

The Timetable of the 166th ISIJ Meeting

	September 17 (Tue)		September 18 (Wed)		September 19 (Thur)	
	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.
Room1 Human & Social Sci. Lecture Hall 1 Room 102	---	Physical phenomena under the imposition of electromagnetic vibration [13:20-16:05] [Charge-free]	(Int.) Innovations in measurement of high temperature property and application to materials production process [Int.1-14] (9:20-16:30)		---	---
Room2 Human & Social Sci. Lecture Hall 1 Room 204	Fundamentals in ironmaking /Operation of sintering and pelletizing processes [1-8] (9:00-11:50)	Fundamentals in sintering -1,2,3 [9-17] (13:00-16:20)	Coke fundamentals /Coke oven operation [53-59] (9:30-12:00)	Young engineer session of coke-making-1,2,3 [60-68] (13:00-16:20)	Introduction of research topics in Novel Processing Forum-1,2 [91-96] (9:20-11:30)	---
Room3 Human & Social Sci. Lecture Hall 1 Room 203	---	---	Solidification and structure control-1,2 [69-75] (9:30-12:00)	Evaluation for liquid flow in final stage of solidification /Property of cast metals [76-82] (13:00-15:30)	Continuous casting /Solidification [97-103] (9:30-12:00)	---
Room4 Human & Social Sci. Lecture Hall 1 Room 202	Transport phenomena-1,2 [18-23] (9:30-11:40)	Thermodynamics: Properties of liquid materials /Refractories /Converter: Secondary refining [24-34] (13:00-17:00)	Hot metal treatment /Inclusion-1,2 [83-90] (9:00-12:00)	(D) Current technologies of steel refining process for environmental issues [D1-8] (13:00-16:30)	Scrap utilization: Recycling /New phases-aided refining-1 [104-111] (9:00-11:50)	New phases-aided refining-2 [112-114] (13:00-14:00)
Room5 Human & Social Sci. Lecture Hall 1 Room 201	Young engineer session of ironmaking-1,2 [35-42] (9:00-11:50)	Dispersed phases in blast furnace /Reduction and smelting -1,2 [43-52] (13:00-16:40)	(D) Possibility of increasing hydrogen utilization for reduction of iron ore in iron making process [D9-16] (10:00-16:15)		Pulverized coal combustion /Blast furnace operation [115-119] (10:00-11:50)	---
Room6 Human & Social Sci. Lecture Hall 1 Room 302	---	Carbon recycling and green energy technologies for establishment of low carbon iron-making system-1,2 [120-126] (13:00-15:30)	New functions and frontier utilization of iron- and steel-making slags [127-131] (10:00-11:40)	---	Iron and steel scrap recycling system to utilize the critical and precious resources-1,2 [132-137] (9:30-11:40)	---
Room7 General Education Lecture Hall Room C2	---	(D) Advanced system integration for facilitating 'systems of operators' skills' in steel works -Part2 [D17-19] (13:30-15:55)	Instrumentation [138-142] (9:30-11:10)	Control-1,2 [143-149] (13:00-15:30)	---	---
Room8 General Education Lecture Hall Room C4	Control technology for free cutting-7 [150-155] (9:40-11:50)	(D) Research activity on the cooling model for the run-out table in the hot strip mill [D20-25] (12:50-17:00)	Cooling /Joining and decarburization [156-162] (9:20-11:50)	(D) Exploring the topics and trends in the research of rolling theory in future [D26-33] (12:30-16:50)	Rolling /Oxidation scale [167-173] (9:20-11:50)	---
