

**"Tetsu-to-Hagané" Vol. 73 No. 15, November, 1987**

**Special Issue on "Advancement and Extension of Ironmaking Technology"**

**Contents**

**Contributing to the Special Issue on "Advancement and Extension of Ironmaking Technology"**

- [Foreword] ..... Y. OMORI...1803
- Looking Back upon the Past 30 Years of Progress in Ironmaking Technology [Letter] ..... S. TAMURA...1805
- Waste Energy Recovery in Ironmaking Processes [Commentary] ..... H. YOSHIDA and J. KONISHI...1808
- Fluidized Bed Combustion Technology of Peat [Commentary] ..... H. HOSODA and T. HIRAMA...1818
- Present Status and Future Requirements on the Hot Dry Rock Power Generation Techniques [Commentary]  
..... H. HAYAMIZU...1826
- Current Situation and Characteristics of Steel Industries in South East Asia [Commentary] ... H. TODA...1835

**Coke**

- Coal Preparation Techniques for Coke Making [Commentary] ..... T. OKUHARA...1846
- Intraparticle Gaseous Diffusion through Coke and Its Pulverization during Oxidation with Carbon Dioxide  
[Commentary] ..... Y. SHIGENO and Y. OMORI...1853
- Model for Estimating Coke Porosity Distribution Based on X-ray Computerized Tomogram  
in Coke Oven [Technical Paper] ..... K. SHIRAIISHI, Y. SAKURAI and M. SAKAWA...1861
- Deterioration of Coke Strength by CO<sub>2</sub> Gasification at High Temperature [Technical Paper]  
..... T. NISHI, H. HARAGUCHI and T. OKUHARA...1869
- Thermal Deterioration of Metallurgical Coke [Technical Paper]  
..... Y. OKUYAMA, T. SHIODE, S. SATO and A. KURUMADA...1877

**Sinter**

- Effect of SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> Additions on the Reduction and Resultant Expansion of Synthesized Materials in  
the Vicinity of CaO·2Fe<sub>2</sub>O<sub>3</sub> Composition [Technical Paper] ..... N. TAGUCHI, T. OTOMO and K. TASAKA...1885
- Formation Mechanism of Acicular Calcium Ferrite of Iron Ore Sinter [Technical Paper]  
..... Y. HIDA, J. OKAZAKI, K. ITOH and M. SASAKI...1893
- Measurement of Macro Strain in the Course of Reduction of the Skeletal Hematite in Sinter  
[Technical Paper] ..... M. ASADA, M. SHIMA and Y. OMORI...1901
- Immersion Treatment of Sinter into CaCl<sub>2</sub> Aqueous Solution [Technical Report]  
..... N. TAGUCHI, T. OTOMO, K. TASAKA and Y. OMORI...1909
- Effect of Use of Preheated Air and Pretreatment of Raw Mix on Iron Ores Sintering [Technical Paper]  
..... N. TAGUCHI, T. OTOMO, K. TASAKA and Y. OMORI...1916
- Microstructure and Reduction Properties of Sinter Agglomerates by Two Separate Granules with  
CaO [Technical Paper] ..... T. KAWAGUCHI, K. KURIYAMA, S. SATO and K. TAKATA...1924
- Basic Designs and Determinations of Optimum Operating Conditions of Pelletizers for Sinter Raw  
Mixture [Technical Paper] ..... S. SUZUKI, K. SATO and M. FUJIMOTO...1932
- Development and Application of an Integrated Simulation Model for Iron Ore Sintering [Technical Paper]  
..... T. KAWAGUCHI, S. SATO and K. TAKATA...1940
- Development of Approximate Simulation Model Aiming at Fast Evaluation of Sintering Process  
[Technical Paper] ..... M. WAJIMA and H. SOMA...1948

**Blast Furnace Phenomena**

- Kinetic Analysis on the Rate of Stepwise Reduction of a Single Sinter with CO-CO<sub>2</sub>-N<sub>2</sub> Gas Mixture  
[Technical Paper] ..... T. USUI, M. OHMI, S. HIRASHIMA and N. KITAGAWA...1956
- Reduction Degradation Behavior of Sinter in the Blast Furnace Shaft [Technical Paper]  
..... R. NAKAJIMA, T. SUMIGAMA, K. WAKIMOTO, S. NAGANO, H. KAWATA and M. SAKURAI...1964

