Program

October 11th (Wednesday)

Room A

9:40 - 11:55  Plenary Lectures

Chair: Takakazu Yamamoto (Kyoto University)
9:40 - 10:25  [PL-1] Outline of COURSE 50 project
Munetoshi Tsuji* (New Energy and Industrial Technology Development Organization)

Chair: Yukitaka Kato (Tokyo Institute of Technology Japan)
10:25 - 11:10  [PL-2] Paths to reduce CO2 emissions in iron and steel making and by steel application in Germany and Europe
Hans Bodo Lüngen* (Steel Institute VDEh)

Chair: Fumitaka Tsukihashi (The University of Tokyo)
Chunxia Zhang* (Central Iron & Steel Research Institute)

13:50 - 18:20  COURSE50

Chair: Koji Saito* (Nippon Steel & Sumitomo Metal Corporation), Mutsumi Tanaka (Kobe Steel, LTD.)
Kyojiuchi Araki* (Nippon Steel & Sumitomo Metal Corporation)

Yusuke Kashihara* (JFE Steel Corporation), Iwai KI, Takeshi Sato, Natsuo Ishiwata

14:50 - 15:10  [11A-3] Effect of surface characteristics of reduced iron on carbon deposition reaction
by CO-H2 gas mixture
Kazuo Nishihiro* (Kanazawa University), Ko-ichiro Ohno, Takayuki Maeda, Kazuya Kunitomo

Koki Nishioha* (Nippon Steel & Sumitomo Metal Corporation), Hiroshi Sakai, Yukio Tomita, Yoshihiko Matsukura, Kazuaki Nakano, Hirokazu Yokoyama, Ryoji Sugiura

Kan Van der Stee* (Tata Steel), Koen Meijer, Stanley Santos, Tim Peeters, Pieter Broersen

16:00 - 16:20  [11A-6] Development of cokemaking technology for hydrogen reduction iron making process
50 Takahiro Shishido* (Kobe Steel, Ltd.), Koji Sakai, Shohei Wada, Noriyuki Okuyama, Naoki Kikuchi

Chair: Yukuta Ujijasera* (Nippon Steel & Sumitomo Metal Corporation), Yusuke Kajihara* (JFE Steel Corporation)
17:00 - 17:20  [11A-7] Combined Coal Gasification and CO2 Reforming for Production of High Temperature Reductive Gas
Zhanheng Guo* (University of Science and Technology Beijing), Lei Guo

Kenji Nakao* (Nippon Steel & Sumitomo Metal Corporation), Mamoru Kasugai, Kimihi Suzuka, Nobuaki Ito, Hitoshi Donomae

17:40 - 18:00  [11A-9] Development of CO2 capture and separation technology in COURSE50 project
Kazunori Hazui* (JFE Steel Corporation), Kyojiuchi Araki, Natsuo Ishiwata, Shigeki Tomomura

18:00 - 18:20  [11A-10] Development of process for heat recovery from steelmaking slag
Yasutaka Ta* (JFE Steel Corporation), Nobuyuki Shigaki, Ikuhiro Sumi

Room B

13:50 - 18:00  Thermodynamics and Process Technology for Sustainable and Efficient Steel Refining and Recycling

Chair: Sun-Joong Kim (Chonnam University), Shigeru Ueda (Tohoku University)
Joongho Lee* (Korea University), Sang Cheol Shin, Youn-Bea Kang, Dong-Joon Min, Chungki Yi, Seok Gyu Sohn

14:20 - 14:40  [11B-2] Interaction between tramp element and alloying elements in ironmaking
Hidetsugu Ota* (Osaka University), Hirokazu Korishita, Takaaki Maeda

14:40 - 15:00  [11B-3] Effect of SrO addition to the CaO-Al2O3-SiO2 slag on desulfurization in molten high Al steel
Kazuto Nishihiro* (Kyushu University), Takayuki Maeda, Ko-ichiro Ohno, Atsuko Sako, Kazuya Kunitomo

Shigeru Ueda* (Tohoku University), Kengo Sugiyama, Xu Qiao, Sun-Joong Kim, Shin-ya Kitamura