Room9 General Education Lecture Hall Room C5	---	---	Tribology [163-166] (10:00-11:20)	(D) Evolution of simulation in production and secondary forming of steel pipe and tube [D34-39] (13:00-16:40)	---	---
Room10 General Education Lecture Hall Room A1	---	---	(D) Formation mechanism and application of retained austenite in steel [D40-49] (9:00-14:35)		Hot-dip coating /Hot-dip coating /Electroplating [282-288] (9:30-12:00)	---
Room11 General Education Lecture Hall Room B1	Ni-based superalloy-1 [174-177] (10:30-11:50)	Ni-based superalloy-2,3 [178-185] (13:00-15:50)	Austenitic heat resistant steels /Ferritic heat resistant steels-1 [236-243] (9:00-11:50)	Ferritic heat resistant steels-2,3 [244-251] (13:00-15:50)	Deformation behavior-6,7 [289-295] (9:20-11:50)	Deformation behavior-8 [296-299] (13:00-14:20)
Room12 General Education Lecture Hall Room B3	Strip steels [186-190] (10:20-12:00)	Machine structural steel-1,2 [191-198] (13:20-16:10)	Corrosion: Electrochemistry /Corrosion: SCC [252-258] (9:00-11:30)	Microbiological acceleration of steel corrosion [13:00-17:00] [Charge-free]	---	---
Room13 General Education Lecture Hall Room B4	---	Trends in steel design for energy shift and advanced energy conversion (13:00-16:40) [1,000yen]	Technology and culture of iron and metals in Hokuriku area Japan (10:00-16:50) [2,000yen]		Electrical steels and magnetic materials-1,2 [300-306] (9:00-11:30)	---
Room14 General Education Lecture Hall Room B10	Phase transformation: microstructure control-1,2 [199-206] (9:00-11:50)	Phase transformation: microstructure control-3,4,5 [207-217] (13:00-17:00)	Stainless steel-1,2 [259-265] (9:20-11:50)	Creation of hydrogen-passive surface on steels for prevention of hydrogen embrittlement [13:00-17:00] [Charge-free]	Recrystallization /Texture-1,2 [307-313] (9:00-11:30)	Microstructure formation /Precipitation [314-319] (13:00-15:10)
Room15 General Education Lecture Hall Room C1	Deformation behavior -1,2 [218-224] (9:20-11:50)	Deformation behavior -3,4,5 [225-235] (13:00-17:00)	Hydrogen embrittlement-1,2 [266-274] (9:00-12:10)	---	Hydrogen embrittlement -3,4 [320-327] (9:00-11:50)	Hydrogen embrittlement -5,6 [328-335] (13:00-15:50)
Room16 General Education Lecture Hall Room C10	---	---	Fatigue /Embrittlement [275-281] (9:20-11:50)	ISIJ and JIM joint session Titanium and titanium alloys -1,2,3 [J1-J10] (13:00-16:40)	ISIJ and JIM joint session Titanium and titanium alloys-4,5,6 [J11-J23] (9:00-14:40)	
Room17 General Education Lecture Hall Room D4	Elemental analysis [336-343] (9:00-11:50)	Others-1,2 [344-350] (13:00-15:30)	(D) The application of biological indexes to process evaluation and material characterization for iron and steel processing -Part3 [D50-61] (9:50-16:30)		(D) Recent topics on analysis of various phenomena at surfaces and interfaces in materials [D62-67] (9:00-12:00)	Precipitate/Inclusion analysis [351-354] (13:00-14:20)
JIM-B Natural Sci. & Technol. Main Hall Room 103	---	---	---	ISIJ and JIM joint session Ultrafine grained materials- fundamental aspects for ultrafine grained structures-1,2,3 [J24-J33] (13:00-16:40)	---	---
	Banquet (18:30-20:30, Kanazawa Excel Hotel Tokyu(5F)) [10,000yen]		Poster Session for Students (12:00-15:00, Natural Sci. Lecture Hall(1F) Room A&B) ISIJ Beer Party (17:30-19:00, Student Union Hall(2F) Cafeteria)			

