

The 190th ISIJ Meeting

Date

September 17 to 19, 2025

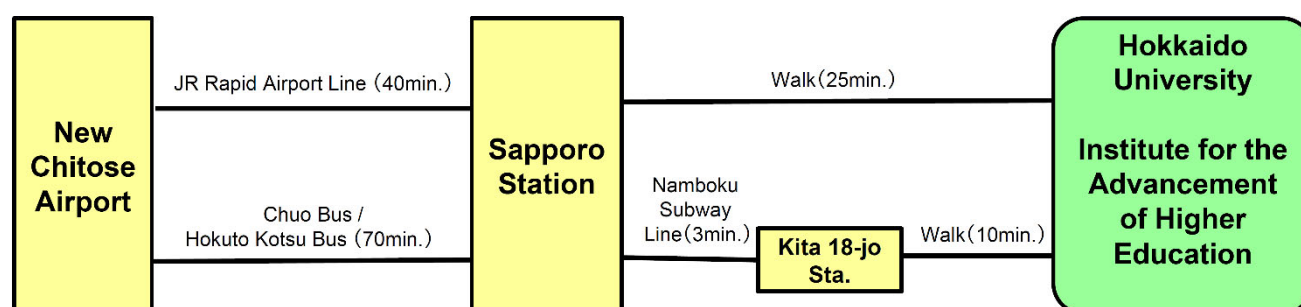
Reception: 8:30- 16:00 (September 17-18), 8:30 - 14:00 (September 19)

Venue

Hokkaido University