- Rheological Property of Petroleum Coke-Oil Slurry for Injecting into a Blast Furnace [Technical Paper]  
 ..... *M. DEGUCHI, S. SASAHARA, T. KASAI, K. TANAKA and S. TAMURA*...1972
- Desirable Blast Velocity from the View Point of Fine Coke Deposit around Blast Furnace Raceway  
 [Technical Paper] ..... *K. TAMURA, M. ICHIDA, H. WAKIMOTO, K. ONO and Y. HAYASHI*...1980
- Desiliconization Reaction of Pig Iron with MnO Containing Blast Furnace Slag under Pressurized  
 and Coke-coexisting Condition [Technical Paper]  
 ..... *C. YAMAGATA, Y. KAJIWARA and S. SUYAMA*...1988
- Solids Flow in a Blast Furnace under Circumferential Imbalance Conditions [Technical Paper]  
 ..... *M. SHIMIZU, Y. KIMURA, M. ISOBE, C. CHE and S. INABA*...1996
- Heat Transfer and Metallurgical Reaction of Iron Ore Fines Injected into Raceway of a Small-scale Hot  
 Furnace [Technical Paper] ..... *Y. KONISHI, K. TAKEDA, S. TAGUCHI and T. HAMADA*...2004
- Estimation of Coke Degradation in the Blast Furnace Considering the Strength Distribution in the Lumpy  
 Coke by Solution Loss Reaction [Technical Paper]  
 ..... *T. KAMIJO, H. IWAKIRI, J. KIGUCHI, T. YABATA, H. TANAKA and M. KITAMURA*...2012
- Model Analysis of Blast Furnace**
- A Mathematical Model of Blast Furnace in Terms of Finite Element Method and Method of  
 Characteristics [Technical Paper] ..... *J. KUDOH and J. YAGI*...2020
- A Mathematical Model of Three-dimensional Gas Flow in Packed Beds [Technical Paper]  
 ..... *Y. OHNO and K. KONDO*...2028
- Mathematical Model Analysis on Three-dimensional Gas Flow in Blast Furnace [Technical Paper]  
 ..... *Y. OHNO, Y. YAMADA, K. KONDO and T. TAKEBE*...2036
- Analysis on Liquid Flow in the Dripping Zone of Blast Furnace [Technical Paper]  
 ..... *T. SUGIYAMA, T. NAKAGAWA, H. SIBAIKE and Y. ODA*...2044
- Estimation of the Inner States by the Use of the Burden Distribution Model Based on the Profile  
 Meter Measurements at Blast Furnace [Technical Report] ..... *K. KURITA and T. MURDI*...2052
- Estimation of the Inner States by the Use of the Model to Evaluate the Influence of Sinter and Coke  
 Properties at Blast Furnace [Technical Paper]  
 ..... *K. KURITA, Y. IWANAGA, M. MOTOSHIGE and Y. AMINAGA*...2060
- Estimation of Refractory Wear and Solidified Layer Distribution in the Blast Furnace Hearth and Its  
 Application to the Operation [Technical Paper]  
 ..... *F. YOSHIKAWA, S. NIGO, S. KIYOHARA, S. TAGUCHI, H. TAKAHASHI and M. ICHIMIYA*...2068

### **Blast Furnace Operations**

- Reduction of SiO<sub>2</sub> Content in Sinter Ore and Its Effect on Blast Furnace Operation [Technical Report]  
 ..... *K. AKETA, M. TAKAMI, I. SHIGAKI, K. HOSHINO, T. TAKAHASHI and K. KADOGUCHI*...2076
- Burden Distribution in Case of Low Gas Temperature at the Center of Upper Shaft of Blast Furnace  
 [Technical Paper] ..... *K. TAKEDA, Y. KONISHI, S. TAGUCHI and T. FUKUTAKE*...2084
- Measurement of Temperature Distribution by Descending Probe in Blast Furnace [Technical Paper]  
 ..... *I. KOBAYASHI, S. INABA, R. HORI, T. GOTO and M. SHIMIZU*...2092
- Development and Application of Blast Furnace Operation Control Expert System Making Use of Artificial  
 Intelligence [Technical Report]  
 ..... *R. NAKAJIMA, T. SUMIGAMA, A. MAKI, K. WAKIMOTO, K. HASHIMOTO, A. SAKAI and M. SAKURAI*...2100