15:40 - 16:00  [11B-5] A study on the relationship between sulfide capacity and degree of polymerization in CaO-SiO2-Al2O3-MgO slags
Hidetsugu Ota* (Osaka University), Dong Joon Min

16:00 - 16:20  [11B-6] A Computational study to estimate the possibilities to improve utilisation of stainless steelmaking slags
Etsu-Pekka Heikininen* (University of Oulu), Virpi Leinonen, Pekka Tanskanen, Timo Fabritius

Chair: Hiyori Matsuura* (The University of Tokyo), Masanori Suzuki (Osaka University)
17:00 - 17:20  [11B-7] Enhanced combustion technology for BFG and COG recovery in steel reheating furnaces
Francesco Dentella* (Swiss Melting Technologies SN)

Chunxia Zhang* (Central Iron & Steel Research Institute), Piotr R. Scheller, Shin-ya Kitamura

Hyungsup Im* (Korea University), Akihiko Horibe, Naoto Haruki, Yutaka Yamada, Shinitaro Maeda

Room C

13:50 - 18:20  Thermal Energy Utilization

Chair: Takahiro Nomura (Hokkaido University)
Keith Fujokai* (Functional Fluids Ltd.)

Chair: Yukitaka Kato (Tokyo Institute of Technology)
14:20 - 14:50  [11C-2] Heat transfer enhancement of thermal energy storage phase change material
Zhonghao Rao* (China University of Mining and Technology), Yutaka Hsu, Chen Zhen Liu

Chunxia Zhang* (Northeastern University), Koichi Nakao* (Okayama University)

Kensuke Yamamoto* (Tohoku University), Hiroaki Nogami

Chair: Hideki Ono (Osaka University), Joonho Lee (Korea University)
15:40 - 16:00  [11B-7] The prediction of entrainment formation from a blast furnace slag under wet alkaline environments
Aya Harashima* (Waseda University), Mokeno Tominoh, Sara Arakawa, Kimihisa Inoue

16:00 - 16:20  [11B-8] Comparison of Simulation models for efficient ladle refining process
Sun-Joong Kim* (Chonnam University), Pieter R. Scheller, Shin-ya Kitamura

Hyungsup Im* (Korea University), Akihiko Horibe, Naoto Haruki, Yutaka Yamada, Shinitaro Maeda
Phosphorus Concentration and Recovery from Steel-making Slag

Room D

Phosphorus Concentration and Recovery from Steel-making Slag
Chair: Kazuyoshi Matsubae (Tohoku University), Takahiro Miki (Tohoku University)

13:50 - 16:20

[11C-3] Development of high thermal conductivity phase change materials to utilize exhaust heat from steelworks
Takahiro Nomura* (Hokkaido University), Nan Sheng, Hiroki Sakai, Yuta Hasegawa, Tomohiro Akiyama

16:20 - 16:40

Daaike Maruoka* (Tohoku University), Hiroki Tsuneda, Taichi Murakami, Eiki Kasai

16:40 - 17:00

[11C-5] Kinetic analysis of carbonation of lithium orthosilicate for thermochemical energy storage material
Hiroki Takasaki* (Tokyo Institute of Technology), Hitoshi Hoshino, Yoshiro Tamura, Yukitaka Kato

17:00 - 17:20

[11C-6] Effect of the bridge formed between particles on heat transfer enhancement and gas permeability in the packed bed reactors
Koichi Nakaso (Okayama University), Kuniaki Gotoh

17:20 - 17:40

[11C-7] Energy efficiency improvement and CO2 emission reduction in China's iron and steel industry
Qi Zhang (Northeastern University, University of Science and Technology Beijing), Kuniaki Gotoh

18:00 - 18:20

Armando Vazquez* (Tenova Goodfellow Inc.)

