 0.4 ~ 0.7) Cathode Material for Lithium Ion Batteries  
..... HU Chuan-yue, GUO Jun, WEN Jin (112)
- Effects of Trace Ce on Strengthening and Fracture Mechanisms of Al-Li-Cu-Mg-Ag-Zr Alloy  
..... YU Cheng, YIN Deng-feng (116)
- Determination of Ni, Co and Mn Content in Li-ion Battery Cathode Material  
..... XU Jin-ling (120)