[] :Lecture Number
() :Lecture Time
■ :Symposium Please ask to each of symposium room desks Directly

Board Meeting: Process evaluation and material characterization
Sept.18(Wed.) 13:00-14:00 Room17

High Temperature Processes

Lecture No.	Title	Speaker	Page
Current technologies of steel refining process for environmental issues			
D1	Reduction potential of slag amount from hot metal dephosphorization process by utilizing multi-phase flux	H.Matsuura	• • • 467
D2	Thermochemistry of heterogeneous CaO–SiO ₂ –P ₂ O ₅ –FeO slags for reducing slag volume	M.Hasegawa	• • • 471
D3	Reaction efficiency improvement of primary refining process at Nagoya Works	S.Mukawa	• • • 475
D4	Discussion on dephosphorization of hot metal with high phosphorus content –Refining technologies of hot metal produced by low grade iron ore–	S.Kitamura	• • • 479
D5	Oily dust recycling and some problems in the refining process	S.Kimura	• • • 483
D6	Refining ability of deoxidation slag for effective utilization of impurities	Y.Kobayashi	• • • 487
D7	Extending of application of hardly utilizable iron scraps utilizing two immiscible liquid metals	M.Nakamoto	• • • 490
D8	Processing of steelmaking slag as secondary resource of phosphorus and manganese	T.Nagasaka	• • • 494

High Temperature Processes & Environmental, Energy and Social Engineering

Lecture No.	Title	Speaker	Page
Possibility of increasing hydrogen utilization for reduction of iron ore in iron making process			
D9	Steelmaking process employing hydrogen produced by a very high temperature reactor and the scale of the plant	M.Ogawa	• • • 498
D10	The possibility of high PC and H ₂ rate operation for achievement of low carbon blast furnace	S.Ueda	• • • 502
D11	Injection technology of natural gas into blast furnace	Y.Kashihara	• • • 506
D12	Examination of effect of reformed COG injected into the blast furnace	S.Matsuzaki	• • • 510
D13	Functions of coke for iron blast furnace in maximizing the hydrogen reduction –Strength after reaction of high strength coke produced by using the caking additive–	N.Okuyama	• • • 514
D14	Operation trial of hydrogenous gas injection to experimental blast furnace in COURSE50 project	S.Watakabe	• • • 518
D15	Thermodynamics on the gaseous reduction with H ₂ –CO mixture	H.Ono	• • • 522
D16	Process image of hydrogen ironmaking in future	Y.Kashiwaya	• • • 524

Instrumentation, Control and System Engineering

Lecture No.	Title	Speaker	Page
Advanced system integration for facilitating "systems of operators' skills" in steel works -Part2			
D17	Towards advanced systems for operators' skills	T.Terano	• • • 528
D18	Evolutionary multiobjective optimization for facilitating systems of operators' skills	I.Ono	• • • 530
D19	A proposal of staff scheduling method using combinatorial auction	N.Fujii	• • • 533

Processing for Quality Products

Lecture No.	Title	Speaker	Page
Research activity on the cooling model for the run-out table in the hot strip mill			
D20	Numerical and experimental study of circular water jets impinging on a film flow	H.Fujimoto	• • • 537
D21	Boiling heat transfer characteristics and film boiling collapse temperature	H.Ohtake	• • • 540
D22	Effects of coolant conditions and rotational speed of hot surface on transient heat transfer during laminar jet cooling	Y.Mitsutake	• • • 544
D23	Visualization of liquid–solid contact occurrence while liquid–jet cooling and effects of surface oxide layer on spray cooling characteristics	N.Nagai	• • • 548
D24	Change in surface wettability of SUS304 by heating and cooling	Y.Takata	• • • 552
D25	Evaluations of heat transfer characteristics of spray cooling	H.Ohkubo	• • • 556
Exploring the topics and trends in the research of rolling theory in future			
D26	Outcomes of the subcommittee for theoretical analysis on the FEM analysis of rolling and its evolution after the committee	K.Yamada	• • • 560
D27	Recent development of numerical simulation on rolling process	Y.Maeda	• • • 564
D28	(Invited Lecture)Rolling theory with noncircular roll flattening and its application to temper rolling	H.Matsumoto	• • • 568

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D29 Skinpass rolling characteristics of tin plate	T.Akashi	• • •	572
D30 Review of lubrication theory in cold sheet rolling	A.Azushima	• • •	575
D31 Analysis of surface shape formation in strip rolling	N.Yukawa	• • •	579
D32 Problems on the researches for strip profile and shape	F.Fujita	• • •	583
D33 Analysis of strip profile by rigid–plastic FEM	H.Furumoto	• • •	587

Evolution of simulation in production and secondary forming of steel pipe and tube

