# Volume I

## TABLE OF CONTENTS

### COKEMAKING/ICSTI

**Coke Oven Battery Construction and State-of-the-Art Technology in Cokemaking**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction and Operation of NSSMC Kashima 1E Coke</td>
<td>1</td>
</tr>
<tr>
<td>Oven Battery</td>
<td></td>
</tr>
<tr>
<td>Satoshi Ishikawa, Kakunari Suzuki, Hideyuki Kunimasa, Yui Komai, Ryousuke Iki</td>
<td></td>
</tr>
<tr>
<td>Recent Experience in Commissioning Two Full Sets of Coke</td>
<td>10</td>
</tr>
<tr>
<td>Oven Machines: Plant Features and Project Organization</td>
<td></td>
</tr>
<tr>
<td>Giovanni Siri, Alessandro Molinari, Klaus Nowitzki</td>
<td></td>
</tr>
<tr>
<td>PT Krakatau POSCO's Gas Treatment Plant in Cilegon, Indonesia</td>
<td>19</td>
</tr>
<tr>
<td>Fabio Cerutti, Antonio Esposito, Björn Otten, Mario Petzsch</td>
<td></td>
</tr>
<tr>
<td>Evaluation of Coke Quality &amp; Its Impact on Blast Furnace Performance</td>
<td></td>
</tr>
<tr>
<td>Criteria to Evaluate Cokemaking Strategy for an Integrated Steel Plant</td>
<td>28</td>
</tr>
<tr>
<td>John Busser, M. Sukhram</td>
<td></td>
</tr>
</tbody>
</table>

---

**Fundamental Coke Kinetic Studies Using a Coke Analogue**

Apsara Jayasekara, Raymond Longbottom, Brian Monaghan

**Macrostrength and Pore Structure of Coke Subjected to Gasification and Annealing Under Blast Furnace Conditions**

Xing Xing, Harold Rogers, Guangqing Zhang, Paul Zulli, Oleg Ostrovski

**Micro-CT Analysis of Coke and Its Relationship to Coke Quality Indicators**

Hannah Lomas, David Jenkins, Merrick Mahoney, Richard Roest, Robin Pearce, Ron Li, Sheridan Mayo, Dadong Wang

**Evaluation of Coke Strength**

Philip Bennett, Adrian Reifenstein, Frank Shi

---

**Safety & Environmental Performances — The Two Core Values of Cokemaking**

**Quality and Classification of Metallurgical Coke**

Richard Pearson, David Pearson, HeeKyoung (Jackie) Park, Yuekan Jiao

**Investigation of Coking Behavior of Coals Using an Automated Plastometer**

Liming Lu, Alex Edenton, Qingbo Meng, Merrick Mahoney

**NFPA Combustible Dust Standards and Cokemaking — How These Regulations May Affect You**
Go To:

Determination of “End of Coking” in Byproduct Recovery
Cokemaking
Matthew Lumadue, Shiju Thomas, S.J. McKnight, Scott Pisula, Matthew DeLibero

Full-Scale Treatment of a Coke Oven Wastewater Using
Immersed Membrane Biological Reactor Technology
Art Kuljian, Jeff Penny, Joshua Harrison

Prolongation of the Life of a Coke Oven Battery — How to Protect the Asset
The Latest Developments on the EnviBAT™ Pressure Regulation System
Frank Krebber, Joanna Kühn-Gajdzik, Kerstin Überschär, F. Hegner, M. Diephaus

Laboratory Method for Coking Pressure Determination
Aleksander Sobolewski, Marek Sciazko, Bartosz Mertas

Development and Production of High-Density Silica for Coke Ovens
Stanislav Dvorak, Karel Lang, Leopold Vasica

Coke Oven Life Prolongation — A Multi-Disciplinary Approach
Jorge Madías, Mariano de Cordova

Predictive Model for Blending Coking Coals — Part 2: U.S. Coals
William Ross Leeder, Louis Giroux, Ted Todoschuk, Cameron Howey, Ka Wing Ng, Tony MacPhee

IRONMAKING/ICSTI

Ironmaking Modeling I — Prediction & Control
Stable Blast Furnace Operation by the Application of Predictive Process Models
Jan van der Stel, Hans Jak, Trevor Bell, James Raleigh, Tim Peeters, Kirill Andreev

