

The 186th ISIJ Meeting

Date

September 20 to 22, 2023

Venue

University of Toyama, Gofuku Campus
3190 Gofuku, Toyama-shi, Toyama 930-8555, Japan

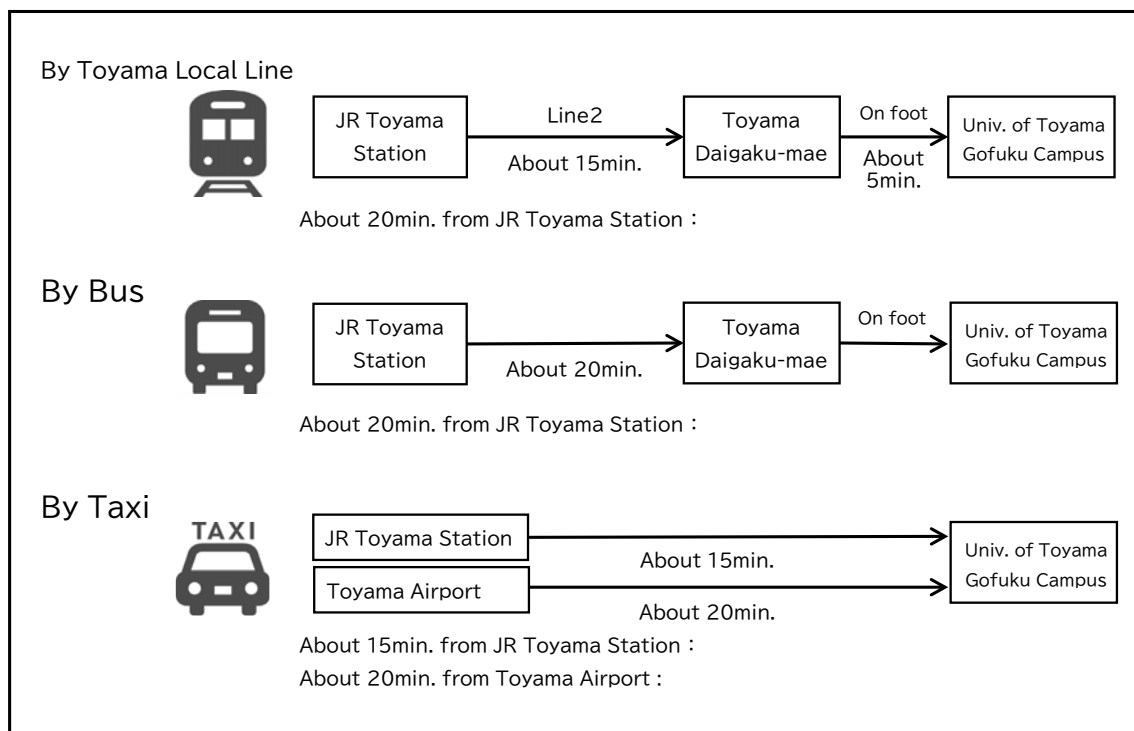
Access to University of Toyama

From Tokyo

About 1hr. from Haneda (Tokyo) Airport by Air

About 2hrs 10min. from JR Tokyo Station by Rail

From Toyama Station to the venue

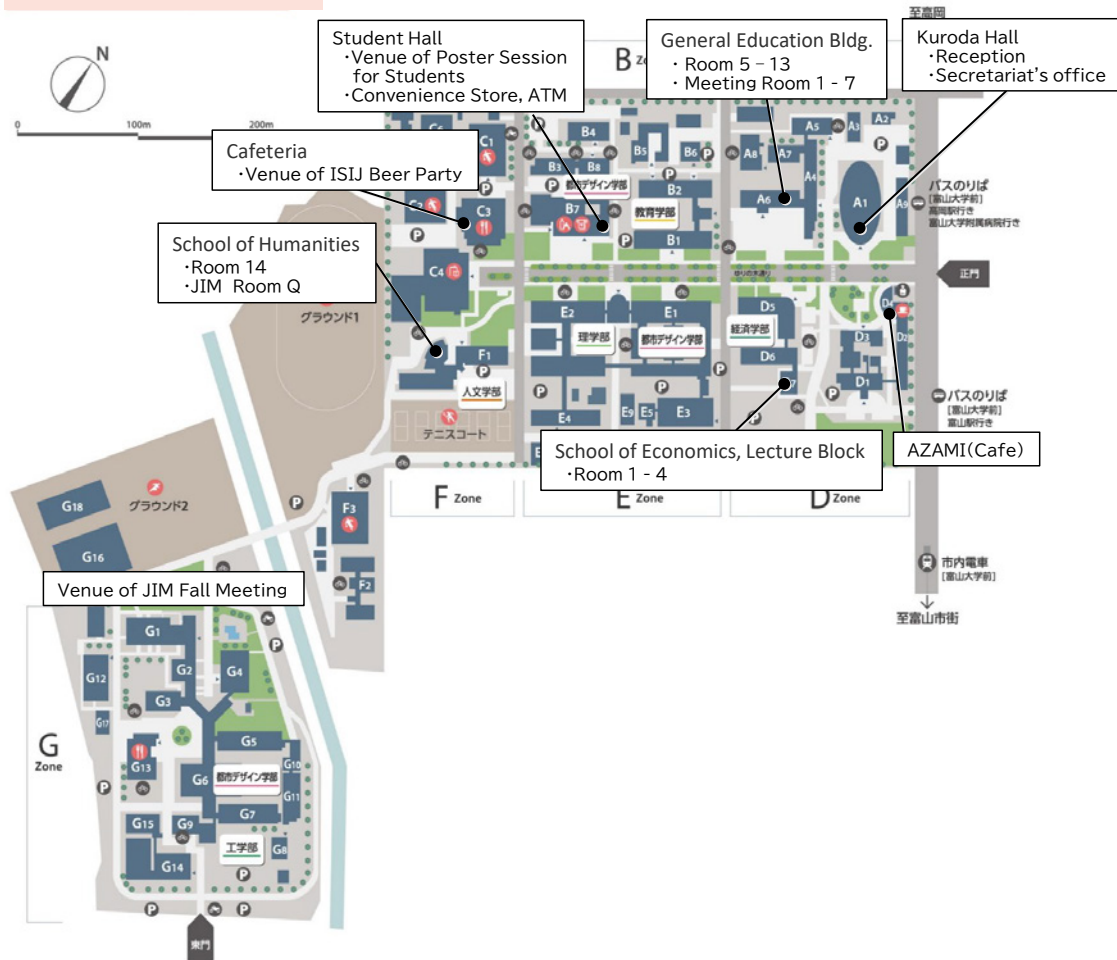


* For more information, please refer to the following website.

<https://www.u-toyama.ac.jp/en/access/>

Campus Map

Gofuku Campus



A zone

- A1. Kuroda Hall
- A4. General Education Bldg. A
- A6. General Education Bldg. C
- A7. General Education Bldg. D