Kita 8, Nishi 5, Kita-Ku, Sapporo, Hokkaido, 060-0808 Japan

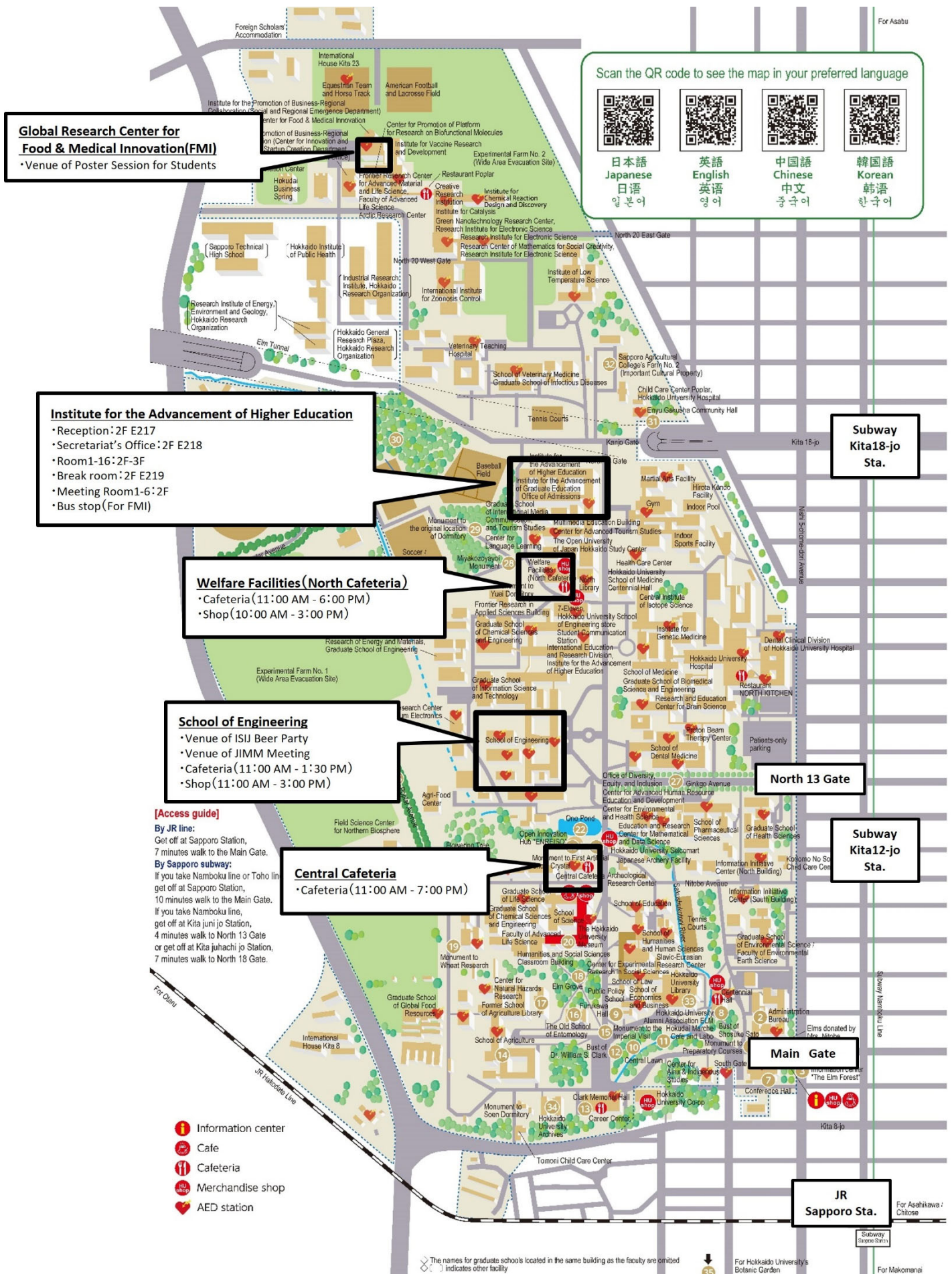
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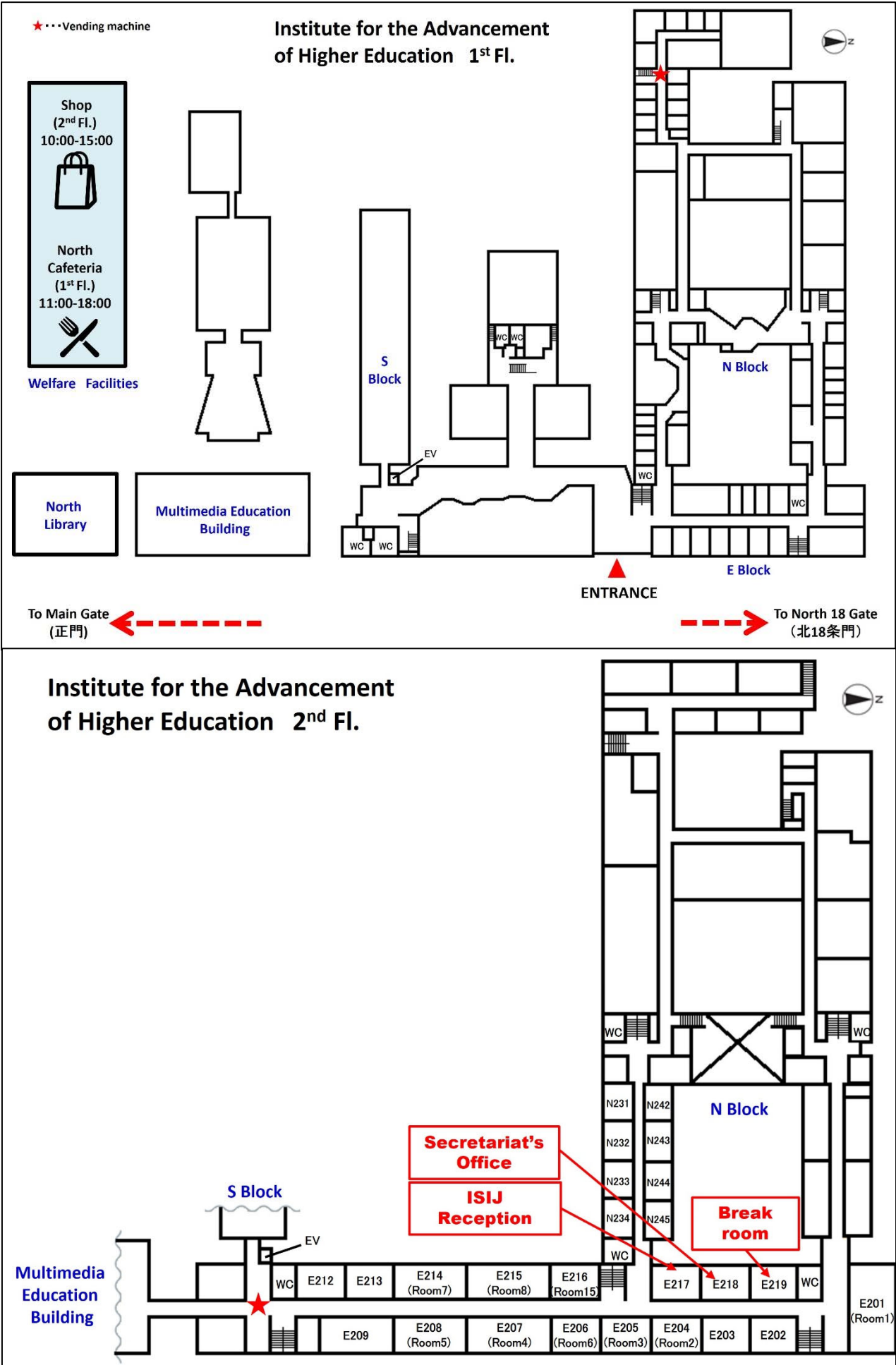
<https://www.global.hokudai.ac.jp/access/sapporo-campus>