Analysis of Transient Processes in Blast Furnace
Yakov Gordon, Nikolai Spirin, Vladimir Shvidkii, Yuriy Yaroshenko, Boris Bokovikov, Vitaliy Moikin, V.V. Lavrov

Development of Visualizing System of Blast Furnace Operation and Application to Operation
Atsushi Inayoshi, Shinroku Matsuzaki, Masahiro Itō

Improvement of Blast Furnace Performance by Applying a High-Efficiency Expert System
Go To:

General Mathematical Model of Adjusting Blast Volume of Blast Furnace Tuyeres
Yanglong Li, Shusen Cheng, Chuan Chen

Blast Furnace Operations I — Campaign Life & Productivity

ArcelorMittal Tubarão Blast Furnace #1 First Campaign: Historical Results, Main Issues on Its Reline, Technological Updates, First Results of Second Campaign and Perspectives
Claudio Cesar da Costa, Ernandes de Souza Belonia Filho, Luiz Wasem, Emerson Ribeiro, Salustiano Pinto Jr.

Cleveland No. 6 Blast Furnace Hearth Campaign Extension
D. (Frank) Huang, Marcelo Andrade, John Ricketts, Osama Hassen, Phillip Pergi, Dennis Cronin, Bruce Stackhouse

Longevity Technology Research and Practice of Baosteel No. 3 BF
Renliang Zhu, Guo Jun Sun, Chengcheng Lin

Operating Experiences at JSPL, BF-II (India) — Achieving Higher Performance Indicators With Inferior Raw Materials
Hemant Upadhyay, Arvind Kumar Bhagat

Sintering I

Chemistry, Structure and Quality of Iron Ore Sinter
Liming Lu, Natalie Ware, Sarath Hapugoda, Tirsha Raynlyn

Direct Reduction Ironmaking I — Use & Value of DRI

Economics and Value-in-Use of DRI in the USA

Strategies for Implementing Direct Reduction Technologies in an Integrated Steel Plant
Nishit Patel, Ian Cameron, Yakov Gordon

High-Carbon Hot DRI Production and Use: ENERGIRON Results and Performances in Operating Plants
Alessandro Martinis, Daniela Dalle Nogare, Annamaria Volpatti, Pablo Duarte

Ironmaking Raw Materials I

Trends in Ironmaking Given the New Reality of Iron Ore and Coal Resources
Jose Henrique Noldin Jr., Peter Schmöle, Hans Bodo Lüngen

Fundamentals of Iron Ore Concentrate Agglomeration Using Alternative Binders
Joseph Halt, S. Komar Kawatra

Effect of Olivine Fineness and Thermal Profile on Oxidation-Sintering of Magnetite Concentrate Pellets
Hesham Ahmed, Charlotte Andersson, Bo Björkman

Effects of Gangue Minerals and Temperature on Reduction Behavior of Fe₂O₃ Using Coke as a Reductant
Peng Gao, Guofeng Li, Yuexin Han, Yongsheng Sun

Innovation and Application on Pelletizing Technology of Large Traveling Grate Induration Machine
Fuming Zhang, Qusheng Wang, Zhiguo Han

Blast Furnace Operations II
Go To:
*top

Stuart J. Street

Innovative and Safety-Oriented Approach to Blast Furnace 426
Revival From Chilled Hearth
  Fabio Cravino, Cristiano Cristiano, Claudio Di Pietro, Maurizio Bastieri

Blast Furnace Banking and Blowdown: A Theoretical and 435
Practical Approach to Preparing for an Extended Outage and Start-Up
  Michael Alter, Charles McGovern, Douglas White, Mateusz Kus

Consequences of Heat Loss in the Lower Furnace 445
  Roman Vaynshtein, Victor van Straaten

Sintering II

Replacement and Start-Up of New Third Hot Stove for 450
Kokura No. 2 Blast Furnace
  Toshiaki Kojima, Takeshi Taniguchi, Akihiro Ishikawa, Takayuki Umesaki

Assimilation Behavior of CaO Source in the Sintering Process 457
  Chishiro Funada, Jun Okazaki, Daisuke Ikeuchi