B zone

- B7. Student Hall

C zone

- C3. Cafeteria

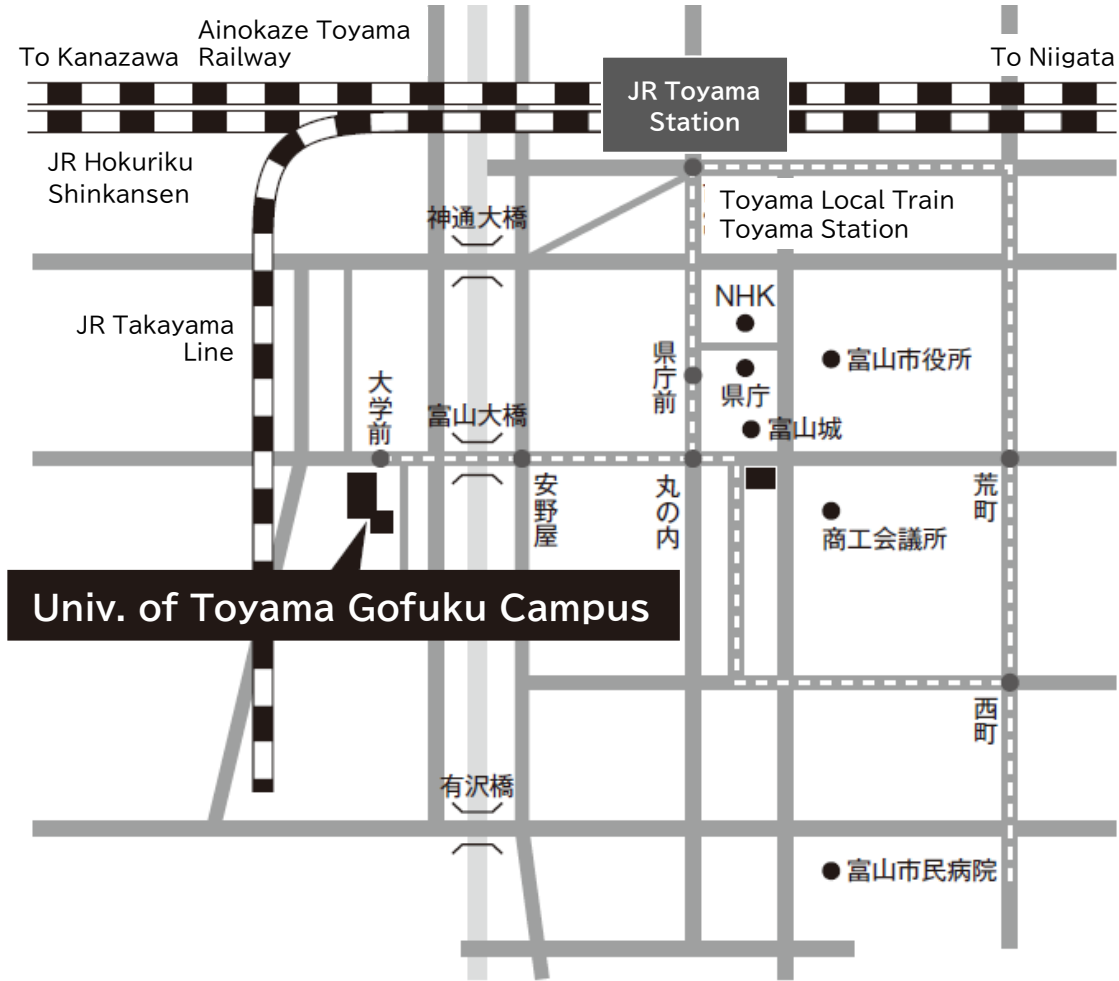
D zone

- D4. AZAMI (Cafeteria)
- D7. School of Economics Lecture Block

F zone

- F1. School of Humanities Bldg.

Map around the venue



The timetable of the 186th ISIJ Meeting
(September 20-22, 2023 at University of Toyama)

Session Room	Sept. 20 (Wed)		Sept. 21 (Thu.)		Sept. 22 (Fri.)	
	AM	PM	AM	PM	AM	PM
Session Room 1 School of Economics Lecture Block (D7) 1st 101	Coal and coke [1-4] (10:00-11:20)	Young engineer session of coke-making 1・2 [5-11] (13:00-15:40)	Introduction of research topics in novel processing forum 1・2 [48-54] (9:00-11:40)	Multiscale analysis of solidification structure, segregation and casting defects (13:00-16:25) [Charge-Free]	Recycling of waste and refractories [73-76] (10:40-12:00)	Transport phenomena [77-81] (13:00-14:40)
Session Room 2 School of Economics Lecture Block (D7) 2nd 201	Frontier of high temperature physical chemistry in oxide/metal interface 1・2 [12-18] (9:20-12:00)	Solidification and structure 1・2 [19-26] (13:00-16:00)	Solidification and structure 3 / Continuous casting and solidification [55-61] (9:20-12:00)	Final symposium on the ISIJ research group "Sensing and Visualization of Slag for Understanding the Flow of Multiphase Molten Slags" (13:30-17:30) [Charge-Free]	Operational improvement and theoretical consideration in refining process 1・2 [82-89] (9:00-12:00)	Secondary refining / Inclusion [90-97] (13:00-16:00)
Session Room 3 School of Economics Lecture Block (D7) 3rd 301	Sintering process / Quality of agglomerates [27-34] (9:00-12:00)	Phenomena in blast furnace / Analysis and control of blast furnace [35-43] (13:40-17:00)	Reduction / Shaft furnace [62-67] (9:30-11:50)	Young researchers' challenges to ironmaking process [D1-D5] (13:00-17:00)	Young engineer session of iron making 1・2 [98-104] (9:00-11:40)	Pre-treatment of high phosphorus iron ore 1・2 [105-110] (13:00-15:20)
Session Room 4 School of Economics Lecture Block (D7) 4th 401	Key technologies for reducing CO ₂ emission from iron-making industry [111-115] (10:00-11:40)	Slag [116-120] (13:00-14:20) Slag and dust recycle for sustainable system [116-120] (14:40-16:20)	Green energy technologies in ironmaking process for green transformation [121-123] (9:20-10:20) Fundamentals [68-72] (10:40-12:20)	-	-	-
Session Room 5 General Education Bldg.A (A4) 3rd A31	Area-sensing-based condition monitoring of facilities in steelworks Part2 [D6-D11] (9:30-12:00)	Process control technology for cyber-physical systems (13:00-16:50) [Charge-Free]	System [124-126] (10:30-11:30)	Instrumentation / Control [127-133] (13:00-15:40)	Systems Resilience to Realize Maximum Efficiency and Operational Stability (10:00-16:20) [Charge-Free]	
Session Room 6 General Education Bldg.A (A4) 3rd A32	Control technologies for free cutting 15 [134-138] (10:00-11:40)	Phenomena and surface defects at the interface of rolled material during rolling [D12-D17] (13:05-16:45)	Modeling of various phenomena in metal forming and its application / Surface and tribology [145-152] (9:00-12:00)	The technical session by young engineers of hot rolling I・II / Rolling [153-162] (13:00-17:00)	Reliability evaluation of weld 5 [163-167] (10:00-11:40)	-
Session Room 7 General Education Bldg.A (A4) 3rd A33	Numericalization of the structure of additive manufacturing materials I・II [139-144] (9:20-11:40)	Technological trends in steel pipes and energy fields [D18-D22] (13:00-16:20)	Technology and Cultural of Iron and Metal in Hokuriku region (10:00-17:30) [2,000yen, Student1,000yen]		-	-
Session Room 8 General Education Bldg.C (A6) 1st C11	Investigation of bio-corrosion of structural materials ~diagnosis and analysis~IV [D23-D27] (9:20-11:55)	Investigation of metal corrosion in various environments II ~Prospects for Next Generation MIC (Microbiologically Influenced Corrosion) Studies~ (13:00-17:10) [Charge-Free]	Stainless steel [200-202] (10:30-11:30)	-	-	-
Session Room 9 General Education Bldg.C (A6) 1st C12	-	Toward controlling multi-phase structures in galvanized/aluminized coatings by hot-dip galvanizing process [D28-D36] (13:00-16:45)	Surface treatment and corrosion [203-206] (10:00-11:20)	-	Heterogeneous deformation microstructures and their effects on mechanical properties ~Results obtained and toward future activities~ (9:00-15:45) [1,000yen]	
Session Room 10 General Education Bldg.C (A6) 1st C13	-	Machine structural steel 1・2 [168-174] (13:00-15:40)	Electrical steel / Recrystallization and texture [207-213] (9:15-11:50)	Martensitic transformation / Phase transformation and microstructure control 1・2 [214-224] (13:00-17:10)	Modeling and simulation 1・2 [233-240] (9:00-12:00)	-
Session Room 11 General Education Bldg.C (A6) 2nd C21	Hydrogen embrittlement 1・2 [175-184] (9:00-12:30)	Innovative evaluation techniques for hydrogen entry and hydrogen trapping: II (13:30-17:20) [Charge-Free]	Understanding of issues and investigation of hydrogen embrittlement evaluation methods for practical application of ultra-high strength steel with hydrogen embrittlement problem (9:30-16:30) [Charge-Free]	-	Hydrogen embrittlement 3・4 [241-250] (9:00-12:30)	Hydrogen embrittlement 5・6 [251-258] (13:10-16:00)
Session Room 12 General Education Bldg.C (A6) 2nd C22	Strength and deformation behavior 1 [185-189] (10:00-11:40)	Strength and deformation behavior 2・3 [190-199] (13:00-16:40)	Heat resistant steels and alloys 1・2 [225-232] (9:00-12:00)	-	Toughness / Fatigue [259-265] (9:20-12:00)	-
Session Room 13 General Education Bldg.D (A7) 1st D12	Leading edge of Ti alloy processing (9:00-11:35) [Charge-Free]	Non-destructive / on-site analysis for materials related to steel [266-270] (13:30-15:10)	Organic compound analysis / Crystal structure analysis / Surface and state analysis / Elemental analysis [271-278] (9:00-12:00)	-	-	-
Session Room 14 School of Humanities Bldg. (F1) 3rd 6	ISIJ and JIM joint session Materials science of martensitic and bainitic transformations and its applications 1 [J19-J23] (10:00-11:40)	ISIJ and JIM joint session Materials science of martensitic and bainitic transformations and its applications 2・3 [J24-J29, J31-J32] (13:00-16:00)	ISIJ and JIM joint session Materials science of martensitic and its applications 4・5 [J30, J33-J40] (9:00-12:20)	ISIJ and JIM joint session Materials science of martensitic and bainitic transformations and its applications 6 [J41-J45] (13:20-15:00)	-	-
JIM Room Q School of Humanities Bldg. (F1) 2nd 4	-	-	ISIJ and JIM joint session Titanium and its alloys 1・2 [J1-J7] (9:30-12:00)	ISIJ and JIM joint session Titanium and its alloys 3・4・5 [J8-J18] (13:00-17:00)	-	-
	Banquet (18:30-20:30 at Crowne Plaza - ANA Toyama) [10,000yen]		Poster Session for Students (12:00-15:00 at Student Hall) [Charge-Free] ISIJ Beer Party (17:30-19:00 at Cafeteria(C3)) [1,000yen]		-	-