Poster Presentation

Blast Furnace Route for Future Ironmaking

P-6 Role of Carbon Dissolution Reaction in the Initial Contact Period of Carbon-unsaturated Fe-C Sample Wetting on Graphite Substrate

19:40

Ko-Ichiro Ohno, Cao Son Nguyen, Takayuki Maeda (Kanazawa University), Kazuya Kunitomo

P-7 In situ observation of the Fe2O3 reduction by the materials which do not include C

19:50

Nobuhito Ishikawa* (National Institute for Materials Science), Tadashi Mitsu, Masaki Takeuchi, Kazutaka Matsuishi

P-8 Experimental and Numerical Study on Gas-solid Flow Characteristics in Oxygen Blast Furnace

20:00

Guang Wang, Jingsong Wang (University of Science and Technology Beijing), Hiroshi Hoshino, Yoshiro Tamura, Yukitaka Kato

P-9 Recent Research Progress of Blast Furnace Cohesive Zone

20:10

Hiroshi Ogata* (Tohoku University), Takahiro Miki, Shigeru Ueda

P-10 In situ X-ray diffraction evaluation of reducibilities of wustite and calcio-wustite in iron ore sinter

20:20

Boyuian Cai* (Tokyo Institute of Technology), Takahiro Watanabe, Masahiro Susa, Miyuki Hayashi

Thermodynamics and Process Technology for Sustainable and Efficient Steel Refining and Recycling

P-11 Determination of Zr activity coefficient in molten iron using gas / Fe-Zr alloy / ZrO2-containing slag / ZrO2 solid multi-phase equilibrium

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Masanori Suzuki* (Osaka University), Hiroshi Hoshino, Yoshiro Tamura, Yukitaka Kato

P-12 Dissolution of dicalcium silicate into molten CaO-FeO-SiO2 slag

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Yoshinori Kobayashi* (Tokyo Institute of Technology), Katsuhito Sadamoto

P-13 Interaction between tramp element and alloying elements in iron

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Hiroki Ono* (Osaka University), Kazuaki Kobayashi, Tetsuya Nagaoka

P-14 Measurement of Interaction Parameters between Al and Cu, Al and Sn in Molten High Al Iron

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Shigeru Ueda* (Tohoku University), Kengo Sugiyama, Xu Gao, Sun-Joong Kim, Shin-ya Kitamura

COURSE50

P-15 Characteristics of lithium silicate prepared by rice husk ash and thermogravimetric analysis

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Hayang Wang* (University of Science and Technology Beijing), Jianliang Zhang, Guangwei Wang

P-16 Utilizing Technique of Unused Exhaust Heat Generated from Steel Works (Overall Optimization)

230

Ryota Mura* (JFE Steel Corporation), Naotaka Ogawa, Ikuko Sato

P-17 Heat recovery from low-temperature off-gas using micro-channel heat exchanger

234

Kazuaki Kobayashi* (Nippon Steel & Sumitomo Metal Corporation), Yuki Kuzumachi, Yui Ogawa

P-18 Optimum Design of the Complex Injection Lance for COURSE50 Experimental Blast Furnace

238

Akito Kasai* (Kobe Steel, Ltd.), Kazuya Miyagawa, Kentaro Nozawa
Life Cycle Social Value and Environmental Impacts  

[PL-19] Data Envelopment Analysis for Steel Productions with The Use of Total Material Requirement for Mining Activities  

Akira Oyaizu* (Tohoku University), Ichiro Daigo, Cravito Jordi, Eiji Yamase

Behavior of Accompanied Element in Steel Cycle  

[PL-20] Identifying the factors of difference of impurity element contents in steel between Japan and Netherlands  

Shota Koketsu* (The University of Tokyo), Leo Fujimura, Benjamin Sprecher, Ichiro Daigo, Yoshikazu Goto

Creating Social Value Beyond Steel Industry  

[PL-21] Analysis of Total Material Requirement for automotive technological change  

Kenji Matsui* (Tohoku university), Akira Oyaizu, Eiji Yamase, Kazuyo Matsubae, Tetsuya Nagasaka


Kenichi Nakajima* (National Institute for Environmental Studies, The University of Tokyo), Ichiro Daigo, Hiroki Hatayama, Eiji Yamase, Kazuyo Matsubae, Yoshinobu Kobayashi, Wataru Takayanagi

Thermal Energy Utilization  

[PL-23] Reactivity evaluation of Li-based mixed oxide with CO₂  

Yuki Hanazaka* (Chiba University), Junichi Ryu


Kaisuke Abe* (Hokkaido University), Ake Kuriwatan, Takahiro Nomura, Tomohiro Akiyama