### **New Process**

- Exergy Evaluation on the Pellets Production and Direct Reduction Processes  
 for the Fired and Cement Bonded Pellets [Technical Paper]  
 ..... *T. AKIYAMA, R. TAKAHASHI and J. YAGI*...2108
- Melting Results of Direct Reduced Iron in Electric Arc Furnace and Properties of Hot Briquetted  
 Iron [Technical Report] ..... *D. KANEKO, M. O. DAVIES, O. TSUCHIYA and H. SAKO*...2116

|                                                                                                                                                                      |                                                                                                       |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------|
| Development of New Ironmaking Process Comprising Shaft-type Reduction Furnace and Cupola-type Melting Furnace [Technical Report] .....                               | T. MIYAZAKI, H. YAMAOKA, Y. KAMEI and F. NAKAMURA...                                                  | 2122 |
| Reduction Behavior of Chromium Ore in a Fluidized Bed [Technical Paper] .....                                                                                        | H. KATAYAMA, T. KOITABASHI and T. HAMADA...                                                           | 2130 |
| Distributions of Chromium and Sulphur between Carbon-saturated Ferrochrome and CaO-MgO-Al <sub>2</sub> O <sub>3</sub> -SiO <sub>2</sub> Slag [Technical Paper] ..... | H. G. KATAYAMA, T. TSAO, T. SASAKI and K. TAKATSUKA...                                                | 2138 |
| Refining of Hot Metal Containing Nb with Multi-staged Continuous Selective Oxidation Process [Technical Report] .....                                                | A. FUKUZAWA, R. NAKAGAWA, S. YOSHIMATSU, A. SATO, T. OZAKI, R. ZHOU, Z. LIN, Y. HUANG and J. JIANG... | 2145 |

|                               |             |                                    |       |
|-------------------------------|-------------|------------------------------------|-------|
| Columns .....                 | 2153, 2154, | Notice to Members .....            | N 221 |
| The Editor's Postscript ..... | 2154,       | Proceedings to the Institute ..... | N 235 |

# 編 集 委 員 会

委員長 鈴木 朝夫

編集運営委員会

|       |      |       |       |       |
|-------|------|-------|-------|-------|
| 阿部 光延 | 荒木 透 | 大谷 泰夫 | 小野 陽一 | 尾上 俊雄 |
| 河部 義邦 | 岸 輝雄 | 国岡 計夫 | 権藤 永  | 佐久間健人 |
| 佐々木 徹 | 雀部 実 | 佐野 信雄 | 新居 和嘉 | 原 富啓  |
| 細井 祐三 | 牧 正志 | 榎本 弘毅 |       |       |

和文会誌分科会

|           |          |       |       |       |
|-----------|----------|-------|-------|-------|
| 主 査 佐野 信雄 | 幹事 河部 義邦 |       |       |       |
| 委 員 浅井 滋生 | 阿部 英夫    | 綾田 研三 | 石黒 徹  | 稲葉 晉一 |
| 乾 恒夫      | 岩田 英夫    | 遠藤 孝雄 | 大河内春乃 | 大宝 雄蔵 |
| 大中 逸雄     | 大矢 清     | 片山 裕之 | 勝亦 正昭 | 金子 智  |
| 河井 良彦     | 川上 正博    | 木内 学  | 栗林 一彦 | 郡司 直樹 |
| 坂木 庸晃     | 坂本 登     | 雀部 実  | 佐藤 駿  | 志賀 千晃 |
| 下村 隆良     | 城田 良康    | 神馬 敬  | 高塚 公郎 | 高橋 政司 |
| 田口 整司     | 田中 紘一    | 田村 至  | 辻川 茂男 | 長谷川守弘 |
| 肥田 行博     | 藤井 徹也    | 松尾 孝  | 三原 豊  | 三吉 康彦 |
| 門馬 義雄     | 八木順一郎    | 山口 正治 | 大和 康二 | 吉田 勝彦 |
| 渡辺 征一     |          |       |       |       |

製鉄特集号編集小委員会

|           |      |      |       |       |
|-----------|------|------|-------|-------|
| 幹 事 八木順一郎 |      |      |       |       |
| 委 員 稲葉 晉一 | 坂本 登 | 佐藤 駿 | 田口 整司 | 中村 正和 |

© COPYRIGHT 1987 社団法人 日本鉄鋼協会

本書に掲載されている記事の無断転載ならびに無断コピーを禁じます。

This publication, or any part thereof, may not be reproduced in any form without the written permission of the ISIJ.