[] : Lecture Number
() : Lecture Time
■ : Event to be held during the 186th ISIJ Meeting (Symposium, Poster Session for students)

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Discussion Sessions

High Temperature Processes

Lecture No.				
Discussion Session	Title	Speaker		Page
Young researchers' challenges to ironmaking process				
D1	Novel carbon neutral ironmaking process using carbon-iron ore composite applying a carbon recycling system	R. Higashi	• • •	323
D2	Dephosphorization behavior of high phosphorus iron ore under a microwave heating	J. Liu	• • •	325
D3	Development of Zn-Al alloy micro-encapsulated phase change material and composite PCM for utilization of exhaust heat	T. Kawaguchi	• • •	327
D4	Thermodynamic analysis on effect of using steel scrap on slag-metal reactions in iron- and steel-making process	K. Kato	• • •	329
D5	Research and development of secondary phosphorus resources and its relation to the iron and steel industry in Japan	T. Iwama	• • •	331

Instrumentation, Control and System Engineering

Area-sensing-based condition monitoring of facilities in steelworks Part2

D6	(ISIJ Research Promotion Grant) Steel plant equipment diagnosis using area sensing technology	I. Ishii	• • •	335
D7	(ISIJ Research Promotion Grant) Wide-area vibration monitoring of ironworks conveyors using panoramic high-speed vision	K. Shimasaki	• • •	336
D8	(ISIJ Research Promotion Grant) Vibration and distortion monitoring for unloader crane using high-speed vision	K. Shimasaki	• • •	337
D9	(ISIJ Research Promotion Grant) Measurement time series 3-dimensional displacements of large structure using stereo sampling moire method	W. Jiang	• • •	338
D10	(ISIJ Research Promotion Grant) Damage detection method by rate of change in deflection response of beams subjected to moving load	T. Uchida	• • •	339
D11	Application of variational autoencoders for anomaly detection from time series data	H. Tamaki	• • •	343

Processing for Quality Products

Phenomena and surface defects at the interface of rolled material during rolling

D12	Development of method for controlling scale microstructure formed on Ni-containing steel	A. Harashima	• • •	345
D13	Mechanism of surface defect generation caused by inclusions in slabs in hot rolling	N. Yukawa	• • •	349
D14	Effect of stress field in caliber rolling on closure of center defects of round billet	T. Katsumura	• • •	351
D15	Behavior of oxide scale on low carbon steel sheet during hot rolling	H. Utsunomiya	• • •	355
D16	Prototype of high-temperature seizure abrasion tester and the evaluation of seizure of hot working rolls	R. Otani	• • •	357
D17	Direct observation of interface between glass die and workpiece during flat drawing by fluorescence method	A. Yanagida	• • •	361

Technological trends in steel pipes and energy fields

D18	(Keynote Lecture) Features and prospects of new nuclear reactors	A. Okami	• • •	363
D19	(Keynote Lecture) Efforts for advanced seismic performance evaluation of piping systems in nuclear power plants	I. Nakamura	• • •	364
D20	(Invited Lecture) Development of austenitic stainless steel with both high strength and hydrogen embrittlement resistance for high pressure hydrogen gas application	T. Osuki	• • •	368
D21	Required performance on steel pipes for geothermal power generation	K. Fujisawa	• • •	372
D22	(Invited Lecture) Current situation and future issues of sour-resistant low alloy OCTG and line pipe	T. Hara	• • •	376

Microstructure and Properties of Materials

Investigation of bio-corrosion of structural materials ~diagnosis and analysis~IV

D23	Prediction of relevant microbial functions based on the PICRUST2 analysis for microbial community data of immersion test in industrial fresh-water	S. Wakai	• • •	377
D24	Analysis of corrosion by sulfate reducing bacterium with EMIC activity	S. Hirano	• • •	381
D25	Relationship between corrosion behavior of SUS304 steel with agar film and diffusion of thiosulfate ions in the agar film	E. Uehata	• • •	382
D26	<i>In-situ</i> observation of marine biofilm on glass in water by using various microscopes	Y. Miwa	• • •	384
D27	Study on the dynamics of microbiome associated with the formation of cathodic sites on steel	Y. Miyano	• • •	385

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Toward controlling multi-phase structures in galvanized/aluminized coatings by hot-dip galvanizing process

D28	Thermodynamic evaluation of phase diagram in the Fe-Zn binary system	I. Ohnuma	· · ·	386
D29	Effect of Mn on alloying reaction between liquid Zn-0.2Al and Fe-Mn alloy	S. Yoneda	· · ·	389
D30	Effect of Si addition on interfacial reactions of steel sheets with Al-Zn alloy melt in hot-dip galvanizing process for production of galvalume steels	Y. Omi	· · ·	390
D31	Internal oxidation of Fe-Si-Mn-Al alloy under oxide scales formed during hot rolling process	S. Maekawa	· · ·	393
D32	Parameter estimation of multi-phase-field model using time-series data of concentration profile in Fe-Zn alloy	S. Shiotani	· · ·	394
D33	Effect of solid-liquid interface anisotropy on hot-dip galvanizing spangle texture formation	T. Takaki	· · ·	396
D34	Alloying effects on the reaction of Fe and Zn during heating of Zn-coated steels to austenite single phase	G. Miyamoto	· · ·	397
D35	Effect of microstructure evolution of galvanized coating on ZnO formation behavior during hot-stamping heating	S. Hayashida	· · ·	399
D36	Effect of Mn addition on powdering resistance of galvanized coating ~Verification by sputtering method~	N. Takeuchi	· · ·	402

Program of the 186th ISIJ Meeting (September 20-22, 2023)