Campus map

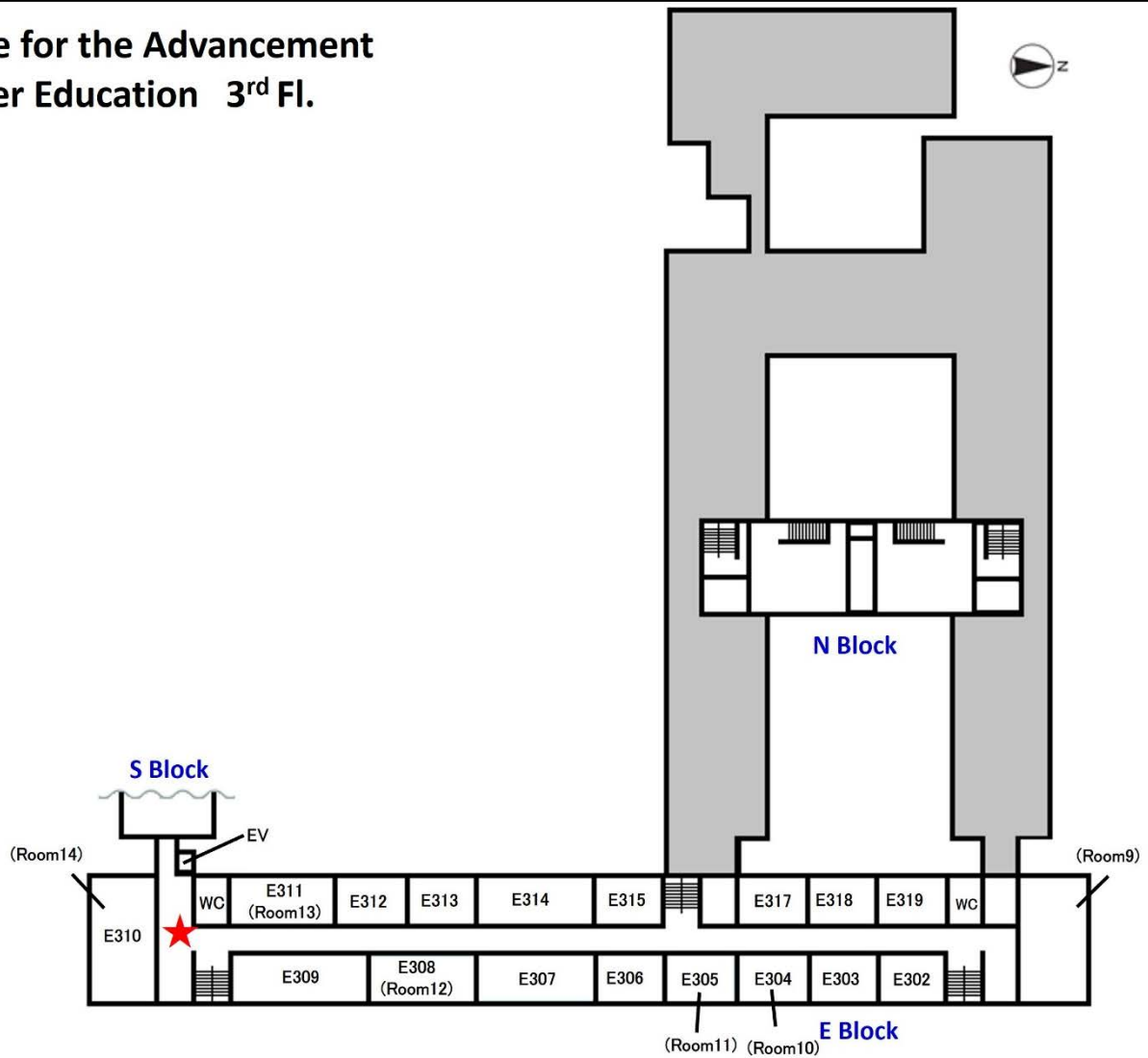


* <https://www.global.hokudai.ac.jp/maps/sapporo>

Institute for the Advancement of Higher Education



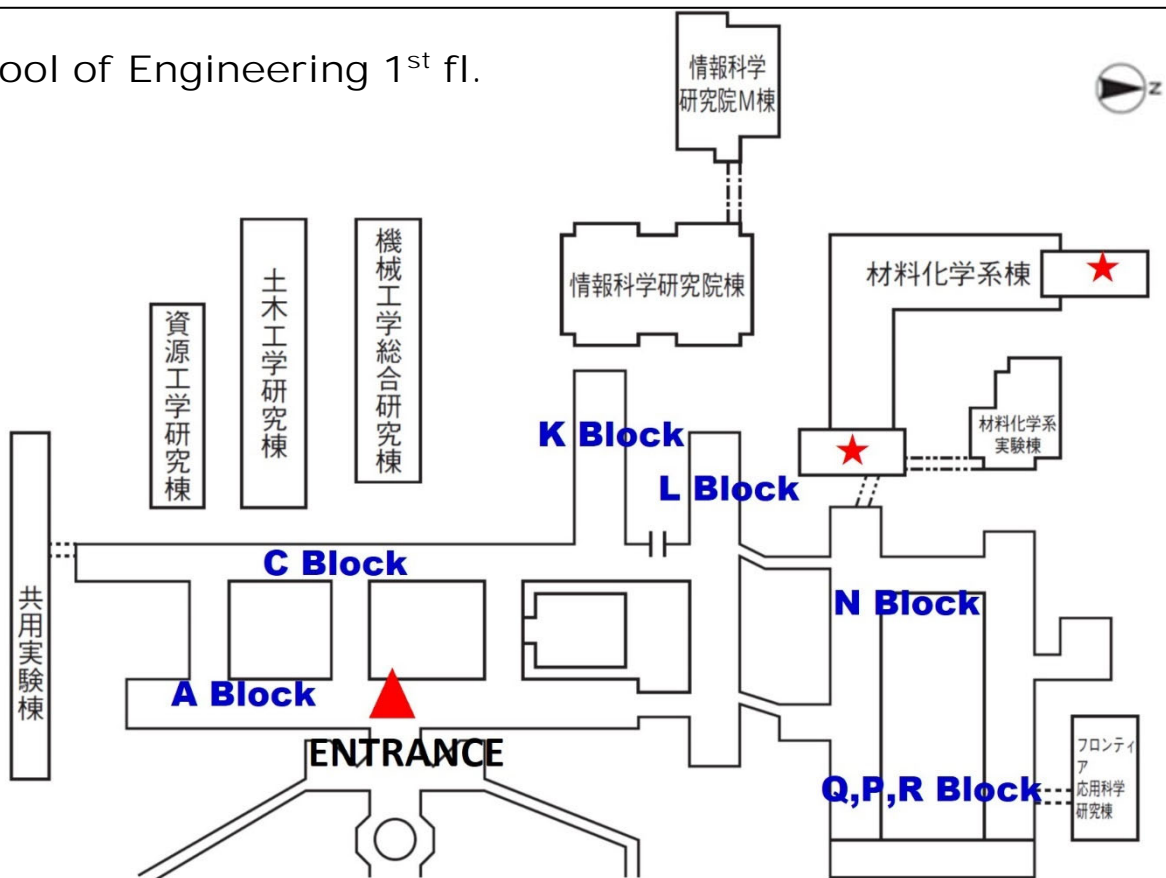
**Institute for the Advancement
of Higher Education 3rd Fl.**