On-Line Conveyor Belt Elemental Analyzer for Sinter Feed 465
Chemistry Control
  Kevin Gordon, Garry Noble, Mick Stuckings

Evaluation of Hydration Characteristics of the Lime Used for 471
Iron Ore Sintering Based on the Constant-Temperature Calorimetric Method

Characterization of Wetting Behavior Between Calcium 481
Ferrite Series Melts and Al₂O₃, MgO Substrate
  Xuewei Lv, Bin Yu, Shenglin Xiang, Chenguang Bai, Jiaqing Yin

Direct Reduction Ironmaking II — Gas-Based DRI

Developing the MIDREX® Direct Reduction Process — 493
Technological Innovations and Process Enhancements
  Henry Gaines, Vincent Chevrier, Christopher Ravenscroft

The Effect of High Operating Pressure in ENERGIRON 504
Reactor Design on Performance and in Reactor Productivity
  Jorge Martinez, Joel Morales, Pablo Duarte, Alessandro Martinis

Status and Start-Up of United Steel Co. (SULB) MIDREX® 514
Combination CDRI/HDRI Plant
  L. Ames, Henry Gaines, Christopher Ravenscroft

Performance of the New Alloys in Direct Reduction Processes 521
  Luis Humberto Quaranta, Pedro Imizcoz, Pablo Cardin

A Novel Test of Catalyst Activity 528
  Elaine Chen, George Tsvik

Micro-Module: The Optimum Approach for Small-Scale 536
ENERGIRON DR Plants
  Joel Morales, Pablo Duarte, Angelo Manenti

Ironmaking Environmental Developments II

Optimal Method for Renewal Sintering Exhaust-Gas 547
Go To:

Interaction Between Injected Waste Plastics and Coke Bed in the Blast Furnace  
Alexander Babich, Dieter Senk, Sebastian Benkert

Bernard Vanderheiden, Frédéric van Loo, Cécile Mathy, Jean-Christophe Pierret

Analysis of Influencing Factors of the Carbon Content of the Blast Furnace Offgas Dust  
Jian Sun, Hui Chen, Jian-long Wu

Ironmaking Raw Materials II  
Stockhouse-Based De-Icing, Drying and Pre-Heating of Coke and Pellets  
Roman Vaynshteyn, Peter Verbraak

Ironmaking Increase of the Sinter Basicity Through the Insertion of Partially Inert Magnesium Silicate Mini Lumps With Mineralogically Stable Interphases  
Enrique Somolinos, Estaban Ruisanchez, Javier Martinez, Cristina Escudero

Chemistry vs. Morphology vs. Reducibility — Some (Non-) Existing Correlations  
Martina Hanel, Johannes Schenk, Heinrich Mali, Christoph Thaler, Franz Hauzenberger, Birgit Kain-Bückner, Hugo Stocker

Effect of Simulant Ash on Wetting Behavior of Liquid Iron

Yano, Takayuki Maeda, Kazuya Kunitomo

Studying the Sintering Behavior of Oxidized Magnetite Pellet During Induration  
Telkicherla Kamesh Sandeep Kumar, Neelakantan Nurni Viswanathan, Hesham Ahmed, Charlotte Andersson, Bo Björkman

Reason Analysis of the Low Reduction Index of North African Lump  
Xu Meng, Ze-jun Ma, Jian Sun, Hui Chen

Ironmaking Energy Studies

Carbonization of Coal and Wood and Rate Enhancement  
Effect of Semi-Char and Semi-Charcoal in Composite Pellets  
Tateo Usui, Hirokazu Konishi, Kazuhiro Ichikawa, Francisco B. Pena, Matheus Souza, Alexandre Xavier, Paulo Assis

Development of Nut Coke Activation for Energy-Efficient Blast Furnace Operation  
Maria Lundgren, Lena Sundqvist Ökvist, Carina Brandell

Economical Feasibility of the Use of Biogas in Iron- and Steelmaking  
Kerly Oliveira Calixto, Máximo Eleotério Martins, Paulo Santos Assis, Isabela Filardi Vasques, Marco Túlio Prado