High Temperature Processes

Lecture No.	Title	Speaker	Page
Plenary Session			
Coal and coke			
1	Method for evaluating the distribution and composition of minerals in coal (1)	M. Sasaki	404
2	Method for evaluating the distribution and composition of minerals in coal (2)	H. Watanabe	405
3	Relationship between oxygen consumption and amount of gas generated during low temperature oxidation of coal	M. Uchida	406
4	Technological development of ironmaking process utilizing ferro-coke	M. Nagayama	407
Young engineer session of coke-making 1			
5	Washing method for a scrubber of a BTX removal process in coke oven gas purification	K. Yamada	408
6	Efficient washing under the belt conveyor with a siphon water supply system	Y. Yoshimori	409
7	Construction report of coke lording facilities to increase a lording capacity	Y. Ogawa	410
8	Sediment in PAC tank troubleshooting	M. Yamamoto	411
Young engineer session of coke-making 2			
9	Rapid analysis of coke reactivity index using Raman spectroscopy	H. Hashida	412
10	Heat consumption improvement of battery D No.5 coke oven at West Japan Works (Fukuyama)	K. Ohsedo	413
11	Evaluation method of coal fluidity of non-or slightly caking coal by addition of aromatic amines	S. Arakawa	414
Frontier of high temperature physical chemistry in oxide/metal interface 1			
12	Three-dimensional observation method of inclusions in steel	I. Hirashima	415
13	Thermophysical property measurement of Fe-Ga melts using electromagnetic levitation technique	M. Adachi	416
14	Thermal conductivity of Na ₂ O-SiO ₂ melt calculated from temperature rise data in short-time region by hot-wire method	T. Hashimoto	417
15	Thermal conductivity measurements of Fe ₃ O ₄ and Fe ₂ O ₃ scales produced by thermal oxidation	R. Endo	418
Frontier of high temperature physical chemistry in oxide/metal interface 2			
16	The density and viscosity measurements of Ni-Ti melts using electrostatic levitation methods	M. Watanabe	419
17	Surface tension measurement of liquid platinum by oscillating droplet methods using levitation techniques	Y. Seimiya	420
18	Heat of fusion measurement for metals from hypercooling limit using an aerodynamic levitator	K. Kawamoto	421
Solidification and structure 1			
19	Crystallographic orientation relationship between austenite grains during solidification in Fe-22Mn-0.7C alloy	K. Fujita	422
23	(ISIJ Research Promotion Grant) Giant undercooling in the δ - γ transformations in steels with diameters on the order of 100 μ m	R. Katsube	423
24	(ISIJ Research Promotion Grant) Crystal orientation relationships between δ and γ phases observed for the massive-like transformation in steels with diameters on the order of 100 μ m	M. Osaki	424
22	Measurement of partition coefficients in low-alloy steel with peritectic reaction	S. Yano	425
Solidification and structure 2			
20	Three-dimensional behavior of microsegregation in succinonitrile solutions using confocal laser microscopy	Y. Tsukahara	426
21	Dendrite behavior grown from top surface of simulated molten steel under vibration imposition	M. Iwahana	427
25	The effect of solidification conditions on the macro segregation behavior in 8%Cr type die steel cast in modified Sato-Mold	K. Chiba	428
26	Influence of solidification rate on shrinkage porosity for 8%Cr type die steel	Y. Sumi	429
Sintering process			
27	Composition range and phase equilibrium of SFCA-I on the CaO-Fe ₂ O ₃ -Al ₂ O ₃ and CaO-SiO ₂ -Fe ₂ O ₃ -5mass% Al ₂ O ₃ systems at 1240°C in air	H. Sato	430
28	Effects of admixing ratio of CaO component to pellets and coke rate on the oxidation behavior of magnetite in pellets during the composite sintering process	K. Hirano	431
29	Effect of basicity of pellet and granule on sinter productivity in the composite sintering process	S. Fujiwara	432
30	Promotion of nitrogen oxide reduction by calcium ferrite compounds	S. Nagae	433

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Quality of agglomerates

31	Effect of pore structure on gas permeability of iron ore sinter	Y. Nagase	• • •	434
32	Effect of magnetite concentration on particle distribution of sinter after degradation	K. Nishihiro	• • •	435
33	Temperature dependence of reduction disintegration of self-fluxing pellet under high hydrogen condition of blast furnace	K. Momma	• • •	436
34	Relationship between Al ₂ O ₃ and SiO ₂ contents and compressive strength of fired iron ore pellets from the perspective of microstructure	K. Mitsui	• • •	437

Phenomena in blast furnace

35	Analysis of heat transfer in a reducing iron oxide pellet at CO and H ₂ atmosphere	J. Kim	• • •	438
36	Softening and melting behaviors of mixed burdens consisting of sintered ores, pellets, and lump ores under H ₂ reduction	T. Hoshika	• • •	439
37	Numerical simulation of sintered ore softening and deformation behavior varied by reducing process	R. Honda	• • •	440
38	Numerical analysis of forces on particles in a blast Furnace raceway	R. Matsuda	• • •	441

Analysis and control of blast furnace

39	Application of the mathematic model in the study of ironmaking blast furnace operations: steady-state and dynamic in-furnace phenomena	Z. Zhao	• • •	442
40	A novel ironmaking decarbonisation technology: Co-injection of hydrogen and biochar (CoHB)	M. Gan	• • •	443
41	Development of automation technology for blast furnace operation in nippon steel corp	T. Natsui	• • •	444
42	Development of PID control system for productivity and heat level of blast furnace (Development of automation technology for blast furnace operation-2)	S. Nakayama	• • •	445
43	Development of predictive control function for blast furnace operation (Development of automation technology for blast furnace operation-3)	S. Yamaki	• • •	446

Slag

44	Phase development in the steelmaking slag during the gas quenching granulation process and the evaluation of their properties	W. Gu	• • •	447
45	Effect of additive material on Fe dissolution behavior of steelmaking slag granules	M. Takano	• • •	448
46	Effect of cooling conditions on the solidification of steelmaking slag containing chromium oxide	S. Motoyoshi	• • •	449
47	Effect of thermal treatment on chromium dissolution behavior from steelmaking slag	H. Mizutani	• • •	450

Introduction of research topics in novel processing forum 1

48	Microwave process scale-up and optimization techniques	K. Kashimura	• • •	451
49	Pulverizing behavior of the discharged slag from reduction period of electric furnace	T. Kozuka	• • •	452
50	Eutectic ratio of alloy solidified with ultrasound under convection suppression	K. Fujita	• • •	453

Introduction of research topics in novel processing forum 2

51	Setting position effect of sucrose in water on its dissolution under ultrasonic vibration	M. Shino	• • •	454
52	Effect of operating conditions on formation of fine Cu particles by ultrasonic irradiation	K. Okumura	• • •	455
53	High temperature solvent extraction of neodymium from neodymium magnets using aluminum and bismuth	M. Yamaguchi	• • •	456
54	The influence of magnetic field on the morphology of anodic oxidation film of titanium	M. Urakawa	• • •	457

Solidification and structure 3

55	Systematic evaluations of semi-solid shear deformation behaviour through MPF-LB simulations	N. Yamanaka	• • •	458
56	Time-resolved and in-situ observation of phase transformation in Cu-Sn alloys	Y. Urakawa	• • •	459
57	Copper sulfide precipitation in Cu contain high carbon steel	K. Tokutomi	• • •	460
58	(ISIJ Research Promotion Grant) Prediction of atomic structure of solidification microstructure using deep generative model	Y. Shibuta	• • •	461

Continuous casting and solidification

59	Improvement of uneven solidification in hypo-peritectic steel by heat flux control mold	K. Furumai	• • •	462
60	Water model study of casting conditions effect on tundish slag entrapment	J. Nakashima	• • •	463
61	Investigation of the formation process of ununiform-solidification structure related to the cycle of V-segregation	K. Izawa	• • •	464

Reduction

62	Effect of reduction characteristic of fine iron ore by pulverized coal on atmospheric gas and mixing ratio	Y. Ueki	• • •	465
----	--	---------	-------	-----

Program of the 186th ISIJ Meeting (September 20-22, 2023)