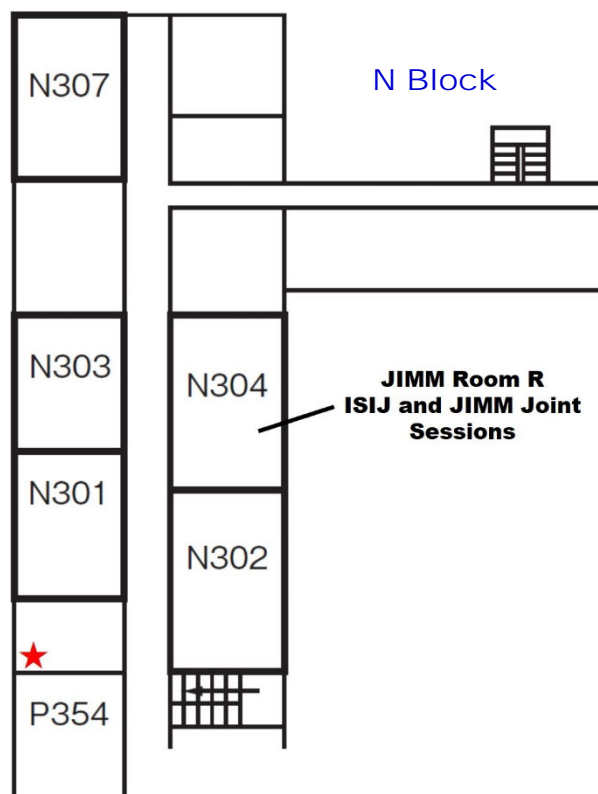
School of Engineering

(Venue of JIMM Meeting)

School of Engineering 1st fl.



School of Engineering 3rd fl.



**The timetable of the 190th ISIJ Meeting
(September 17-19, 2025 at Hokkaido University)**

ISIJ Room (Session Room1~16)⇒Institute for the Advancement of Higher Education
JIMM Room, ISIJ Beer Party ⇒Engineering Bldg.
Poster Session for Students ⇒Global Research Center for Food & Medical Innovation (FMI)