D34 Mechanism of pipe end deformation after cutting of square steel pipe formed by roll forming	T.Nagamachi	• • •	591
D35 (Invited Lecture)Application of FEM simulation to ERW tube and pipe forming process	F.Z.Wang	• • •	595
D36 Development of finite element analysis method for three–dimensional hot bending and direct quench process	H.Kubota	• • •	599
D37 (Invited Lecture)Simulation of thermal strain and residual stress in pipe welding	N.S.Ma	• • •	603
D38 (Invited Lecture)Necking simulation of stainless–steel tube for automotive exhaust tube	S.Kihara	• • •	607
D39 Applicability of mechanical property of steel tubes by ring tensile test	H.Yoshimura	• • •	611

Microstructure and Properties of Materials

Lecture No.	Title	Speaker	Page
Formation mechanism and application of retained austenite in steel			
D40	Morphology of retained austenite in lath martensite with various carbon contents	S.Morito	• • • 615
D41	Difference in transformation behavior between ferrite and austenite formations in medium manganese steel	N.Nakada	• • • 617
D42	The role of retained austenite in ultrafine grained multi–phase steels	Y.Okitsu	• • • 618
D43	Ultrahigh–strength TRIP–aided martensitic steel with excellent impact toughness	J.Kobayashi	• • • 620
D44	Hydrogen embrittlement properties of Cr added ultra high–strength TRIP–aided martensitic steels	T.Hojo	• • • 624
D45	Hydrogen embrittlement properties of 0.2–0.4%C ultra high–strength TRIP–aided bainitic ferrite steels with hot forging process	T.Hojo	• • • 628
D46	Effect of Cr in quenching and partitioning treatment of martensitic stainless steel	T.Egashira	• • • 632
D47	Suppression of hydrogen embrittlement in type SUS304 metastable austenitic stainless steel plate by microstructure–gradient control and its design concept	S.Iwanaga	• • • 634
D48 (ISIJ Research Promotion Grant)	A large elastic–like strain in Fe ₃ Pt and Fe–31.2Pd alloys exhibiting significant lattice softening	T.Fukuda	• • • 637
D49	Hydrogen embrittlement of TWIP steels	M.Koyama	• • • 638

Process Evaluation and Material Characterization

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The application of biological indexes to process evaluation and material characterization for iron and steel processing -Part3			
D50	Bioassay of zinc ion by medaka larvae	M.Yamaguchi	• • • 640
D51	Bioassay of lithium ion by medaka larvae	H.Kai	• • • 642
D52	Application of the detection of zinc, nickel and chromium(VI) using change of functions of mammalian cells and the effective metal concentration	A.Ogawa	• • • 644
D53	The study of the nickel ion recognition mechanism using the human macrophage–like cell line	H.Tamauchi	• • • 647
D54	Relationship between the crystallization of melt–solidified slag and the leaching behavior of lead	H.Sano	• • • 650
D55	Removal of chromium(VI) ion in aqueous solution with oxidizing slag exhausted from steelmaking process in electric arc furnace	K.Okazaki	• • • 652
D56	Reaction between zinc ion in aqueous solution and magnetite with purity of 95mass%	T.Teshima	• • • 654
D57	Chemical and biochemical properties of components eluted from both electric arc furnace oxidizing normal steel slag and stainless steel one	T.Takahashi	• • • 656
D58	Chemical speciation of iron(III) by ESI–MS :Hydrolysis and coordination of organic ligands	T.Urabe	• • • 660
D59	Evaluation for biofouling on mortar containing various EAF slags	T.Masuda	• • • 662
D60	Novel evaluation and characterization processes for biofilm formed on various materials	H.Kanematsu	• • • 664
D61	Selective acquisition of chromium ion in water by biofilm	N.Hirai	• • • 666

Recent topics on analysis of various phenomena at surfaces and interfaces in materials