Carbon and Material Recycling  

[PL-25] Development of Solid Oxide Electrolysis Cells for CO₂ reduction in an Active Carbon Recycling Energy System as applied to iron-making process  

Yuichirō Numata (Tokyo Institute of Technology), Maria Caprisse Azucena Nepomuceno, Yukitaka Kato

[PL-26] Intelligent Energy Saving Technology for Rolling Mill Lines  

Tatsuya Tsuchamoto* (Toshiba Mitsubishi Electric Industrial systems Corporation), Hiroi YU Imanari

[PL-27] New Technology for the Production of Ultra-Pure Calcium Carbonate and Sequestration of Recycled Carbon Dioxide from Steel Bag  

Mike Wynter, Mark Tilley, Takashi Murayama* (Linxia Inc.)

Gas Separation by PCPs/MOFs for the Steel Industry  

[PL-28] CO₂ gas separation using PCPs/MOFs with fluorinated anions  

Shin-ichiro Noro* (Hokkaido University), Xin Zhong, Takayoshi Nakamura

[PL-29] JST ACCEL Project for Gas Separation by PCPs/MOFs  

Takakazu Yamamoto, Maru Izou* (Japan Science and Technology Agency)

[PL-30] A new synthesis process of Ethylene Glycol from Carbon mono-Oxide  

Jianyu Chai* (Highchem Company Ltd.), Sun Li, Yoshio Taguchi

Phosphorus Concentration and Recovery from Steel-making Slag  

[PL-31] Separation of iron oxide and phosphorus oxide from steelmaking slag by capillary action  

Takahiro Miku* (Tohoku University)

[PL-32] Separation of phosphorus oxide from steelmaking slag by porous CaO absorber  

Aki Oishi* (Tohoku University), Takahiro Miku, Tetsuya Nagasaka

Room A

October 12th (Thursday)

9:00 - 9:45  Plenary Lectures  

Chair: Eiki Kasai (Tohoku University)

9:00 - 9:45  (PL-4) Steel industry in Brazil – development, challenges and opportunities  

José Noldin* (UFRGS)

9:55 - 12:35  Blast Furnace Route for Future Ironmaking  

Chair: Hiroshi Nogami (Tohoku University)


Kazuya Kunitomo* (Kyushu University)


Fengman Shen* (Northwestern University), Li Zhang, He Guo, Qiulin Wen, Huiyan Zheng, Qiangjian Gao, Xin Jiang

Chair: Kazuya Kunitomo (Kyushu University), Fengman Shen (Northwestern University)


Zhang Fuming* (Shougang Group Co., Ltd.), Meng Xianglong, Hu Zurui


Koji Saiño* (Nippon Steel & Sumitomo Metal Corporation)


Jonghwan Jung* (POSSCO), Seungmoon Lee

12:15 - 12:35  [12A-4] Modelling of blast furnace process modification for lowering CO₂ emissions from integrated steel plant  

Joel Örre* (Svea METOS), Lena Sundqvist, Mats Bramming, Bo Sundelin, Per Lagerwal, Bo Bjorkman

13:35 - 14:20  Plenary Lectures  

Chair: Hiroshi Nogami (Tohoku University)

13:35 - 14:20  (PL-5) FINEX® as a Solution to Steel Industry’s Challenge  

Sang-Ho Yi* (POSSCO)

14:25 - 17:55  Ironmaking Resources and Preparation Process  

Chair: Masaru Matsumura (Nippon Steel & Sumitomo Metal Corporation), Takayuki Maeda (Kyushu University)


Eiki Kasai* (Tohoku University)


Liming Lu* (CSIRO Mineral Resources)

15:15 - 15:35  [12A-6] Effect on coke when using biomass as part of the blend  

Maria Lundgren* (Swerea MEFOS AB), Lena Sundqvist Ökvist, Alexandria Hirsch, Janaina Brum, Ahmet Y. Gunbati, Katarina Pein, Anna Dahlstedt, Johanna Alatalo, Astrid Mata, Caisa Samuelsson, Bo Bjorkman


Aniruddha Bhattacharyya* (Montanuniversität Leoben), Hado Heckmann, Johannes Schenk, Johann Wurm

Chair: Takahide Higuchi (JFE Steel Corporation), Liming Lu (CSIRO)