Natural Gas in Ironmaking: On the Use of DRI and LRI in the Blast Furnace Process  
Jorge Gibson, P. Chris Pistorius
Go To:

Primary Slags Formation Behaviors of Pellets in Cohesive Zone of Blast Furnace

Shengli Wu, Xintiang Liu, Mingyin Kou, Jinming Zhu, Kaifa Zhang, Wei Huang

Influence of MgO, Al₂O₃ and CaO/SiO₂ on Viscosity of Blast Furnace-Type Slag

Xuewei Ly, Jie Zhang, Zhiming Yan, Chenguang Bai

Research on Blast Furnace Operation With High-Alumina Slag in Meishan Steel

Hong Song Han, Fengman Shen, Zhenghao Zhang, Xin Jiang, Liaoasha Li

Theoretical Analysis of Al₂O₃ Behaviors in Blast Furnace

Haiyan Zheng, Fengman Shen, Xin Jiang, Guo Wei, Yansong Shen, Xiulin Wen

Blast Furnace Cohesive Zone

Experimental Analysis of the Interfacial Wetting Phenomena Between Slag and Coke Surface Under Simulated Conditions of the Blast Region of Blast Furnace

Anrin Bhattacharyya, Johannes Schenk, Gregor Arth, Hugo Stocker, Christoph Thaler

Influence of Burden Softening and Melting Properties on Cohesive Zone Shape and Gas Flow in Blast Furnace

Guolei Zhao, Shusen Cheng, Jun Zhao, Yanglong Li, Chao Li

Wettability of Graphite Substrates Against Molten CaO-SiO₂

Nakashima

Direct Reduction Ironmaking III — DRI Raw Materials

Characterization of DR Pellets for DRI Applications

Bodil Elisabeth Monsen, Edith Thomassen, Irene Bragstad, Eli Ringdalen, Per Helge Hoegaas

DR Grade Pellet Quality and Supply

Joseph J. Poveromo

Simultaneous Metallization and DRI Carburization Kinetics in DR Shaft Furnaces

Jose Carlos D'Abreu, Helio Marques Kohler, Mauricio Marcos Otaviano, Edelink Efrain Tinoco Falero

Economical Flux Addition in the Pellet Plant, DR and EAF Production Stream

Marka Okrutny, Janice Bolen

Blast Furnace Equipment & Maintenance I — Staves

ArcelorMittal IH-7 Blast Furnace Stave Circuit Failure Remediation Techniques

James Bobek, Sergey Trenkinshu, Donald Zuke, Travis Langdon

Thermal Deformation and Stress Analysis of Blast Furnace Copper Stave

Qi Liu, Shusen Cheng, Yanglong Li, Jianping Niu, Dongdong Liu
Go To:

Ho Jun Yoon, Won Seok Choi

Reduction Phenomena

Effects of CaO/ CaCO$_3$ on the Carbothermic Reduction of Titanomagnetite Ores

$\text{Sungmo Jung, Eungssoo Choi}$

Effect of Hydrogen-Enriched Gas on Reduction-Disintegration and Reducibility of Sinter

$\text{Xin Jiang, Fengman Shen, Lin Wang, Chengyu Yang, Haiyan Zheng, Guo Wei, Qingfeng Tan}$

Density Functional Theory Study on the Interaction Mechanism of CO and FeO Surface

$\text{Hong Zhong, Liangying Wen, Chong Zou, Jian Xu, Jiajia Tu}$

Kinetics of Phosphorus Migration During Coal-Based Reduction of Phosphorus-Containing Oolitic Iron Ore

$\text{Yuexin Han, Zhihang Li, Peng Gao, Yongsheng Sun}$

Blast Furnace Hearth

The End of Carbonaceous Blast Furnace Hearth Workings

$\text{Albert J. Dzermajko}$

A CFD Model for Estimating Refractory Erosion and Skull Buildup in the Blast Furnace Hearth

$\text{Lei Shao, Seppo Louhenkilpi, Zong-shu Zou, Henrik Saxén, Shan Yu}$

Go To:

Zhang Jianliang, Kexin Jiao, Liu Zhengjian, Yang Tianjun, Ning Xiaojun, Liang Lisheng

Research and Application on Temperature Distribution Control Technology of Blast Furnace Hearth and Bottom

$\text{Fuming Zhang, Shusen Cheng, Hongbo Zhao}$

Migration of Erosion and Relationship Between Bottom and Hearth Temperature of Blast Furnace

$\text{Yanglong Li, Peng Zhang, Shusen Cheng, Jianmin Gao}$

Blast Furnace Injection

Coal-Gas Co-Injection in Blast Furnaces: Are There Hidden Benefits?