D62	Analysis of passive film structure formed on steels which is effect on corrosion behavior	M.Sakairi	• • • 668
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D63 Electrochemical phase change of iron rusts by in-situ X-ray diffraction technique	T.Doi	• • •	672
D64 Ga-FIB-TOF-SIMS analysis on deuterium distribution in Fe-30%Ni alloys	T.Tanaka	• • •	673
D65 Effect of excited states of nitrogen in plasma on nitriding reaction for steels	S.Sato	• • •	677
D66 In-situ observation of phase transformation behavior of Al ₂ O ₃ scale by means of synchrotron radiation	S.Hayashi	• • •	679
D67 Application of Okamoto-cavity microwave-induced plasma to a nitridation method of steel materials	K.Wagatsuma	• • •	682

International Organized Sessions

High Temperature Processes

2013/09/18 Lecture Room 1

Innovations in measurement of high temperature property and application to materials production process

- 09:20 ~ 09:25
Opening address M.Susa(Tokyo Inst. of Tech.)
- 09:25 ~ 10:35 Chairperson:N.Saito(Kyushu Univ.),S.Sukenaga(Tohoku Univ.)
- 09:25 ~ 09:55
Int. 1 (Invited Lecture)Structure and dynamics of oxide and fluoride melts:
an in-situ high-temperature nuclear magnetic resonance point of view ... 684
CEMHTI-CNRS OP.Florian·V.S.Kanian·A.Rakhmatullin·A.L.Rollet·J.P.Coutures·C.Bessada
- 09:55 ~ 10:15
Int. 2 Application of multinuclear solid-state NMR to structural analysis of slag ... 686
NSSMC OK.Kanehashi
- 10:15 ~ 10:35
Int. 3 Reduction of iron oxides in mould flux with additions of strong reducing agents ... 688
Tokyo Inst. of Tech. OM.Wang·R.Endo·Y.Kobayashi·M.Susa
- 10:45 ~ 11:55 Chairperson:Y.Kobayashi(Tokyo Inst. of Tech.),R.Endo(Tokyo Inst. of Tech.)
- 10:45 ~ 11:15
Int. 4 (Invited Lecture)Comprehensive understanding of surface and interface of liquid iron and its alloys ... 689
Korea Univ. OJ.Lee
- 11:15 ~ 11:35
Int. 5 Composition dependence of surface tension of reciprocal oxide-fluoride melts ... 690
Osaka Univ. OM.Suzuki·T.Tanaka·S.Tanaka, NSSMC M.Hanao·H.Yamamura
- 11:35 ~ 11:55
Int. 6 Viscosity of CaO-SiO₂-Al₂O₃-K₂O system ... 691
Tohoku Univ. OS.Sukenaga, Kyushu Univ. T.Higo, NSSMC K.Kanehashi, Tohoku Univ. H.Shibata, Kyushu Univ. N.Saito·K.Nakashima
- 13:10 ~ 14:50 Chairperson:M.Nakamoto(Osaka Univ.),M.Suzuki(Osaka Univ.)
- 13:10 ~ 13:40
Int. 7 (Invited Lecture)Characterisation of phase equilibria and dynamic steady state freeze linings in complex ... 693
metallurgical slags
The Univ. of Queensland OE.Jak·A.F.Mehrdadi·P.C.Hayes
- 13:40 ~ 14:00
Int. 8 Temperature dependence of emissivity and electrical resistivity of carbon fiber ... 697
AIST OK.Higuchi·H.Watanabe·N.Yamada·N.Iwashita
- 14:00 ~ 14:20
Int. 9 Noncontact measurements of normal spectral emissivity,heat capacity and thermal conductivity of ... 698
liquid cobalt
Tohoku Univ. OJ.Takano·H.Higashi·M.Uchikoshi·M.Isshiki·M.Ohtsuka·H.Fukuyama
- 14:20 ~ 14:50
Int. 10 Reduction of radiative heat transfer by valence control of iron ions in mould flux ... 700
Tokyo Inst. of Tech. OR.Maehashi·R.Endo·Y.Kobayashi·M.Susa
- 15:00 ~ 16:30 Chairperson:H.Fukuyama(Tohoku Univ.),T.Yoshikawa(The Univ. of Tokyo)
- 15:00 ~ 15:30
Int. 11 (Invited Lecture)Thermophysical properties of liquid Cr-Fe-Ni alloys ... 701
DLR OJ.Brillo·H.Kobatake
- 15:30 ~ 15:50
Int. 12 Marangoni effect on solution growth of SiC by temperature difference method using Fe-Si solvent ... 704
The Univ. of Tokyo OS.Kawanishi·T.Yoshikawa·K.Morita