Session Room	Sept. 17 (Wed.)		Sept. 18 (Thu.)		Sept. 19 (Fri.)	
	AM	PM	AM	PM	AM	PM
Session Room 1 2F E201	Shaft furnace, Direct reduction [1-5] (9:20-11:00)	Blast furnace 1・2・3 [6-16] (13:35-17:25)	Development of hydrogen reduction technology to realize carbon neutrality in Japanese steel industry [D6-D18] (9:20-17:00)		Production and characterization of iron ore sinters for hydrogen reduction blast furnace [D1-D5] (9:20-12:20)	Sinter / Non-ferrous smelting [75-81] (13:20-15:55)
Session Room 2 2F E204	Young engineer session of iron making 1・2 [17-23] (9:20-11:55)	-	Frontiers in thermophysical properties and thermodynamics of materials research 1 [42-44] (10:00-11:00)	Frontiers in thermophysical properties and thermodynamics of materials research 2 / Properties of liquid materials [45-51] (14:00-16:45)	Refining process aiming at carbon neutrality 1・2 [82-88] (9:20-12:00)	Electric furnace / Converter and Secondary refining [89-95] (13:00-15:35)
Session Room 3 2F E205	Inclusion / Continuous casting [24-31] (9:20-11:55)	Thermodynamics 1・2 / Transport phenomena, High temperature reactions [32-41] (13:15-17:05)	Quantification of solidification phenomena using multiple approaches V-1・2 [52-58] (9:20-12:00)	Quantification of solidification phenomena using multiple approaches V-3 / Fundamentals of solidification [59-66] (14:00-16:55)	Young engineer session of coke-making 1・2 [96-104] (9:20-12:30)	Cokemaking technology [105-108] (13:30-14:50)
Session Room 4 2F E207	Development of green technology in surface treatment for high performance and corrosion resistance of steels III (9:30-12:00) [Charge-Free]	Ironmaking system and recycle [109-111] (13:15-14:15)	Introduction of research topics in novel processing forum / Slag and dust treatment [67-74] (9:20-12:15)	Slag treatment and recycle / Waste material recycling [112-118] (14:00-16:35)	Thermal energy storage technologies for carbon neutrality of iron & steel industry (9:20-13:00) [Charge-Free]	-
Session Room 5 2F E208	The development of emerging and advanced seed technologies through the 'Steel carbon neutral research grant' [D19-D27] (10:20-16:30)		Cutting-edge of green technologies for carbon neutrality of steelmaking industry [119-122] (10:30-11:50)	Towards suitable maintenance and management of steel structures (13:25-16:30) [Charge-Free]	Interrelated environmental challenges of the steel sector (9:20-11:50) [Charge-Free]	-
Session Room 6 2F E206	Production optimization / System [123-129] (9:20-12:00)	Advances in systems and technologies enhancing carbon productivity (13:30-16:20) [Charge-Free]	Equipment diagnostics in ironworks using 3D area sensing [D28-D34] (9:25-12:00)	Instrumentation [130-134] (14:00-15:40)	-	-
Session Room 7 2F E214	Control technology for free-cutting-17 (1)・(2) [135-141] (9:20-12:00)	Deformation and microstructure / Rolling [142-149] (13:15-16:10)	Reliability evaluation of weld 7 (1)・(2) [153-160] (9:20-12:20)	Forming technologies for tube materials derived from closed cross-sectional characteristics [161-165] (14:30-16:10)	Novel materials processing for the innovative plate rolling [D35-D42] (9:35-15:50)	
Session Room 8 2F E215	-	Pickling and oxidation scale [150-152] (13:15-14:15)	The technical session by young engineers of plate rolling [250-253] (10:40-12:00)	Speciation and control of Mn in steel slag (14:00-16:30) [Charge-Free]	Modeling of various phenomena in metal forming and its application [166-169] (9:20-10:40)	-
Session Room 9 3F E301	Hydrogen embrittlement 1・2 [170-177] (9:20-12:15)	Hydrogen embrittlement 3 [178-181] (13:15-14:35)	Final report of research group on "Extraction of essential factor technology for hydrogen embrittlement evaluation" (9:20-15:20) [Charge-Free]		Hydrogen embrittlement 4・5 [254-259] (9:20-11:35)	Frontiers of materials development to support a hydrogen society (13:00-16:00) [Charge-Free]
Session Room 10 3F E304	Symposium on approaches to grain boundary engineering for achieving high-performance steels II (10:00-16:20) [Charge-Free]		Exploring the frontiers of next-generation microbiologically influenced corrosion research [Int-1-Int-5] (10:20-16:20)		Electrical steel 1・2 [260-267] (9:20-12:15)	Recrystallization, grain growth 1・2 [268-273] (13:30-15:50)
Session Room 11 3F E305	New processing technology and alloy design of Ti (9:20-11:55) [Charge-Free]	Long-standing & new issues in heat resistant steels and alloys (14:00-16:30) [Charge-Free]	The technical session by young engineers of Hot rolling / The technical session 1 by young engineers of Cold rolling [206-213] (9:20-12:20)	The technical session 2 by young engineers of Cold rolling / The technical session by young engineers of coating [214-221] (13:25-16:25)	Clarification of various structural factors in hot-dip galvanized coatings for creating high functionalities (9:20-15:00) [Charge-Free]	
Session Room 12 3F E308	Strength and deformation behavior 1・2 [182-189] (9:20-12:15)	Strength and deformation behavior 3 [190-194] (13:15-14:55)	Strength and deformation behavior 4 / Grain boundary [222-230] (9:20-12:35)	Material prediction and modeling [231-234] (14:00-15:20)	Toughness, ductility and wear / Fatigue [274-282] (9:20-12:35)	-
Session Room 13 3F E311	Surface treatment and corrosion 1 [195-198] (10:30-11:50)	Surface treatment and corrosion 2・3 [199-205] (13:15-15:50)	Heat resistant materials for next generation nuclear reactor 1・2 [235-242] (9:20-12:15)	Heat resistant alloys / Heat resistant steels [243-249] (14:00-16:35)	Stainless steels 1 [283-287] (9:20-11:00)	Stainless steels 2・3 [288-297] (12:20-16:00)
Session Room 14 3F E310	ISIJ and JIMM Joint Sessions Materials science of martensitic and bainitic transformations and its applications I [J19-J23] (10:00-11:40)	ISIJ and JIMM Joint Sessions Materials science of martensitic and bainitic transformations and its applications 2・3 [J24-J31] (13:00-16:00)	ISIJ and JIMM Joint Sessions Materials science of martensitic and bainitic transformations and its applications 4・5 [J32-J39] (9:20-12:20)	ISIJ and JIMM Joint Sessions Materials science of martensitic and bainitic transformations and its applications 6・7 [J40-J46] (14:00-16:30)	Diffusion and diffusionless transformation / Microstructural evolution [298-306] (9:20-12:35)	-
Session Room 15 2F E216	-	Crystal structure analysis / Crystal structure analysis/Precipitate and inclusion analysis [307-312] (14:00-16:15)	-	-	-	-
Session Room 16 3F E317	Technology and culture of iron in Hokkaido and Tohoku region (9:20-16:30) [2,000yen, Student 1,000yen]		-	-	-	-
JIMM Room R Engineering Bldg. N 3F N304	-	ISIJ and JIMM Joint Sessions Titanium and its alloys 1・2・3 [J1-J10] (13:20-17:00)	ISIJ and JIMM Joint Sessions Titanium and its alloys 4・5 [J11-J18] (9:00-11:50)	-	-	-
Banquet (18:30-20:30 at Sapporo Beer Garden Poplar Hall (〒065-0007 Sapporo City Higashi Ward Kita 7 Jo Higashi 9 Chome 2-10) [Pre-registration only])			Poster Session for Students (12:00-14:30 at Foyer, 1F, Global Research Center for Food & Medical Innovation (FMI)) [Charge-Free] ISIJ Beer Party (17:30-19:00 at Cafeteria (Engineering Bldg.)) [1,000yen]			

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

Program of the 190th ISIJ Meeting (September 17-19, 2025)

Discussion Sessions

High Temperature Processes

Lecture No.