$\text{Maarten Geerdes}$

Transport Behavior Characterization of Pulverized Coal for Blast Furnace

$\text{Pramod Kumar Gupta, Herve Pierret, Eric Hess, Jean-Louis Eymond, Guillaume Lesoin, Alain Daelman, Sami Alex Zaimi, Jean Louis Lebronvallet, Denis Vogt}$

Evaluation of PCI Coals in New Injection Facility at CanmetENERGY–Ottawa

$\text{Shamik Ray, Ka Wing Ng, Louis Giroux, Tony MacPhee, Ted Todroschuk}$

Combined Blast and Supplemental Fuel Injection Is the Major Way to Improve the Energy Efficiency of Blast Furnace

$\text{Yakov Gordon, Nikolai Spirin, Vladimir Shvidkii, Yuly Yaroshenko}$
Go To:
^top

Xianglong Meng, Fuming Zhang, Weiqiao Wang, Lin Li,
Jianhua Dai

Direct Reduction Ironmaking IV — Coal-Based DRI

Coal Gasification-Based DRI Production: Start-Up and
Operation of JSPL’s Angul I MXCOL® DRI Plant
Thomas Wieslaw, G Hughes

DRI Production Using Coke Oven Gas (COG): Results of the
MIDREX® Thermal Reactor System™ (TRS®) Testing and Future
Commercial Application
Gary Metius, Henry Gaines, Michael Riley, Lawrence E. Bool
III, Bradley Damstedt

The Physics Simulation Research for Baosteel Corex
Reduction Shaft
Mingyin Kou, Xiaoming Mao, Haifa Xu, Jinming Zhu, Wanren Xu

Investigation Into the Reduction Behavior of Iron Ore Fines
in Multi-Stages Fluidized Bed Reactor
Hyun-Soo Kim, Chang Kuk Ko, Min Young Cho

Ironmaking Raw Materials III — Flux

Proper Methods of Adding MgO-Bearing Flux in Blast
Furnace Process
Fengman Shen, Qiulin Wen, Xin Jiang, Haiyan Zheng,
Qiangjian Gao, Yupen Hu, Guo Wei, Yansong Shen, Lin Wang

Increasing the Value-in-Use of Magnesium Silicate Fluxes:
Javier Martinez

Effect of Flux Addition From Furnace Top on Blast Furnace
Operation in Meishan Steel
Hong Song Han, Fengman Shen, Zhenghao Zhang, Xin Jiang

Study on the Modification and Crystallization Behaviors of
Blast Furnace Smelt Slag for Mineral Fiber Material
Jie Li, Kai Zhao, Yu-zhu Zhang, Weixing Liu, Jun Guo Li

Ironmaking Modeling II — Process Studies

Use of Artificial Neural Network in Determination of Bed
Permeability During Drying Stage of Iron Ore Pellets
Marcelo Chagas, Marcelo Lucas Pereira Machado, João
Batista Conti, Eduardo Frigini Frigini

Fundamental Analysis of Passing Behavior of Powder
Particle Through Packed Bed by DEM
Hiroshi Nogami, Masahiro Fukuda, Takaumi Honda, Jun
Suzuki, H Kawai

The Effect of Burden Distribution Modes on Gas
Distributions Inside COREX Shaft Furnace by Numerical Simulation
Mingyin Kou, Shengli Wu, Wei Shen, Kaiping Du, Zhekai
Zhang, Feng Chang, Jinming Zhu

DEM Simulation of Particle Size Segregation of Binary
Particle Mixtures in a Quasi-2D Model
Zhaoxun Hu, Dongdong Wang, Fuiliang Guo, Chen Chen, Jian
Xu, Chenguang Bai
Blast Furnace Equipment & Maintenance II — Burden Distribution