63	Effect of reducing gas composition and ore type on sticking of powder ore	K. Fujihara	• • •	466
64	Effect of reduction conditions on reduction behaviors and microstructure characteristics of pellets for hydrogen reduction in shaft furnace	J. Li	• • •	467
Shaft furnace				
65	Two-phase flow analysis on powder behavior in packed bed of shaft furnace	Y. Hanada	• • •	468
66	Estimation of direct reduction process stability with hydrogen increment	M. Sun	• • •	469
67	Hy ³ (Hy-CUBE): Hyundai steel's initiative for carbon avoidance steelmaking	H. Kim	• • •	470
Fundamentals				
68	Periodicity of interaction coefficients in molten Fe-based alloys	H. Todoroki	• • •	471
69	Effect of FeO on the activities of components in Ca ₂ SiO ₄ -Ca ₃ P ₂ O ₈ solid solutions	K. Saito	• • •	472
70	Thermodynamic properties of sulfur in the CaO-AlO _{1.5} -LaO _{1.5} system	R. Takada	• • •	473
71	Thermodynamic properties of vanadium oxide in the CaO-SiO ₂ -VO _x slag at 1873K	D. Park	• • •	474
72	(ISIJ Research Promotion Grant) Precipitation behavior of AlN inclusions in Fe-2.0mass%Al-(2.0-10.0)mass%Mn alloy under continuous unidirectional solidification process	K. Imai	• • •	475
Recycling of waste and refractories				
73	Condensation of samarium using solid-liquid slag	R. Umeda	• • •	476
74	Synthesis of LiFePO ₄ from steelmaking slag extract	J. Deng	• • •	477
75	Quantitative analysis of fatigue fracture of refractory bricks using persistent homology	T. Higaki	• • •	478
76	Improvement of durability of tundish refractories by suppressing crack formation caused by impact during dismantlement of tundish coating	Y. Kato	• • •	479
Transport phenomena				
77	Analysis of mass transfer coefficients at gas-liquid and liquid-liquid interfaces in gas stirred vessel	H. Sato	• • •	480
78	Entrapment velocity of inclusions at liquid-liquid interface	H. Arai	• • •	481
79	Representation of flow phenomena under experimental condition of multiple non-dimensional numbers similitude	Y. Tsukaguchi	• • •	482
80	Validation of DEM simulation for scraps and cokes packed bed charged from a bottom-gate bucket	A. Matsunaga	• • •	483
81	Temperature changes in molten steel by Al-dross addition and blowing dry air	S. Kim	• • •	484
Operational improvement and theoretical consideration in refining process 1				
82	Development of desulfurization process at normal pressure for production of ultra-low sulfur steel	M. Muranushi	• • •	485
83	Change in composition of molten steel during top blowing of CaO powder under reduced pressure	S. Kasahara	• • •	486
84	Development of torpedo car type dephosphorization method without using fluorine	H. Negishi	• • •	487
85	Skull suppression development in BOF type dephosphorization furnace	K. Ouchi	• • •	488
Operational improvement and theoretical consideration in refining process 2				
86	Nozzle clogging mechanism in a casting process of Al-Ti-Ca containing alloy	Y. Kimura	• • •	489
87	Optimization of gas blowing pattern during VCR	T. Fukushi	• • •	490
88	Thermodynamic analysis of slag-metal reaction in melting process of direct reduced iron and steel scraps	K. Kato	• • •	491
89	Recovery of zinc by reaction between electric furnace dust and calcium chloride	K. Okumura	• • •	492
Secondary refining				
90	Effect of liquid fraction on reaction rate of molten steel desulfurization using solid-liquid coexisting slag	A. Matsuzawa	• • •	493
91	Investigation of copper migration by electrochemical reaction at the interface between molten iron containing copper and molten slag	K. Mori	• • •	494
92	Removal process of copper from steel scrap by plasma nitrogen-metal reaction	A. Suzuki	• • •	495
Inclusion				
93	The effect of deoxidizing elements on inclusions in vacuum refining of stainless steel	S. Narita	• • •	496
94	(ISIJ Research Promotion Grant) Effect of Ti addition on sulfide inclusion morphology of stainless steel	T. Sato	• • •	497
95	Effect of cooling rate on secondly inclusions of Fe-36mass%Ni alloy	H. Fukaya	• • •	498
96	Crystallization kinetics of the CaO-SiO ₂ -Al ₂ O ₃ -MgO system inclusions	Y. Wang	• • •	499
97	Nonmetallic inclusions in Fe-18Cr-2Mo Alloy during unidirectional solidification experiments	K. Kameda	• • •	500

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Young engineer session of iron making 1

98	Development of technology to control melt assimilation in parallel granulation system 1 (Improvement of the sintered ore strength by optimizing raw material distribution)	K. Koga	· · ·	501
99	Development of technology to control melt assimilation in parallel granulation system -2 (Effect of melt properties on microstructure of sintered ores)	S. Yamazaki	· · ·	502
100	Effect of decreasing air flow rate between two ignition furnaces on sinter product yield at remo-tec development of REMO-tec (RE-ignition method for optimization of total energy consumption) -7	M. Matsumura	· · ·	503
101	High yield operation test by decreasing air flow rate between two ignition furnaces at Kimitsu No.3 sinter plant [RE-ignition method for optimization of total energy consumption-8]	K. Okada	· · ·	504

Young engineer session of iron making 2

102	Effect of the accumulation of molten slag and iron at the blast furnace hearth on the gas pressure drop	R. Matsunaga	· · ·	505
103	The low coke ratio operation of Muroran No.2 Blast Furnace	R. Matsuo	· · ·	506
104	Relining and blow-in operation of Kurashiki No.4 (3rd) blast furnace	Y. Takahama	· · ·	507

Pre-treatment of high phosphorus iron ore 1

105	Removal of gangue components in iron ore by alkali-hydrothermal treatment using a flow-type reactor	N. Tsubouchi	· · ·	508
106	MLA analysis of iron ore after alkali hydrothermal treatment	R. Murao	· · ·	509
107	Dephosphorization of high phosphorus iron ore by roasting with limestone, reduction, and magnetic separation	R. Minakawa	· · ·	510

Pre-treatment of high phosphorus iron ore 2

108	Development of dephosphorization technology via Al-Si-P-O phase formation	T. Adachi	· · ·	511
109	Volatilization removal of phosphorus in high phosphate iron ore by electrothermal reduction under vacuum condition	E. Shibata	· · ·	512
110	Simultaneous reduction behavior of phosphorus and iron from high-P iron ore	X. Gao	· · ·	513

Sustainable Systems

Lecture No.

Plenary Session

Title

Speaker

Page

Key technologies for reducing CO₂ emission from iron-making industry

111	Preparation of formed coke by two-stage carbonization of acid-loaded woody biomass	S. Kudo	· · ·	514
112	Research on landfill avoidance and coal replacement effect by organic waste carbonization	M. Sekiya	· · ·	515
113	Reaction behavior of iron ore constituent phases in the ironmaking process using ammonium salt	H. Tsuru	· · ·	516
114	PIV analysis of rotary cylindrical heat exchanger	N. Maruoka	· · ·	517
115	Improvement of energy storage material for a direct-heat exchange type chemical heat storage	K. Nakaso	· · ·	518

Slag and dust recycle for sustainable system

116	(ISIJ Research Promotion Grant) Calcium recovery from steel slag through electrochemical techniques	L. Xu	· · ·	519
117	(ISIJ Research Promotion Grant) Phosphorus recovery process from steelmaking slag eluate by electro dialysis -Effect of Si ions on phosphorous ion separation-	Y. Sasaki	· · ·	520
118	Development of alkaline leaching process of zinc from EAF dust	K. Haiki	· · ·	521
119	Dissolution of Zn from EAF dust in aqueous solution	S. Yokoyama	· · ·	522
120	Reduction process of EAF dust by dry magnetic separation	H. Kubo	· · ·	523

Green energy technologies in ironmaking process for green transformation

121	Investigation of hybrid sensible/latent heat storage material using molten nitrate and Al alloy-based microencapsulated phase change material	Y. Shimizu	· · ·	524
122	Evaluation of heat storage and release performance in a bench scale packed bed latent heat storage system with high temperature latent heat storage pellets	T. Nakamura	· · ·	525
123	Development of energy harvesting technology using waste heat from steelworks	T. Kuroki	· · ·	526

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Instrumentation, Control and System Engineering

Lecture No.	Title	Speaker	Page
Plenary Session			
System			
124	Application of anomaly detection system for steelmaking plants and development of model-updating guidance	Y. Harada	527
125	Development of Real-time state estimation model for a converter	H. Kase	528
126	Application of parallel computing multiple meta strategies to the scheduling problem in production process with crane interference	S. Hashimoto	529
Instrumentation			
127	High-accuracy outer diameter measurement of threads for oil country tubular goods	S. Oshima	530
128	The measurement method of welding misalignments of steel pipes using AR markers and a smartphone	Y. Tsukamoto	531
129	Development of gas leak detect camera with ultrasonic sensors for mounting on a drone	K. Ishiyama	532
Control			
130	Multivariable data-driven control and prediction for looper control system in hot rolling mill	K. Futamatagawa	533
131	Fictitious Reference Iterative Tuning for thickness control in hot rolling process as a cascade control system	M. Ikesawa	534
132	Development of automatic learning function for short stroke auto width control	A. Suzuki	535
133	Development of model predictive control system for automatic blast furnace operation (Development of automation technology for blast furnace operation-4)	H. Yamamoto	536