16:35 - 16:55  [12A-8] Glycerin-Ethanol Blending on Temperature Programmed Decomposition over Low-Grade Iron Ores  

Ade Kurniawan* (Hokkaido University), Kelsuke Abe, Koichi Ohashi, Takahiro Nomura, Tomohiro Akiyama


Yasuharu Toku* (Nippon Steel & Sumitomo Metal Corporation)
Room D

11:15 - 12:15 COURSE50

Chair: Yutaka Ujishita (Nippon Steel & Sumitomo Metal Corporation), Yutuske Kashiwara (JFE Steel Corporation)

11:15 - 11:35 [120-1] Development of CO$_2$ chemical absorption technology

Yoshiki Matsuzaki (Nippon Steel & Sumitomo Metal Corporation), Hiroki Aomi (Nippon Steel & Sumitomo Metal Corporation), Kenichi Ogasawara

11:35 - 11:55 [120-2] Development of CO$_2$ physical adsorption technology

Nobuyuki Shigaki (JFE Steel Corporation), Tsuyoshi Mogi, Takashi Haraoka, Ichiroh Sumi

11:55 - 12:15 [120-3] Consideration of the scale-up of the entire COURSE50 system

Shigeaki Tonomura (Nippon Steel & Sumitomo Metal Corporation), Ryota Murai, Mutsumi Tanaka, Yuko Tomita, Shin Tomisaki

15:15 - 16:15 Thermodynamics and Process Technology for Sustainable and Efficient Steel Refining and Recycling

Chair: Noritaka Saito (Kyushu University), Gao Xu (Tohoku University)

15:15 - 15:35 [12D-4] Dissolution of dicalcium silicate into molten CaO-FeO-SiO$_2$ slag

Yoshio Koyabashi (Tokyo Institute of Technology), Takahide Sadamoto

15:35 - 15:55 [12D-5] Compositions of liquid phases and activities of components in the CaO-SiO$_2$-P$_2$O$_5$-FeO heterogeneous slags coexisted with CaSiO$_3$-CaP$_2$O$_5$ solid solutions

Masakatsu Hasegawa (Kyoto University), Kohel Miwa, Ryota Matsugi

15:55 - 16:15 [12D-6] Oxidation equilibrium of molten Fe-Mn-Al alloy at steelmaking and casting temperature

Hitotomi Matsuura (The University of Tokyo), Shota Mitsuishi

16:35 - 18:15 Blast Furnace Route for Future Ironmaking

Chair: Kichihiro Ohno (Kyoto University), Jongwhun Jung (POSCO)


Takuya Natsui (Nippon Steel & Sumitomo Metal Corporation), Katoru Nakano, Yoshinori Matsuura, Kohel Sunahara, Yutaka Ujishita

16:55 - 17:15 [12D-8] Effect of O$_2$ injection to blast furnace tuyere on pulverized coal ignition

Koichi Takahashi (JFE Steel Corporation), Akinori Murao, Yusuke Kashiwara, Nobuyuki Oyaama, Hirotoshi Matsuuo, Michitaka Satoh


Hesham Ahmed (Lulea University of Technology), Martin Ölund, Lena Sundqvist Ökvist, Bo Björkman

Chair: Hiroshi Nogami (Tohoku University), Hesham Ahmed (Lulea University of Technology)


Soon-Mo Shin, Min-Woo Cho (Graduate Institute of Ferrous Technology), Sung-Mo Jung


Sungo Natsui (Hokkaido University), Akinori Sawada, Tatsuya Kikuchi, Ryosuke O. Suzuki

Room A

October 13th (Friday)

9:00 - 9:45 Plenary Lectures

Chair: Takakuki Yamamoto (Kyoto University)

9:00 - 9:45 [PL-5] Chemistry and Application of Porous Coordination Polymers/Metal-Organic Frameworks - 28 Susumu Kitagawa (Kyoto University)

9:55 - 11:55 Gas Separation by PCPs/MOFs for the Steel Industry

Chair: Masaya Matsuoka (Osaka Prefecture University), Ryotaro Matsuda (Nagoya University)

9:55 - 10:15 [13A-1] Cu(II) porous coordination polymers as adsorbents for CO/N$_2$ separation