15:50 ~ 16:10

Int. 13 Electric resistivity and conduction mechanism of Sb_2Te_3 -GeTe system in liquid state ... 705

Tokyo Inst. of Tech. O.R.Endo·S.Maeda·S.Kumamoto·Y.Kobayashi·M.Susa, AIST M.Kuwahara

16:10 ~ 16:30

Int. 14 Effect of agitation on crystallization behavior of super-cooled melts characterized by electrical capacitance measurement ... 706

Kyushu Univ. O.N.Saito, Tohoku Univ. S.Sukenaga, Fukuoka Inst. of Tech. Y.Ohta, Kyushu Univ. K. Nakashima

16:30 ~ Closing remark H.Fukuyama(Tohoku Univ.)

High Temperature Processes

Lecture No. Plenary Session	Title	Speaker	Page
1 (ISIJ Research Promotion Grant)	Mechanism of cementite oxidization under CO-CO ₂ atmosphere	A.Kawakami	• • • 707
2	Effect of temperature on carbon deposition during integrated coal pyrolysis—tar decomposition over low grade iron ore	R.B.Cahyono	• • • 708
3	Reduction roasting and magnetic separation of high iron gibbsite for beneficiating Fe and Al ₂ O ₃	Z.G.Liu	• • • 709
4	A new process of gas-based direct reduction—electric furnace smelting separation for high chromium vanadium—titanium magnetite	J.Tang	• • • 710
5	The influence of coke surface composition on NO _x concentration Decreasing NO _x technology in sintering process-1	K.Katayama	• • • 711
6	Lime coating coke (LCC) for decreasing NO _x Decreasing NO _x technology in sintering process-2	K.Katayama	• • • 712
7	Evaluation lime coating coke (LCC) for decreasing NO _x in Oita No.2 sintering machine Decreasing NO _x technology in sintering process-3	K.Sato	• • • 713
8	Challenge of cost saving in pelletizing plant of Kakogawa works	Y.Takiguchi	• • • 714
9	In-situ observation of production process of calcium ferrite from molten Fe-Ca-O 2 Influence of cooling rate	R.Murao	• • • 715
10	Effect of steel slag distribution on pore network during sintering Sintering mechanism using high Al ₂ O ₃ material(1)	Y.Kuriki	• • • 716
11	Effect of steel slag properties on melt flow behavior during sintering Sintering mechanism using high Al ₂ O ₃ material(2)	T.Higuchi	• • • 717
12	Verification of liquidus lines on the FeO _x rich side of the FeO _x -CaO-SiO ₂ phase diagram at various oxygen partial pressures	Y.Katahira	• • • 718
13	Evaluation of mineralogical property of fine ores Evaluation of low grade iron ore-1	Y.Terakawa	• • • 719
14	Analysis of intensive factor of sinter by quantitative determination techniques	T.Takayama	• • • 720
15	Development in large-scale sinter pot considering material segregated charge	O.Ishiyama	• • • 721
16	Effect of bed temperature on the oxidation reaction of metallic iron particles in a model sinter bed	K.Fujino	• • • 722
17	Properties of pre-reduced pellet feed as sinter raw material	H.Yabe	• • • 723
18	Iron precipitate in iron-silicon composite oxide by electron irradiation	N.Ishikawa	• • • 724
19	Cold model study on flux dispersion and solid-liquid mass transfer by mechanical stirring	R.Shiba	• • • 725
20	Model experiment on removal of non-metallic inclusions by bubble floatation	S.Narita	• • • 726
21	Basic study of numerical analysis of gas-liquid flow using particle method simulation	S.Natsui	• • • 727
22	Two dimensional fluid flow simulation by considering the effect of surface tension	T.Tochigi	• • • 728
23	Kinetic model to simulate reaction between Fe-Mn-Ca matte and steelmaking slag	S.J.Kim	• • • 729
24	AlN crystal growth using wettability between molten iron alloy and solid alumina	H.Goto	• • • 730
25	Measurement on activity of Nd in Nd-Fe system by electromotive force method	D.Noguchi	• • • 731
26	Viscosity and electrical conductivity estimations of metallurgical molten slags	G.H.Zhang	• • • 732
27	Effect of metallic cations on the thermal conductivities of almino-silicate melts	H.Matsui	• • • 733
28	Development of a method to measure torpedo car brick thickness	R.Otake	• • • 734
29	The effect of temperature on the wear mechanism of MgO-C brick	A.Inoue	• • • 735
30	In situ observation of oxidation process of natural flake graphite with laser microscope	Y.Saito	• • • 736
31	Investigation for mechanism of heat transfer to powder materials in burner heating technology	F.Ogasawara	• • • 737
32	Dissolution behavior of FeO-MgO solid solution into molten slag	F.X.Huang	• • • 738
33	Effect of the slag contents on dephosphorization rate of molten steel	M.Ota	• • • 739
34	Continuous temperature measuring system for RH	T.Ibata	• • • 740
35	Development of adjusting technology for debased raw materials in Tobata No.3 sinter machine	S.Kashimura	• • • 741
36	Development of the ultra fine ore high blending technique by a pre-granulation method	R.Shiozaki	• • • 742
37	The development of continuous melted iron and slag temperature measurement at Murooran 2BF	N.Omoto	• • • 743
38	Operation improvement by applying CD tuyere at Kobe No.3 blast furnace	T.Maeda	• • • 744
39	Effect of coke mixed charging on reduction and gasification reaction	Y.Iwai	• • • 745
40	High lump ore ratio operation under low productivity	N.Uchida	• • • 746
41	Improvement of permeability by enlargement of equipment for center charged coke at Kakogawa No.3 blast furnace	Y.Tanaka	• • • 747