Discussion Session	Title	Speaker	Page
Production and characterization of iron ore sinters for hydrogen reduction blast furnace			
D1	Effect of particle size of magnesite in sinter on microstructure and low-temperature disintegration	M. Yamakawa	• • • 342
D2	Evaluation of gaseous reduction rate of sinter with added dolomite for H ₂ -enriched blast furnace	K. Kato	• • • 344
D3	Fe chemical state distribution of high-MgO sinters investigated by imaging XAFS	Y. Takeichi	• • • 346
D4	Phase diagram of the iron-rich corner of the CaO-Al ₂ O ₃ -Fe ₂ O ₃ -2.5 mass% MgO system at 1240°C in air	M. Hayashi	• • • 348
D5	Reduction process of multi-component calcium ferrite SFCA	K. Sugiyana	• • • 351
Development of hydrogen reduction technology to realize carbon neutrality in Japanese steel industry			
D6	(Invited Lecture) Working toward a carbon-neutral steelmaking and green innovation fund projects	T. Kato	• • • 354
D7	Overview of the green innovation fund project: "hydrogen utilization in the steelmaking process"	N. Ishiwata	• • • 356
D8	Optimal grinding method of iron ore to promote the liberation of iron minerals	Y. Takaya	• • • 359
D9	Effect of pellet characteristics on the low-temperature reduction disintegration mechanism under hydrogen reduction shaft furnace	K. Momma	• • • 361
D10	Evaluation of pellets strength for clarification of powdering and clustering phenomena during hydrogen reduction	S. Ishihara	• • • 363
D11	Reducibility and pore structure of iron ore pellets	H. Konishi	• • • 365
D12	Evaluation of gaseous reduction rate of low-grade iron ore pellets for direct hydrogen reduction	K. Kato	• • • 367
D13	Clustering behavior of hematite pellets under hydrogen-based reduction conditions	K. Ohno	• • • 369
D14	Characterization of microstructures for improving the quality of hydrogen-reduced iron	S. Ueda	• • • 371
D15	Post-treatment evaluation using solid oxide electrolysis cells with simulated exhaust gas from direct reduction furnace	Y. Ikeda	• • • 373
D16	Multi-dimensional and multi-scale analysis on reaction and heat transfer in hydrogen reduction of iron oxide	H. Nogami	• • • 376
D17	Evaluation of hydrogen-iron-reduction behavior on shaft furnace	T. Nomura	• • • 378
D18	Direct reduction simulation considering heat and mass transfer at particle scale in shaft furnace	S. Natsui	• • • 380

Sustainable Systems

The development of emerging and advanced seed technologies through the 'Steel carbon neutral research grant'

D19	Low temperature ironmaking process by lime addition method	T. Miki	• • • 383
D20	Reduction of iron ore using hydrogen-rich gas derived from waste plastic	J. Kano	• • • 385
D21	Evaluation of the potential for bio-coke production from sulfuric acid lignin generated as a byproduct of woody biomass saccharification	H. Nonaka	• • • 389
D22	Suggestion of measures for reduction of energy input and CO ₂ emissions through basic study with laboratory mini electric furnace to understand mechanism of scrap heating and melting in actual electric furnace	M. Sugimoto	• • • 391
D23	Effect of metallic thin film on wettability of molten iron and graphite immediately after contact	H. Muneoka	• • • 395
D24	Effect of ash-containing carbonaceous materials on primary carburization and melting of pure iron	A. Ono	• • • 399
D25	Dynamic behavior of the molten Fe-Cu alloy-molten slag interface during polarization	S. Natsui	• • • 401
D26	Production of inexpensive zeolite from blast furnace slag as a CO ₂ adsorbent	Y. Sasaki	• • • 404
D27	Characterization of the reaction between silicon nitride and iron oxide components in molten slags	S. Sukenaga	• • • 408

Instrumentation, Control and System Engineering

Equipment diagnostics in ironworks using 3D area sensing

D28	Equipment diagnostics in ironworks using 3D area sensing	I. Ishii	• • • 409
D29	3D displacement measurement of beam structures using model-based digital image correlation	F. Wang	• • • 410
D30	Displacement measurement methods for distant structures using phase analysis techniques	M. Fujigaki	• • • 414
D31	An evaluation of stiffness of structural components by data assimilation using multi-point vibration measurement	K. Shimizu	• • • 415
D32	Damage detection using relative change in displacement and rotation response of beams under moving load	A. Koga	• • • 418
D33	Structural defect detection using digital image correlation and mode decomposition	Y. Kato	• • • 422
D34	Concept of steel plant equipment diagnosis by combining structural simulation and surrogate modeling	K. Sakakibara	• • • 425

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Processing for Quality Products

Novel materials processing for the innovative plate rolling

D35	Importance of precipitation control in steels	T. Furuhara	• • •	427
D36	An on-line steel plate rolling model considering Nb precipitation	M. Sakamoto	• • •	431
D37	(Invited Lecture) Quantitative index of cleavage crack arrestability and its dependency on grain sizes	F. Yanagimoto	• • •	435
D38	Development of highly-ductile steel plate for ships ensures excellent crashworthiness	K. Ichikawa	• • •	439
D39	Toughening by controlling content of carbon in solid solution in martensitic steel	S. Uranaka	• • •	443
D40	Temperature control and cooling technology for plate mill	H. Fukuda	• • •	446
D41	Control technologies and applications of plate mill rolling	N. Kubo	• • •	450
D42	Effect of shear band distribution on warpage behavior in strip rolling	D. Kasai	• • •	454

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International Organized Sessions

2025/9/18 Room 10

Lecture No.	Title	Speaker	Page
Exploring the frontiers of next-generation microbiologically influenced corrosion research			
10:20-10:40			
	Opening Address: Y. Miyano [Akita Univ.]		
Chair: K. Eguchi [JFE]			
10:40-11:40			
Int.-1	(Keynote Lecture) Intersection of microbiologically influenced corrosion and corrosion science		
	Kansai Univ.	○T. Haruna	458
11:40-12:20			
Int.-2	(Invited Lecture) Microbially influenced corrosion: aspects of varied waters and tribocorrosion		
	VTT Technical Research Centre of Finland Ltd ○V. Ratia-Hanby · Q. Nguyen · A. Bordbar-Khiabani · M. Nuppunen-Puputti · A. Alimbekova		459
Chair: N. Hirai [Suzuka. Tech. Colle.]			
14:00-14:40			
Int.-3	(Invited Lecture) Microbiologically influenced corrosion failures of mild steel cooling water pipework at the high-rise complex		
	SRG Global Asset Care	○B. Panchal	461
14:40-15:20			
Int.-4	Microbiologically-influenced corrosion of stainless steel in fresh dam-water		
	Kurimoto	○J. Liao	465
15:20-16:00			
Int.-5	Metagenomic perspectives on the complexity of microbiologically influenced corrosion across environmental and material contexts		
	JAMSTEC	○S. Wakai	466
16:00-16:20			
	Closing Address: Y. Miyano [Akita Univ.]		