Shinpei Kusaka (Kyoto University)


Ryotaro Matsuda (Nagoya University), Akishita Hiro, Yunsheng Ma

10:35 - 10:55 [13A-3] CO$_2$ Capture using a Gate Type PCP/MOF

Hiroshi Kojiri (Nippon Steel & Sumitomo Metal Corporation)


Ryo Matsuura (Kyushu University/JFE Steel), Tatsuya Kon, Hitoshi Saima


Yu Horiuchi (Osaka Prefecture University), Dang Do Van, Makoto Katagiri, Masaya Matsuoka

Room B

11:15 - 12:15 Blast Furnace Route for Future Ironmaking

Chair: Koichi Takahashi (JFE Steel Corporation), Fuming Zhang (Shangai Group)

9:55 - 10:15 [13B-1] Hot blast superheating – A scalable technology to reduce carbon consumption

Ian Cameron (Hunun Ltd), Miren Sukham, Barry Hyde, John Busser, Alex Gorodetzky


Wei Zhang (Wuhan University of Science and Technology), Jiong Dai, Jinming Zhou, Wei Wang, Zhengliang Xue


Piao Li, Juntai He, Zeyi Jiang (University of Science and Technology Beijing), Guangming Zeng, Xiaoming Zhang

Chair: Takuya Natsui (Nippon Steel & Sumitomo Metal Corporation), Hiroshi Nogami (Tohoku University)

11:15 - 11:35 [13B-4] Increasing the proportion of lump ores in blast furnace by improving the characteristics of primary-slags

Binbin Dui (University of Science and Technology Beijing), Shengli Wu, Lixin Wang, Kai Gu, Yinan Lu


Subhadhankar S (Pilshe Steel Ltd), Dhiren Pathak, P. Jayar Krishna, Santosh Kumar Lal, Basant Kumar Singh, Virendra Ranjan Tripathi, Amit Kumar Singh

11:55 - 12:15 [13B-6] Reduction of Material and Utilities Consumption by Optimization of the usage at Blast Furnace

Virendra Ranjan Tripathi, Basant Kumar Singh (Pilshe Steel Ltd), Rajkumar Vishwakarma, Narayan Chandra Sinha, Anil Singh, Satish Kumar, Ujjal Ghosh, Subhadhankar S
Room C

Ironmaking Resources and Preparation Process

Takahide Higuchi*, Naoyuki Takeuchi, Yusuke Ishigaki, Tetsuya Yamamoto, Hidetoshi Matsuno, Nobuyuki Oyama... 516

Takeyuki Fujisaka*, Hiroshi Mio, Kenichi Higuchi, Seiji Nomura... 520

Sang Gyun Shin*, Dong Joon Min... 524

11:15 - 11:35 [13C-4] Reduction behaviors of iron ore pellets containing coal under different heating rates
Hao Hsun Chang*, In-Gann Chen, Chi-Hao Wang, Ke-Miao Lu, Shih-Wei Lin... 528

Guang Wang* (University of Science and Technology Beijing), Jingsong Wang, Qingguo Xue... 532

Room D

Thermodynamics and Process Technology for Sustainable and Efficient Steel Refining and Recycling

9:55 - 10:15 [13D-1] Dissolution rate of CO₂ controlled spherical quicklime into molten slag
Nobuhiro Maruoka*, Akira Ito, Mihoko Hayasaka, Hiroshi Nogami... 536

Yusuke Harada, Noriaki Saito* (Kyushu University), Kunihiko Nakashima... 540

10:35 - 10:55 [13D-3] Slag foaming behaviors in EAF process using DRI addition
Won Yeong Son, Youngjo Kang* (Dong-A University)... 542

11:15 - 11:35 [13D-4] Converter slag recycling by tuyere injection in high PC rate operation at Kobe No.3 blast furnace
Nayuta Mitsuoka* (Kobe Steel Ltd), Kota Tanaka, Tomonori Maeda, Hitoshi Toyota, Atsushi Sato, Tadasu Matsuo... 546

Yuichi Tsuruoka* (Waseda University), Masahiro Tsuboi, Ito Kimihisa... 548

Masashi Nakamoto* (Osaka University), Toshio Tanaka... 552