

ISSN 1006-706X

Volume 28 • Number 11 • November 2021



Journal of Iron and Steel Research International

钢铁研究学报(英文版)



中国钢研科技集团有限公司
CHINA IRON & STEEL RESEARCH INSTITUTE GROUP



Springer

万方数据

Journal of Iron and Steel Research International

Volume 28 · Number 11 · November 2021

REVIEW

A review on bath fluid flow stirring technologies in EAF steelmaking

L.Z. Yang · H. Hu · Z.S. Yang · B.T. Xue · Y.F. Guo · S. Wang 1341

SHORT COMMUNICATION

Strain rate sensitivity of a 1.5 GPa nanotwinned steel

R.D. Liu · Y.Z. Li · L. Lin · C.P. Huang · Z.H. Cao · M.X. Huang 1352

ORIGINAL PAPERS

Preparation of calcium ferrite by flue gas desulfurization gypsum

L.C. Liu · H.B. Zuo · W.G. Liu · Z.Q. Xu 1357

An efficient method for iron ore sintering with high-bed layer: double-layer sintering

Q. Zhong · H.B. Liu · L.P. Xu · X. Zhang · M.J. Rao · Z.W. Peng · G.H. Li · T. Jiang 1366

Phase stability of $\text{Fe}_{23}\text{Zr}_6$ and thermodynamic reassessment of Fe-Zr system

Z.T. Du · L. Zou · C.P. Guo · X.P. Ren · C.R. Li 1375

Physical and computational study of a novel submerged entry nozzle design for twin-roll casting process

M.G. Xu · M.Y. Zhu 1390

Heat transfer characteristics for double-jet in different flow regions on a thick plate

X.H. Tian · T.L. Fu · Z.D. Wang · G.D. Wang 1400

Effect of La on inclusions and fracture toughness of low-alloy ultra-high-strength 40CrNi2Si2MoVA steel

W. Gong · C. Wang · P.F. Wang · Z.H. Jiang · R. Wang · H.B. Li 1408

Investigation of reheat cracking susceptibility in CGHAZ of modified T23 steel

R.Y. Zhou · S.X. Li · L.H. Zhu · G.L. Zhai · M. Song 1417

Effect of isothermal temper embrittlement and subsequent hydrogen embrittlement on tensile properties of 2.25Cr-1Mo-0.25V base metal and welded metal

Z.P. Shen · W. Fu · L.R. Kong · H.H. Ma · X.H. He · X.C. Yu · C.Y. Zhou 1426

Oxidation damage and interfacial failure of dissimilar metal welds containing ferritic heat resistant steels

X.G. Li · Z.P. Cai · X. Chen · S.Q. Dong · W.H. Cai · Y. Zhang · S.L. Li · K.J. Li · S.S. Rui · J.L. Pan 1439

Modified artificial neural network model with an explicit expression to describe flow behavior and processing maps of Ti2AlNb-based superalloy

Y.Q. Fu · Q. Zhao · M.Q. Lv · Z.S. Cui 1451

Twinning induced remarkable strain hardening in a novel $\text{Fe}_{50}\text{Mn}_{20}\text{Cr}_{20}\text{Ni}_{10}$ medium entropy alloy

M.J. Qin · X. Jin · M. Zhang · H.J. Yang · J.W. Qiao 1463

Effect of vanadium content on microstructure and properties of in situ TiC reinforced $\text{V}_x\text{FeCoNiCu}$ multi-principal-element alloy matrix composites

C.L. Tu · X.D. Sun · J. Li · H.G. Zhu · X.D. Li 1471

Further articles can be found at link.springer.com

Indexed/abstracted in *Current contents (ISI)*, *Index Medicus/Medline*, *Chemical Abstracts*, *Bioscience Information Service (BIOSIS)*, *CAS*, *METADEX*, *INSPEC*, *Science Citation Index*, *Ei Compendex*

Instructions for Authors for *J. Iron Steel Res. Int.* are available at www.springer.com/42243