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High Temperature Processes

Lecture No.	Title	Speaker	Page
Plenary Session			
Shaft furnace, Direct reduction			
1	Analysis of cooling gas inflow phenomenon into the top of reactor in a hydrogen reduction shaft process	R. Takahashi	• • • 467
2	Application of carbon capture and utilization to carbon recycle in shaft furnace operation	K. Moriya	• • • 468
3	Reaction behavior of carbon deposition and carbidization by CH ₄ gas on Reduced Iron	C. Shimizu	• • • 469
4	Fe ₃ C formation under low carbon activity using rotary kiln	K. Ikeda	• • • 470
5	Reduction and melting behavior of deposited carbon-iron oxide composite in hydrogen atmosphere	R. Higashi	• • • 471
Blast furnace 1			
6	Canceled		
7	Predictive temperature of pig iron after pouring into torpedo ladle car	J. Kim	• • • 473
8	Profile measurement of refractory by radiographic testing	K. Yamada	• • • 474
Blast furnace 2			
9	Effect of pore structure on reduction degradation of sintered ore	S. Nomoto	• • • 475
10	Development of degradation model for sinter ore considering reduction and impact energy	K. Nishihiro	• • • 476
11	Evaluation of the reaction rate of sinter and coke under high H ₂ and H ₂ O atmosphere	A. Nakajima	• • • 477
12	Prediction of final reduction degree of magnetite powder considering reduction stagnation due to metallic iron layer formation	T. Mizuo	• • • 478
13	Effect of particle distribution on reduction behavior of ore-coke mixed layer	T. Iwanaga	• • • 479
Blast furnace 3			
14	Effect of gas type on heat transfer from high temperature gas to solid particle layer	A. Shinotake	• • • 480
15	Structural analysis of cohesive layer by cohesive zone simulator	N. Yasuda	• • • 481
16	Analysis of the effect of gas density change on raceway behavior	K. Kano	• • • 482
Young engineer session of iron making 1			
17	Relationship between oxygen enrichment time after re-ignition and sintering productivity: Development of REMO-tec +ECO (Enhanced Combustion by Oxygen-enrichment) -2	S. Nakamura	• • • 483
18	Quality management of sintering ore for low CR blast furnace operation at Kashima area	H. Kosuge	• • • 484
19	Drone-assisted inspection for air leakage of the ducts in a sinter plant	T. Matsuda	• • • 485
20	Improvement of charging equipment at Tobata No.3 sintering machine	Y. Tange	• • • 486
Young engineer session of iron making 2			
21	Development of a sintering firing guidance system utilizing DX technologies	Y. Matsuda	• • • 487
22	Reduction in carbon consumption with optimal placement of coarse coke under inclined mixing of limestone (Development of technology to control melt assimilation in parallel granulation system-3)	K. Koga	• • • 488
23	Verification of reducing coke consumption with priority placement of coke in easily meltable granulate (Development of technology to control melt assimilation in parallel granulation system 4)	K. Tamaki	• • • 489
Inclusion			
24	Inclusion formation behavior with reoxidation in Ti-added ultra-low carbon steel	W. Cha	• • • 490
25	Canceled		
26	Effect of oxides on distribution of sulfides in high Cr and S added steel	Y. Hayashi	• • • 492
27	Formation behavior of sulfide inclusions during solidification of Fe-Cr-Mn-S alloys	H. Makiuchi	• • • 493
28	Effect of cooling rate on copper sulfide precipitation in low carbon steel	Y. Fukui	• • • 494
Continuous casting			
29	Experimental study on molten steel flow behavior in ladle-tundish	K. Kojima	• • • 495
30	Effect of side shape of the sliding plate on the fluid flow in the submerged entry nozzle in CC mold	Y. Narita	• • • 496
31	Canceled		
Thermodynamics 1			
32	(Nishiyama Commemorative Prize • 110th Anniversary Lecture (Invited)) Physical chemistry for the optimization of inclusions in molten steel	M. Ohta	• • • 498
33	The solubility of nitrogen in liquid Fe-Ni-Cr alloys	K. Moriya	• • • 499
34	Evolution of Al-Ti complex oxide inclusions during ti-added ultra low C steel: Thermodynamic modeling and experimental investigation	Y. Park	• • • 500

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Thermodynamics 2

35	Equilibrium between molten Fe-Ni alloy and $\text{Al}_2\text{O}_3\text{-MnO-SiO}_2$ slag	M. Iwabuchi	• • •	501
36	Thermodynamic properties of MnO in the CaO-MnO-SiO_2 ferromanganese slag	T. Yamada	• • •	502
37	Measurement of CuFe_2O_4 activity coefficient in Fe_3O_4 phase	S. Ono	• • •	503

Transport phenomena, High temperature reactions

38	Drag coefficient of filmy bubble attaching non-wettable wall	Y. Tsukaguchi	• • •	504
39	Observation of fluid flow by bottom blowing in the EAF-shaped vessel using PIV	S. Kim	• • •	505
40	Interfacial behavior of molten Fe-(Cu, Sn, Ni, Cr) alloy-FeS added slag during polarization	M. Ambiru	• • •	506
41	Interfacial reactions between refractories and FeO-containing slags in the DRI melting process	K. Tsuruta	• • •	507