Improvement of a Bell-Less-Type Charging System for
1069
Lower Coke Ratio, CR, Operation at the Blast Furnace
Takafumi Otomo

Effect of Conveyor Angle on Particle Size Segregation in
1079
Parallel-Hopper Bell-Less Top by Discrete Element Method
Chao Li, Shusen Cheng, Guolei Zhao, Yanglong Li, Jun Zhao

Innovations in Blast Furnace Charging
1089
Peter Whitfield, Joseph Saxiner, Al Colucci

On-Line Laser Detector for BF Burden Surface Profile Measurement
1097
Zhengkai Gao, Jianhua Dai, Jianliang Zhang, Jiyi Luan, Jinguang Lu, Tai Gao, Xin Yang

Investments Facilitating Ironmaking at Reduced Cost
1107
David Berdusco, Lionel Hauserer, Philippe Bermes, Fabrice Hansen, Paul Tockert, Steffen Köhler, Ben Muller

Alternate Ironmaking & Resource Recovery

Hlsarna — Highly Energy-Efficient Ironmaking
1116
Koen Meijer, Jean Borlée, Michael Skorianz, Christoph Feilmayr, Paul Goedert, Rod Dry

A New Process of Oxidation Roasting-Gas-Based Direct
1123

Mansheng Chu, Jue Tang, Zhenggen Liu, Cong Feng, Y.T. Tang, X.X. Xue

Application on HIsmelting Smelting Reduction Process in China
Xianglong Meng, Lin Li, Fuming Zhang, Chaozhen Cao

Reduction Roasting of Boron-Bearing Iron Concentrate for Boron and Iron Recovery
Peng Gao, Jianwen Yu, Yuexin Han, Xinchao Wei, Yongsheng Sun

Electrowinning of Iron From Waste Solutions
1162
Timothy Eisele

Ironmaking Raw Materials IV — Composite Pellets

Effect of Heating Condition on Carbothermic Reduction
1166
Behavior of Coal-Containing Composite Pellets Packed in Tall Bed
Tsung-Yen Huang, Shih-Hsien Liu, Gang-Herng Shiao

Melting Acceleration of Iron Ore Composite Using Two Kinds of Carbonaceous Materials
Taichi Murakami, Kanae Owaki, Eiki Kasai

Effects of Coke Mixed Charging Ratio on Softening-Dripping Performance of Vanadium-Titum Mixed Burden Smelted in Blast Furnace
Mansheng Chu, Zhenggen Liu, Jue Tang, Siyuan Wang, X.J. Fu, Z. Wang

Comprehensive Utilization of Boron-Bearing Iron
1193
Blast Furnace Operating Improvements

Perspective and Challenges of Ironmaking in China
Yongzhi Sha, Jun Cao

A Numerical Study of Oxygen Blast Furnace Operation
Mikko Helle, Henrik Saxen

The Pilot Expert System to Control Blast Furnace Operation
Yakov Gordon, Nikolai Spirin, Vladislav Lavrov, Larisa Gileva, Yu. Yaroshenko

Technological Progress and Prospect of 5,500-m³ Blast Furnace in Shougang Group
Hui Chen, Wei-dong Zhang, Jian-long Wu, Bo-cheng Ren Yi, He-shun Zhang, Li-jun Ren

The Cause and Countermeasures of BF Blowpipe Burnout at Tangsteel of HBIS
Zhengkai Gao, Jun Zhao, Yonglong Jin, Jianliang Zhang, Yong Gao, Xin Yang

Ironmaking Poster Session

Technological Improvements to Increase Intensity of
Go To: top

Mingyin Kou, Kaiping Du, Shengli Wu, Zhekai Zhang, Feng Chang, Xinliang Liu

Reaction Characteristics of Carbothermic Reduction With Tall Pellets Bed

Research on Metallurgical Properties of Different Types of Titanium Resources
Jianlong Wu, Hui Chen, Zejun Ma, Jian Sun, Hai-long Liang

Effect of SiO₂ on the Compressive Strength and Hot Abrasion Resistance of Self-Reducing Pellets Bonded With Portland Cement
Alberto Eloy Anduze Nogueira, Cyro Takano, Marcelo Breda Mourão, Adolfo Pillihuaman Zambrano