Processing for Quality Products

Lecture No.	Title	Speaker	Page
Plenary Session			
Control technologies for free cutting 15			
134	Detailed measurement of temperature on rake face of tool in high carbon steel cutting	A. Ikuta	537
135	Effect of cutting speed on machinability and residual stress of heat treated S55C steel	A. Takemura	538
136	Coating properties of shot-peened coated carbide inserts	R. Tose	539
137	Fundamental study on machinability of scale with S55C	M. Hagino	540
138	Effect of cutting temperature on material deformation and residual stress	R. Hanaki	541
Numericalization of the structure of additive manufacturing materials I			
139	Hydrogen effect on SSRT property in additively manufactured SUS304L	K. Wada	542
140	(ISIJ Research Promotion Grant) Effects of thermal history variation with part geometry on solidification microstructure and mechanical properties of SUS304L in laser powder bed fusion	M. Kusano	543
141	Persistent homology analyses to the microstructure of laser powder bed fused Al-Si alloy	A. Suzuki	544
Numericalization of the structure of additive manufacturing materials II			
142	(ISIJ Research Promotion Grant) Periodic analysis of pores in Ti L-PBF material in the building direction	Y. Shigeta	545
143	(ISIJ Research Promotion Grant) Effect of defects on plastic deformation of LPBF CP-Ti	K. Kondoh	546
144	Fabrication of Y ₂ O ₃ -decorated stainless-steel powders by hetero-agglomeration and their laser powder bed fusion	S. Fujita	547
Modeling of various phenomena in metal forming and its application			
145	Predicting ductile fracture during torsion testing using ellipsoidal void model and another model	K. Komori	548
146	Numerical investigation of dynamic recrystallization and following softening behaviors of steels	Y. Yamashita	549
147	Cyclic loading behavior of pre-formed steel for cold forging	K. Hayakawa	550
148	Development of wrinkle-free deep drawing method for large metallic foil	N. Yukawa	551
Surface and tribology			
149	Effect of nitrided layer on fatigue properties in various nitriding methods of steel	T. Tomizawa	552
150	Development of atmospheric-pressure plasma jet nitriding for steel in air	N. Takahashi	553
151	Effect of mating material on the wear of SKD 11 coated with FeGa ₃ in an atmospheric environment	R. Protasius	554
152	Micro-Plasto hydrodynamic lubrication in cold rolling of steel sheet 1 (Confirmation of Micro-Plasto hydrodynamic lubrication)	S. Inagaki	555

Program of the 186th ISIJ Meeting (September 20-22, 2023)

The technical session by young engineers of hot rolling I

153	Improvement of roll-coolant ability in the roughing mills	S. Yamano	• • •	556
154	Activities to reduce misscoils	Y. Nanri	• • •	557
155	Improved accuracy of coiling temperature by stabilizing the cooling state	S. Harada	• • •	558

The technical session by young engineers of hot rolling II

156	Measures to improve coiler temperature control accuracy	K. Ikemoto	• • •	559
157	Fukuyama IHOT Replacement of crop shear	T. Ihara	• • •	560
158	Measures against issues of down coiler	T. Uesugi	• • •	561

Rolling

159	Evaluation method of surface heat flux for water jet cooling to a moving hot plate	S. Fujita	• • •	562
160	Influence of sizing press condition on width drop at head and tail portions of slab	H. Goto	• • •	563
161	Technology of width control for taper slab in hot rough rolling	D. Choi	• • •	564
162	Development of shape control technology based on data science for 12Hi cluster rolling mill	T. Kitamura	• • •	565

Reliability evaluation of weld 5

163	Experimental measurement of heat amount transported to tungsten electrode in TIG welding	Y. Asai	• • •	566
164	Effect of cathode spot behavior on metal transfer phenomena in metal inert gas welding	K. Aoyama	• • •	567
165	A machine learning based recognition of different experimental conditions for steel-weld microstructural images	K. Tsutsui	• • •	568
166	Microstructure and mechanical properties in dissimilar weld of copper to 304 stainless steel produced by TIG arc welding	Y. Sato	• • •	569
167	Influence of chemical composition of filler wire on antibacterial property of dissimilar overlay weld metals of Cu alloy on stainless steel	K. Kadoi	• • •	570

Microstructure and Properties of Materials

Lecture No.

Plenary Session

Title

Speaker

Page

Machine structural steel 1

168	Microstructure refinement and toughening by induction heating in SCM440	T. Tsubakura	• • •	571
169	Friction / wear and rolling contact fatigue properties under oil lubrication in steels for machine structural use with ultrafine structure surface-treated by repeated induction heating and quenching	Y. Todaka	• • •	572
170	Effect of isothermal transformation treatment on the rolling contact fatigue life of bearing steel	A. Iwamaru	• • •	573

Machine structural steel 2

171	Influence of porous layer on rotating-bending fatigue strength and pitting resistance of nitrided-SCM440H steel	T. Maruyama	• • •	574
172	Pore closure and pitting resistance in rolling-sliding-contact fatigue of nitrided-SCM440H steel	T. Maruyama	• • •	575
173	Effect of high dislocation density on fatigue properties of high carbon steel wire	T. Terahata	• • •	576
174	Effects of metallographic structure on the appearance of nieutsuri in blade patterns of Japanese sword	H. Kanno	• • •	577

Hydrogen embrittlement 1

175	Successive EBSD observation of hydrogen-induced deformation twinning in Fe-Cr-Ni austenitic steel	Y. Ogawa	• • •	578
176	A mechanism behind hydrogen-assisted fatigue crack growth in low-carbon steel focusing on a thermally activated process of hydrogen-dislocation interaction	O. Takakuwa	• • •	579
177	The characteristics of hydrogen solution in Fe-Cr-Ni austenitic alloys investigated by first-principles calculation: the roles of Cr and Ni atoms on average and local hydrogen concentration	J. Moriyama	• • •	580
178	Fatigue crack growth property of 1 GPa-class martensitic steel with different prior austenite grain sizes in gaseous hydrogen environment	K. Kuriyama	• • •	581
179	Development of a visualization technique for hydrogen in metals using a conductive polymer	H. Kakinuma	• • •	582

Hydrogen embrittlement 2

180	Development of deformation microstructures in hydrogen-assisted fatigue fracture of ferritic / pearlitic steel and martensitic steel	H. Matsumiya	• • •	583
181	Identifying hydrogen trapping sites induced by deformation in pearlitic steels by 3D atom probe	T. Sasaki	• • •	584
182	Dependence of delayed fracture property of martensitic steel on carbon density at grain boundaries	I. Fujimoto	• • •	585
183	Microstructure change and crack initiation processes in white structure spalling of rolling bearings	S. Endo	• • •	586
184	Strengthening of high carbon steel for suppression of hydrogen embrittlement of rolling bearings	M. Yamada	• • •	587

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Strength and deformation behavior 1

185 (ISIJ Research Promotion Grant) Tensile deformation behavior of 9mass%Ni steel at low temperature	N. Koga	• • •	588
186 Explanation of dominant factors of {110} in Fe-3%Si alloys	T. Kose	• • •	589
187 Effect of aging on strain development in simple shear tests of pearlitic steels	Y. Ono	• • •	590
188 Microstructure and mechanical properties of cold rolling Fe-23%Ni-5.0%Al-0.8%C alloy	N. Gomi	• • •	591
189 Non-destructive orientation mapping of plate-like samples with laminographic three-dimensional X-ray diffraction microscopy	Y. Hayashi	• • •	592

Strength and deformation behavior 2

190 The factors affecting Lüders strain in austenitic TRIP steels and ferritic steels	N. Maruyama	• • •	593
191 Deformation characteristics of Lüders front in metastable austenitic TRIP steels and ferritic steels	N. Maruyama	• • •	594
192 Microscopic inhomogeneous deformation of steel under Lüders deformation	S. Sadamatsu	• • •	595
193 Difference between carbon and nitrogen in solid solution on propagation behavior of tensile local deformation band in ferritic steel	E. Kyo	• • •	596
194 Grain size effect on yielding and Lüders deformation behavior in high purity iron studied by digital image correlation (DIC) analysis	W. Lau	• • •	597

Strength and deformation behavior 3

195 Shear band development in bending of a ferrite-martensite dual-phase steel	Y. Asada	• • •	598
196 Factor analysis of strain distribution generation process in Dual-Phase steel using a machine learning technique	K. Hayashi	• • •	599
197 Micromechanical investigation of martensite transformation and strain partitioning in a medium carbon quenching and partitioning steel	W. Yin	• • •	600
198 Effect of retained austenite on tensile deformation behavior of 1.5GPa-grade ultra-high strength martensitic steels	N. Tsuchida	• • •	601
199 Effect of microstructure on hole expansion ratio of cold rolled high strength low alloy steel	C. Lee	• • •	602

Stainless steel

200 Effect of nitrogen in solid solution on high temperature strength of austenitic stainless steels	N. Itabashi	• • •	603
201 Effect of B on work hardening of stable austenitic stainless steels	S. Yamasaki	• • •	604
202 Influence of precipitation during heating on recrystallization behavior in high-purity ferritic stainless steel sheet	T. Inada	• • •	605

Surface treatment and corrosion

203 Effect of heating on coating composition and corrosion of ZnMgAl coated steel	I. Sohn	• • •	606
204 Effect of boron on the phosphatability of high strength cold-rolled steel sheets	S. Furuya	• • •	607
205 (ISIJ Research Promotion Grant) Relationship between sulfide inclusions and pitting corrosion resistance of stainless steels	M. Nishimoto	• • •	608
206 Influence of shot ejection pressure on hot shot peened surface property	T. Miyake	• • •	609