Journal of Iron and Steel Research International

Volume 28 · Number 11 · November 2021

EDITORIAL COMMITTEE

Honorary Editor-in-Chief

Rui-yu Yin (China)

Editor-in-Chief

Zhi-ling Tian (China)

Associate Editors-in-Chief

Han Dong (China)

Jian-xin Xie (China)

Xing-zhong Zhang (China)

Advisory Board

Hong-nian Cai (China)

Yong Gan (China)

Hai-zhou Wang (China)

Xi-shan Xie (China)

Zeng-yong Zhong (China)

Jing Zhu (China)

Director

Yuan-qi Wang (China)

Deputy Director

Yan-jing Shao (China)

EDITORIAL BOARD

Fujio Abe (Japan)

Visvalingam Balasubramanian (India)

Wolfgang Bleck (Germany)

Geoff Brooks (Australia)

Huan-tang Cai (USA)

Jian-chun Cao (China)

Dao-lun Chen (Canada)

Man-sheng Chu (China)

Yu-wen Cui (Spain)

Chen-hong Deng (China)

Hong-biao Dong (UK)

Jian-xin Dong (China)

Alan P Druschitz (USA)

Si-chen Du (Sweden)

Feng Fang (China)

Zhan-cheng Guo (China)

Ke Han (USA)

Xiao-xu Huang (China)

Qing Jiang (China)

Yong-lin Kang (China)

Hui-jun Li (Australia)

Jin-shan Li (China)

Sheng-li Li (China)

Wei Li (China)

Yong-chang Liu (China)

Hong-ming Long (China)

Xiao-gang Lu (China)

Xiong-gang Lu (China)

Alan A. Luo (USA)

Jia-ming Luo (China)

Zhi-ping Luo (USA)

Xue-wei Lv (China)

Han Ma (China)

Yong-lin Ma (China)

Xin-ping Mao (China)

Hiroyuki Matsuura (Japan)

Devesh Misra (USA)

Zuo-ren Nie (China)

Hiroshi Nogami (Japan)

Fu-sheng Pan (China)

Jun-wei Qiao (China)

Cheng-jia Shang (China)

Il Sohn (Korea)

Chang-jiang Song (China)

Prakash Srirangam (UK)

Kiet Tieu (Australia)

Cong Wang (China)

Fu-hui Wang (China)

Guo-dong Wang (China)

Shu-qi Wang (China)

Wan-lin Wang (China)

Xin-hua Wang (China)

Zhao-dong Wang (China)

Bryan Webler (USA)

Kai-ming Wu (China)

Ying Wu (China)

Zhi-dong Xiang (China)

Qing-yan Xu (China)

Wei Xu (China)

Ke Yang (China)

Zhi-gang Yang (China)

Man Yao (China)

Xiao-qin Zeng (China)

Qi-jie Zhai (China)

Ji Zhang (China)

Jie-yu Zhang (China)

Li-feng Zhang (China)

Yu-zhu Zhang (China)

Ming-yi Zheng (China)

Ke-chao Zhou (China)

Shao-xiong Zhou (China)

Miao-yong Zhu (China)

JOURNAL OF IRON AND STEEL RESEARCH INTERNATIONAL

(Monthly, Started in 1994)

Editor-in-Chief

Zhi-ling Tian

China Iron and Steel Association

Sponsored by

China Iron and Steel Research Institute Group

Edited and Published by

CISRI Boyuan Publishing Co., Ltd.

Printed by

No.76 Xueyuan Nanlu, Beijing 100081, China

Printed by

Beijing Kexin Printing Co., Ltd.

Domestic Distribution

Beijing Newspapers and Periodicals Distribution Bureau

China Post Group (Code: 82-767)

Abroad Distribution

China International Book Trading Corporation (M 1464)

Copyright © 2021

The Editorial Board of

JOURNAL OF IRON AND STEEL RESEARCH INTERNATIONAL

Domestic cost ¥100

Abroad cost \$100

ISSN 1006-706X

CN 11-3678/TF

ISSN 1006-706X



9 771006 706203

 Springer

万方数据