42 Measures for operation stabilization at Kurashiki No.4 blast furnace	S.Yamashita	• • •	748
43 Simulation of particle trajectory of actual blast furnace by using DEM and its validation with the measured data Development of burden distribution control technology-6	H.Mio	• • •	749
44 DEM analysis on powder behavior passing through an orifice that consists of course particles	M.Fukuda	• • •	750
45 Accumulation behavior of powder in packed bed including liquid phase	S.Kikuchi	• • •	751
46 Analysis of packed bed effects on liquid flow based on MPS method	T.Kon	• • •	752
47 Effect of reduction degree of iron oxide on carbon deposition reaction from CO-H ₂ mixture gas	M.Yotsuda	• • •	753
48 Estimation of reduction rate of sinter and simulated sinter by H ₂ -CO gas mixtures	M.Taniguchi	• • •	754
49 Reduction behaviour of iron ore pellet in a non-uniform gas flow field	T.Kon	• • •	755
50 Melting behavior of silicates in cohesive zone of blast furnace and effect of Al ₂ O ₃ addition on the melt volume increase	Y.Maeda	• • •	756
51 Effect of CO-H ₂ gas mixtures on reducibility of artificial iron ore with FeO-CaO-SiO ₂ -Al ₂ O ₃ -MgO systems under rising temperature from 1000 to 1200°C	T.Kaise	• • •	757
52 Acceleration of melting of reduced iron in carbon-iron ore composite by dividing the role of carbonaceous materials	T.Murakami	• • •	758
53 Distribution of N- or S-containing products during coal carbonization and influences of these heteroatoms on coal fluidity	N.Tsubouchi	• • •	759
54 Magnetic resonance study on thermoplasticity and re-solidification of coal	H.Kumagai	• • •	760
55 Relationship between carbon matrix connectivity, porosity and pore shape of coke measured by image analysis	N.Sakimoto	• • •	761
56 Influence of coal gas pressure on pushing behaviors of commercial coke oven	S.Aizawa	• • •	762
57 Influence of wall displacement on coke pushing force	T.Nakagawa	• • •	763
58 Development of new coke oven door sealing system	Y.Takahashi	• • •	764
59 Countermeasure for increase in coal moisture	T.Kikkawa	• • •	765
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