Electrical steel

207 Secondary recrystallization mechanism in heavily cold-rolled grain-oriented silicon steel (3)	R. Matsubara	• • •	610
208 Phase-field simulation of secondary recrystallization in grain-oriented silicon steel	Y. Suwa	• • •	611
209 Domain-wall-structure model of through the thickness of Fe-Si sheet studied by X-ray topography	T. Kataoka	• • •	612

Recrystallization and texture

210 Inhomogeneous deformation near grain boundaries in Ti-added ultra-low carbon steel	T. Yabuuchi	• • •	613
211 Microstructural evolutions of ferrite and cementite with interaction during recrystallization in pearlite	T. Yang	• • •	614
212 Analysis of unrecrystallized austenite-ferrite transformation behavior and orientation relationship between ferrite and austenite in Nb-added low carbon steel	N. Osumi	• • •	615
213 Effect of MoS ₂ on deformation and recrystallization textures of ball milled iron particle	S. Motozuka	• • •	616

Martensitic transformation

214 A mechanism for dependency of Ms on grain size of austenite and influence of textures	T. Tomida	• • •	617
215 3D <i>in situ</i> observation for strain-induced martensitic transformation in austenitic steel by synchrotron X-ray	T. Iwano	• • •	618
216 Crystallographic characterization of deformation-induced martensitic transformation in ultrafine grained metastable austenitic steel	Y. Liu	• • •	619
217 Effect of rolling temperature on mechanical properties of TRIP-aided martensitic steel sheet	G. Kojima	• • •	620

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Phase transformation and microstructure control 1

218	Effect of Mn concentration in cementite on austenitization behavior of Fe–C–Mn alloys	K. Fujikura	• • •	621
219	Phase stability and thermal expansion property of additive manufactured super invar alloy	S. Sai	• • •	622
220	Suppression of grain coarsening in directly quenched steel after hot forging	J. Tanaka	• • •	623
221	Precipitation behavior of fine carbide particles in heat-resistant austenitic stainless steel	N. Kitagawa	• • •	624

Phase transformation and microstructure control 2

222	Effect of solution treatment temperature on Hall-Petch coefficient in ferritic steels	A. Morimatsu	• • •	625
223	A precise measurement of grain boundary segregation by STEM-EDS and ζ factor method (Development of a precise measurement and a quantitative prediction of grain boundary segregation -1)	Y. Murata	• • •	626
224	Thermodynamic approach for grain boundary segregation in Fe-P alloys (Development of a precise measurement and a quantitative prediction of grain boundary segregation -2)	M. Egami	• • •	627

Heat resistant steels and alloys 1

225	Prediction of the graphitization behavior during long-term creep in carbon steels	T. Hatakeyama	• • •	628
226	Ductility of high-Cr ferritic heat-resistant steels during long-term creep deformation	M. Mitsuhara	• • •	629
227	Microstructural evolution on high-temperature hydrogen exposure in Fe-Ni based alloys	Y. Tsuda	• • •	630
228	Alloying effects on the stability of γ/γ'' two-phase microstructure	S. Nishida	• • •	631

Heat resistant steels and alloys 2

229	The influence of preheating on fatigue life of Alloy718 fabricated by selective laser melting	K. Ogawa	• • •	632
230	Microstructure and mechanical properties of high-entropy alloys processed by selective laser melting	H. Xie	• • •	633
231	Measurement of dislocation density measured X-ray diffraction in-situ tensile test at elevated temperature in the SLM fabricated Ni-based superalloy	A. Ito	• • •	634
232	Effects of powder overlay welding processes on microstructure and hardness of overlaid Ni-based alloy	T. Maruyama	• • •	635

Modeling and simulation 1

233	Improvement in the strength-ductility balance of dual phase steel using generative adversarial networks	Y. Fukatsu	• • •	636
234	Image generation of virtual dual phase steel reflecting the process by conditional generative adversarial networks	R. Narikawa	• • •	637
235	3D microstructure reconstruction of metal using SliceGAN and its quantitative evaluation	K. Sugiura	• • •	638
236	Application of precipitate pinning effect to simulation of austenite abnormal grain growth using cellular automaton method	K. Murata	• • •	639

Modeling and simulation 2

237	Thermodynamics for synthesizing ultrafine lamellar structures composed of martensite and metastable austenite in the Fe-Mn-C system	M. Muench	• • •	640
238	Thermodynamic analysis for effects of alloying elements on carbon diffusion in austenite phase of low-carbon steels	T. Nishibata	• • •	641
239	Data-driven estimation of plastic properties of alloys using neighboring indentation test	T. Chen	• • •	642
240	Quantitative phase-field simulation of melting process of cold scrap iron	I. Shiga	• • •	643

Hydrogen embrittlement 3

241	Analysis of hydrogen embrittlement mechanism of steel by simultaneous monitoring of corrosive environment, hydrogen entry and hydrogen embrittlement	M. Kawamori	• • •	644
242	Influence of iron carbide on delayed fracture resistance in Si added steel	Y. Matsumoto	• • •	645
243	The relationship between the microstructure and hydrogen embrittlement properties of high Si containing and rapid tempering steel	M. Sunako	• • •	646
244	Micro-mechanical characterization of hydrogen embrittlement of SUH660 using micro-tensile testing	S. Momono	• • •	647
245	Effect of Ni equivalent and stacking fault energy on hydrogen embrittlement of austenitic stainless steels	N. Takahashi	• • •	648

Hydrogen embrittlement 4

246	Effects of alloying elements on hydrogen diffusion and hydrogen absorption in Fe-Cr-Ni alloy	T. Omura	• • •	649
247	First-principles analysis of the mechanism of the effects of Cr, Mn, and Fe on the hydrogen solubility of Ni	K. Ito	• • •	650
248	Atomistic study of hydrogen segregation at grain boundaries in α -Fe polycrystals using interatomic potentials	K. Ito	• • •	651
249	Hydrogen embrittlement evaluation of bulk cementite by microbending tests during hydrogen charging	K. Tomatsu	• • •	652

Program of the 186th ISIJ Meeting (September 20-22, 2023)

250	Convenient hydrogen embrittlement test method 0.3mm thin wall hollow high pressure hydrogen low temperature tensile test method	S. Torizuka	• • •	653
Hydrogen embrittlement 5				
251	Effect of Mn content on hydrogen embrittlement resistance of tempered martensite in low alloy steel	S. Yoshida	• • •	654
252	Effect of grain size on hydrogen embrittlement in tempered martensitic low alloy steel	K. Hani	• • •	655
253	Observation of hydrogen in HPT-Fe using magnetic small-angle neutron scattering	Y. Oba	• • •	656
254	Effects of solid-solute aluminum, silicon, and titanium on hydrogen embrittlement susceptibility of iron	A. Udagawa	• • •	657
Hydrogen embrittlement 6				
255	Effects of hydrogen transportation by dislocations on hydrogen-related intergranular fracture of tempered martensitic steel	K. Okuno	• • •	658
256	Effect of tensile speed on crack initiation and propagation behavior of tempered martensitic steel with hydrogen	Y. Hirakawa	• • •	659
257	Effects of grain boundary characteristics and grain size on crack propagation of hydrogen embrittlement in pure iron	Y. Kimoto	• • •	660
258	Effects of temperature and strain in dynamic strain aging on delayed fracture susceptibility of tempered martensitic steel	D. Ueno	• • •	661
Toughness				
259	Effect of temperature rise during Charpy impact test on deformation-induced transformation of metastable austenitic steels	X. Yuan	• • •	662
260	Brittle fracture of high strength martensitic steels with coarse cementite	T. Otsuki	• • •	663
261	Relationship between heat treatment and mechanical properties of high-hardness, high-ductility hypereutectoid steel	H. Nakakita	• • •	664
262	Estimation for Weibull stress with stress analysis	T. Ozawa	• • •	665
Fatigue				
263	Effects of cyclic softening on fatigue crack propagation properties	T. Yonezawa	• • •	666
264	Flaking process with white etching area under rolling contact fatigue of carburized SAE5120	D. Takazaki	• • •	667
265	(ISIJ Research Promotion Grant) Micro-mechanical characterization of shear-type fatigue crack growth in WC-Co alloy using small specimen	Y. Tampa	• • •	668
Process Evaluation and Material Characterization				
Lecture No.	Title	Speaker		Page
Non-destructive / on-site analysis for materials related to steel				
266	High-temperature oxidation behavior of metals by hydrogen supply using alkaline water electrolysis	M. Fukumoto	• • •	669
267	Characterization of the anisotropic physical properties of functional iron alloys	S. Suzuki	• • •	670
268	Spatial distribution measurement of non-metallic inclusions in steel using ion beam induced luminescence	S. Imashuku	• • •	671
269	Gas pressure measurement beneath of oxide scale during high-temperature oxidation of steel	R. Okumura	• • •	672
270	(ISIJ Research Promotion Grant) Development of frequency-tunable sub-terahertz measurement system and its NDT applications	T. Tanabe	• • •	673
Organic compound analysis / Crystal structure analysis				
271	Characterization of pyrolysis gas in coals with the different rank using VUV-SPI-TOFMS	N. Tsuji	• • •	674
272	Chemical structural analysis for oxidized coal using isotope ¹⁷ O gas and solid state ¹⁷ O NMR	Y. Hata	• • •	675
273	Quantitative method of gases generate by low temperature oxidation reaction of coal with isotopic oxygen	Y. Tobu	• • •	676
274	Effect of dislocations on stress relaxation of metals	K. Baba	• • •	677
Surface and state analysis/Elemental analysis				
275	(ISIJ Research Promotion Grant) Expansion behavior and spectral features of uranium atoms in UO ₂ laser ablation	A. Kuwahara	• • •	678
276	(ISIJ Research Promotion Grant) Measurement of enhancement factor by arc superposition in laser-induced breakdown spectroscopy (LIBS)	H. Muneoka	• • •	679
277	Structural analysis of phosphorus adsorbed goethite using quantum chemical calculations	S. Kawanami	• • •	680
278	Structural analysis of phosphorus adsorbed goethite in iron ore by microscopic infrared spectroscopy and quantum chemical calculations	S. Kawanami	• • •	681