Frontiers in thermophysical properties and thermodynamics of materials research 1

42	Estimation of the hydrogen reduction rate constant of molten iron oxide using aerodynamic levitation	T. Kawashima	• • •	508
43	Surface tension behavior of molten iron-based alloys considering the effect of oxygen adsorption	Y. Seimiya	• • •	509
44	Effect of the types of alkali metal oxide species on the phonon mean free path of alkali silicate glasses	S. Nikaido	• • •	510

Frontiers in thermophysical properties and thermodynamics of materials research 2

45	Characterization of surface ionic structure relaxation in molten oxide slag with surface-active constituents	M. Suzuki	• • •	511
46	Effect of Al_2O_3 addition on electric furnace steelmaking slag.	K. Tanaka	• • •	512
47	Effect of wettability and surface tension on viscoelasticity of high-temperature suspensions	K. Nakanishi	• • •	513
48	Thermal conductivity of alkali silicate slag from the perspective of silicate network structure	S. Ebihara	• • •	514

Properties of liquid materials

49	Effect of current value on accuracy of thermal conductivity measurement by hot wire method	K. Saito	• • •	515
50	Structure and thermal properties of $\text{CaO-SiO}_2\text{-FeO}_x\text{-MgO-Al}_2\text{O}_3$ slag	H. Takebe	• • •	516
51	Investigation of the lower temperature limit for promoting oxide scale melting by SiO_2 powder coating on Si-containing steel	L. Miyazaki	• • •	517

Quantification of solidification phenomena using multiple approaches V-1

52	Systematic simulations for semi-solid simple shear deformation with multi-phase-field lattice boltzmann model	N. Yamanaka	• • •	518
53	Time-resolved and in-situ observation of solidification in Alloy 718 using synchrotron X-ray imaging techniques	T. Narumi	• • •	519
54	Development of 3D quantitative cellular automaton model for highly accurate prediction of microsegregation	K. Kaneko	• • •	520
55	Simulation of microstructural evolution in senary Cu/Ag-Cu-Sn-Ti filler metal/ Si_3N_4 active metal brazed joint by CALPHAD-coupled phase-field method	T. Morino	• • •	521

Quantification of solidification phenomena using multiple approaches V-2

56	Measurement of changes in volume and the lattice constant of Zn-Al alloy as a function of temperature by using 4D-CT+XRD	K. Tamura	• • •	522
57	Development of machine learning model to predict solid-liquid interfacial properties from microstructure image	Y. Sakai	• • •	523
58	Investigation of data assimilation for solidification structure reconstruction and material properties estimation using X-ray transmission image	A. Yamamura	• • •	524

Quantification of solidification phenomena using multiple approaches V-3

59	In-situ observation of formation and motion of inclusions in model alloy during solidification	H. Nakao	• • •	525
60	Inclusion behavior colliding with dendrite	Y. Miura	• • •	526
61	(ISIJ Research Promotion Grant) Effect of wettability on the collision and adhesion behavior of inclusions and bubbles in the submerged entry nozzle in CC mold	H. Harada	• • •	527
62	Introduction to Phase-field Application Using NIMS-CPDDB	M. Ode	• • •	528

Fundamentals of solidification

63	In-situ observation of dendrite fragmentation immediately after undercooled solidification	T. Nishimura	• • •	529
64	Effect of trace impurity elements on solidification structure in copper alloy	K. Komori	• • •	530
65	Formation behavior of microporosities during solidification in copper alloy	Y. Urakawa	• • •	531
66	Formation sequence of graphite in hypoeutectic gray cast iron by using unidirectional solidification	A. Kishimoto	• • •	532

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Introduction of research topics in novel processing forum

67	Design of a 36kW microwave furnace for heating silicon sludge	K. Kashimura	• • •	533
68	Magnetic field effect on liquid metal velocity flowing in double coaxial pipe	K. Iwai	• • •	534
69	Infiltration of molten metal into packed bed of solid spherical particles by ultrasonic irradiation	K. Okumura	• • •	535
70	Powdering mechanism of CaO-SiO ₂ -Al ₂ O ₃ slag	T. Kozuka	• • •	536

Slag and dust treatment

71	High value-added utilization of BOF slag: Towards slag recycling and phosphorus recovery	C. Du	• • •	537
72	(Tetsu-to-Hagané Special Issue Author • 110th Anniversary Lecture (Invited)) Recovering phosphorus from steelmaking slag and reducing slag volume	T. Iwama	• • •	538
73	Condensation behavior of vanadium in specific mineral phases of steelmaking slag	R. Tsuneda	• • •	539
74	Effect of the phases composed of CaO on the compressive strength of geopolymers	S. Kurahashi	• • •	540

Sinter

75	Sintering behavior and characteristics of sintered samples by the composite sintering process using green pellets made of de-phosphorized fine iron ore	D. Maruoka	• • •	541
76	Influence of composite sintering process on sinter productivity using dephosphorized fine ore	S. Fujiwara	• • •	542
77	Fe chemical state of iron ore sinter investigated by Imaging XAFS	S. Nakao	• • •	543
78	Atomic level analysis of the interface between FeO & M.Fe on reduction of iron ore	K. Takehara	• • •	544

Non-ferrous smelting

79	Effect of additives on the carbothermic reduction reaction of woody biomass and zinc oxide under reduced pressure	K. Oshima	• • •	545
80	Evaluation of reduction behavior of zinc containing dust during heat treatment	S. Kato	• • •	546
81	(ISIJ Research Promotion Grant) Preparation of manganese carbide for production of medium manganese steel	K. Saito	• • •	547

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