Research on Gas-Solid Reduction Reaction Characteristics of Packed Bed in COREX Melter Gasifier
Shengli Wu, Zhekai Zhang, Mingyin Kou, Hua Lu, Liyuan Chen, Kaiping Du

Effect of Coke Breeze Distribution on Coke Combustion Rate of the Quasi-Particle
Hiroshi Ogi, Takayuki Maeda, Ko-ichiro Ohno, Kazuya Kunitomo

Analysis of the Carbon-Saving Potential for Blast Furnace With the Injection of the Gas Made From Coal

Effect of Mill Scale Adding Methods on NOx Emission of Coke Combustion During Iron Ore Sintering
Bo Su, Zhigang Que, Shengli Wu, Guoliang Zhang, Chaogang Hou

Influence of Chemical Compositions on Liquid Fluidity of Ferrite
Bo Su, Shengli Wu, Wei Huang, Ji-Cheng Bei, Juan Zhu

Research on Pelletizing Dynamics of Iron and Steel Plant Metallurgical Dust
Mingyin Kou, Shengli Wu, Hua Lu, Feng Chang, Kaiping Du, Hong Li

Analysis of Influencing Factors on Silicon Content in Hot Metal From COREX Process
Mingyin Kou, Shengli Wu, Yao Jiang, Wei Shen, Kaiping Du

Ironmaking Across the Globe

Ironmaking in North America
Louis W. Lherbier Jr., John A. Ricketts

Developments in Ironmaking in South America
Jorge Luiz Ribeiro de Oliveira, Francisco Coutinho Dornelas, Erick Torres Bispo dos Santos, Jorge Adelino de Faria, Edson Luiz Massonori Harano

Current Status and Future Perspective of Japanese Ironmaking Technology for Environmental Solution
Koji Saito, S. Nomura
Ironmaking in Western Europe — Status Quo and Future Trends

Hans Bodo Luengen, Michael Peters, Peter Schmöle

Ironmaking in South Korea — Beyond the Blast Furnace

Hoo-Guen Lee, Sang-Ho Yi

Ironmaking Environmental Developments I

Effect of Lime Coating Coke on Decreasing NOx Emission From Sintering Process

Masaru Matsumura, Kazuaki Kato, Shunji Kasama, Kenji Sato

Influence of Iron Ores on the NOx Emission of Coke Combustion in the Sintering Process

Yongzhong Zhang, Shengli Wu, Guoliang Zhang, Zhigang Que, Li Zhang

The Design and Operation of a Dust Tower for Studying the Dustiness of Raw Materials for Ironmaking

Joseph Halt, S. Komar Kawatra

Injecting Different Types of Biomass to the Blast Furnace and Their Impacts on the CO2 Emission Reduction

Jan-Olov Wikström, Chuan Wang, Pelle Mellin, Leif Nilsson, Jonas Lövgren, Mikael Larsson

Ironmaking/Computer Modeling

Armin Silaen, Tyamo Okosun, Yan Chen, Bin Wu, Jiaqi Zhao, Yongfu Zhao, John D'Alessio, Jerry Capo, Chenn Q. Zhou

Multi-Phase Flow Simulation in Blast Furnace by MPS-SMAC Coupling Model

Tatsuya Kon, Shigeru Ueda, Nobuhiro Maruoka, Hiroshi Nogami

Optimized Blast Furnaces Operation With Integrated Burden Control

Martin Schaler, Harald Frütschel, Thomas Kronberger, Bernhard Schürz

Numerical Analysis of Injection of Liquid Hydrocarbons, Processed Waste Plastics and Pulverized Coal Into Blast Furnace Raceways

Christian Maier, Christian Jordan, Christoph Feilmayr, Christoph Thaler, Michael Harasek

Investigation of Co-Injection of Natural Gas and Pulverized Coal in a Blast Furnace

Tyamo Okosun, Stuart J. Street, Yan Chen, Jiaqi Zhao, Bin Wu, Chenn Q. Zhou

Drain Rate and Liquid Level Simulation in Blast Furnace Hearth

Hemant Upadhyay, Tarun Kumar Kundu