Program of the 186th ISIJ Meeting (September 20-22, 2023)

ISIJ and JIM Joint Sessions

Lecture No. Joint Session	Title	Speaker	Page
Titanium and its alloys 1			
J1	Improvement of an open atmosphere focused pulsed laser nitrided Ti surface through a control of laser-induced plasma	A. Yoshino	682
J2	Surface characteristics of the focused pulsed laser-treated titanium in the mixture gas comprising oxygen and nitrogen	K. Yonemoto	683
J3	Electronic structure analysis of light element doped rutile TiO ₂ using the all-electron mixed basis <i>GW</i> approach	R. Sahara	684
J4	Evaporation behavior of Al in Ti-Al binary alloy melts	H. Mizukami	685
Titanium and its alloys 2			
J5	Network microstructure formation and improvement of mechanical properties of near- α Ti alloy by heat treatment optimization	T. Tanigawa	686
J6	Effect of aging temperature on formation of bi-lamella microstructure in Ti-6Al-4V alloys	T. Kiguchi	687
J7	Fabrication of Ti-Zr binary alloys with periodic microstructure	T. Shiraiishi	688
Titanium and its alloys 3			
J8	Strengthening mechanisms of P/M Ti-Fe extruded materials with rhenium addition	T. Teramae	689
J9	Laser-assisted additive manufacturing of Ti-Zr Alloy: an alternative metal for medical implants	A. Issariyapat	690
J10	Enhancing ductility in additively manufactured solute-lean martensitic Ti-alloys	J. Huang	691
J11	Single-crystal-structure formation of Ti-6246 alloy in laser powder bed fusion and unique α variant selection after β annealing	T. Kitashima	692
Titanium and its alloys 4			
J12	Measurement of internal fatigue crack in Ti-6Al-4V using synchrotron radiation X-ray CT	F. Yoshinaka	693
J13	Effect of Al content on the superelastic and mechanical properties of Ti-Mo-Al ternary alloys	N. Nohira	694
J14	Effects of O and Al addition on active twinning systems in titanium	G. Tsukamoto	695
J15	Effect of heat treatment condition on machinability of Ti-5Al-2Fe-3Mo	T. Kunieda	696
Titanium and its alloys 5			
J16	Plastic properties of a Ti-6Al-2Sn-4Zr-2Mo-Si alloy with duplex ($\alpha+\alpha'$) microstructure	H. Matsumoto	697
J17	Room temperature tensile properties of layered Ti-Mo structure by hot compression of stacked sheets	S. Emura	698
J18	Microstructure formation mechanism and mechanical properties of linear friction welded near β Ti-17 alloy joint	N. Kinouchi	699
Materials science of martensitic and bainitic transformations and its applications 1			
J19	Universality of butterfly-type variant pairing with (100) _{γ} junction plane in α' -martensite	N. Takahashi	700
J20	Variant pairing of thin-plate martensite at γ boundaries	Y. Shinohara	701
J21	Mapping and statistical analysis of martensite block in carbon steel with Rodrigues-Frank space	K. Tamura	702
J22	In-situ ECCI observation of dislocation behavior in lath martensite of low-carbon steel	J. Inoue	703
J23	Crystallographic and magnetic structures in heat-treated Fe-N alloy containing α'' -Fe ₁₆ N ₂ phase	T. Tamaoka	704
Materials science of martensitic and bainitic transformations and its applications 2			
J24	Where and when are dislocations induced by transformation cycling in Ti-Ni alloys?	M. Nishida	705
J25	Substructure boundary sliding in lath martensite quantitatively investigated by using molecular dynamics (MD) simulation and experiment	M. Zhang	706
J26	Effect of stacking fault energy on dislocation density of deformation-induced martensite in metastable austenitic stainless steel	T. Masumura	707
J27	Phenomenology of hydrogen-induced TWIP effect in Fe-Cr-Ni austenitic steels	Y. Ogawa	708
Materials science of martensitic and bainitic transformations and its applications 3			
J28	Effect of printing parameters on martensite morphology of additively manufactured hot-work tool steel	A. H. Pham	709
J29	Effect of temperature of bainitic transformation on microstructures in high carbon steel	S. Morito	710
J31	Effect of strain field around B2 particle on lath martensite structure in Fe-Ni-Al alloy	E. Hirai	711
J32	Effect of grain boundary precipitates on lath martensite structure in Fe-Ni-Al alloy and Fe-Ni-Si alloy	T. Moritani	712

Program of the 186th ISIJ Meeting (September 20-22, 2023)

Materials science of martensitic and bainitic transformations and its applications 4

J33	Thermodynamic model of martensite-transformation-start temperature of high carbon steels	M. Takahashi	· · ·	713
J34	Formation of ultrafine polygonal ferrite grain structure with excess carbon content from ultrafine austenite grain in 0.1C-2Si-5%Mn steel	S. Torizuka	· · ·	714
J35	FCC-HCP martensitic transformation in high-entropy alloys	K. Tsuchiya	· · ·	715
J36	Martensitic transformation hysteresis and microstructure in Ni-Co-Mn-Sn-based metamagnetic shape memory alloys	T. Miyakawa	· · ·	716

Materials science of martensitic and bainitic transformations and its applications 5

J37	Effect of pre-existed γ morphology on C and Mn partitioning during intercritical annealing in steel sheet containing Mn	K. Endoh	· · ·	717
J38	Effect of Nb addition on hardness of ausformed martensitic steels	M. Takahashi	· · ·	718
J39	Effects of heterogeneity of Mn distribution evolved during γ reversion on bainite transformation	K. Matsumoto	· · ·	719
J30	Multi-aspect characterization of low-temperature tempering behaviors in high-carbon martensite	Y. Zhang	· · ·	720
J40	Effects of alloying elements on low-temperature tempering behaviors of high-carbon martensite	K. Marusawa	· · ·	721

Materials science of martensitic and bainitic transformations and its applications 6

J41	Tensile properties, fatigue crack growth, and fracture toughness of a thermo-mechanically rolled and direct quenched and partitioned (TMR-DQP) 0.4% C steel	G. Kumar	· · ·	722
J42	Fracture mechanics analysis on anisotropy of cleavage fracture of martensitic steels due to transformation-induced internal stress	N. Nakada	· · ·	723
J43	Effect of few percent of retained austenite on yielding behavior of tempered martensitic steel sheet	J. Tobata	· · ·	724
J44	Heterogeneous deformation behavior of fine-grained 18%Ni martensitic steel	Y. Sakura	· · ·	725
J45	Effect of low temperature tempering on elastic limit of low carbon martensite	Y. Ochiai	· · ·	726