Tuesday, April 23

Registraion Open

08:00-

2F, Lobby

Plenary Session 1

08:30-10:30

Room A (Grand Ballroom A, 2F)

Coffee Break

10:30-11:00

2F, Lobby

Oral Sessoion 03

[O3A]

11:00-12:50

Room A (Grand Ballroom A, 2F)

[O3B]

11:00-12:30

Room B (Grand Ballroom B, 2F)

Lunch Break

12:30-14:00

Oral Sessoion 04

[O4A]

14:00-15:25

Room A (Grand Ballroom A, 2F)

[O4B]

14:00-15:30

Room B (Grand Ballroom B, 2F)

Coffee Break

15:30-15:50

2F, Lobby

Poster Session 2

15:50-18:00

Room C (Grand Ballroom C, 2F)

Plenary Session 1

Tuesday, April 23 / 08:30-10:30
Room A (Grand Ballroom A, 2F)

PL1 08:30-09:10

The First Tritium Campaign of the Karlsruhe Tritium Neutrino Experiment (KATRIN)

Magnus Schloesser[1]*, The KATRIN Collaboration[2]

[1]Karlsruhe Institute of Technology, Germany, [2]Karlsruhe Tritium Neutrino Experiment, Germany

PL2 09:10-09:50

Tritium Related Activities in KHNP

Kyu-Min Song

Korea Hydro & Nuclear Power, Republic of Korea

PL3 09:50-10:30

Tritium Activities at Chalk River, Canadian Nuclear Laboratories

S. Suppiah*, S.Thomson

Canadian Nuclear Laboratories Ltd., Canada

Oral Sessoion 03

[O3A]

Tuesday, April 23 / 11:00-12:50

Room A (Grand Ballroom A, 2F)

O3A.1 11:00-11:25

Measurements of the Effective Thermal Conductivity of a Solid Tritium Breeder Pebble Bed under Neutron Irradiation

Qin Zhan[1], Hongguang Yang[1]*, Shanshan Liu[1], Zhibo Han[1], Beibei Luo[1], Yanyan Ge[1], Jiyin Zhu[1], Liling Yang[1], Yan Tang[2]

[1]China Institute of Atomic Energy, China, [2]University of Chong Qin, China

O3A.2 11:25-11:50

Development of WCCB Test Blanket

Yoshinori Kawamura[1]*, Hyoseong Gwon[1], Wenhai Guan[1], Hisashi Tanigawa[1], Takanori Hirose[1], Atsushi Wakasa[1], Kentaro Hattori[1], Noriaki Chiba[1], Tamon Ouchi[1], Seiji Yoshino[1], Seiji Mori[2], Hiromasa Iida[2], Takumi Yamamoto[2], Hiroyasu Uto[1], Yoji Someya[1]

[1]National Institutes for Quantum and Radiological Science and Technology, Japan, [2]Nippon Advanced Technology, Japan

O3A.3 11:50-12:10

The Isotopic Effect on Tritium Permeation in Breeding Blankets

Carlos Moreno*, Fernando R. Urgorri, David Rapisarda

Centre for Energy, Environment and Technology, Spain

O3A.4 12:10-12:30

Progress of HCCR TBM and Its Tritium Extraction System Development

Mu-Young Ahn[1]*, Seungyon Cho[1], Youngmin Lee[1], Soon Chang Park[1], Seok-Kwon Son[1], Yi-Hyun Park[1], Duck Young Ku[1], Chang-Shuk Kim[1], Jongil Kim[1], Don Won Lee[2], Cheol Woo Lee[2], SeongDae Park[2]

[1]National Fusion Research Institute, Republic of Korea, [2]Korea Atomic Energy Research Institute, Republic of Korea

12th International Conference on Tritium Science & Technology

Tritium 2019

April 22–26, 2019, Haeundae Grand Hotel Busan, Korea

O3A.5 12:30-12:50

Overview on Tritium Transport Modelling Activities for TBM Systems and Breeding Blanket Concepts in Europe

Italo Ricapito[1]*, Carlos Moreno[2], David Rapisarda[2], Almudena Rueda[3], Jenifer Serna[3], Fernando R. Urgorri[2], Yves Poitevin[4]

[1]Fusion for Energy, Spain, [2]Centre for Energy, Environment and Technology, Spain, [3]Empresarios Agrupados, Spain, [4]Fusion for Energy, France

Oral Sessoion 03

[O3B]

Tuesday, April 23 / 11:00-12:30

Room B (Grand Ballroom B, 2F)

O3B.1 11:00-11:25

A New Paradigm of Tritium Emission Control: Is Dose an Adequate Measure?

Satoshi Konishi*

Khoto University, Japan

O3B.2 11:25-11:50

Current Status of Process Design for ITER Storage and Delivery System

Min Ho Chang[1]*, Jea-Uk Lee[1], Dong-You Chung[1], Hyun-Goo Kang[1], Sei-Hun Yun[1], Hongsuk Chung[2], Kyu-Min Song[3]

[1]National Fusion Research Institute, Republic of Korea, [2]Korea Atomic Energy Research Institute, Republic of Korea, [3]Korea Hydro & Nuclear Power Co., Republic of Korea

O3B.3 11:50-12:10

Performance Restoration of a Tritium-Aged $LaNi_{4.25}Al_{0.75}$ Sample

Gregory C. Staack*, David W. James

Savannah River National Laboratory, USA

O3B.4 12:10-12:30

Tritium Self-Sufficiency Performance Analysis for CFETR

XIA Xiulong*

China Academy of Engineering Physics, China

Oral Sessoion 04

[O4A]

Tuesday, April 23 / 14:00-15:25

Room A (Grand Ballroom A, 2F)

O4A.1 14:00-14:25

Differential DNA Damage Response of Embryonic Neural Stem Cells and Fibroblasts after Tritiated Thymidine Contamination

Sofiane Mokrani, Christine Granotier-Beckers*, Olivier Etienne, Christian Grisolia, Franois Boussin

The French Alternative Energies and Atomic Energy Commission, France

O4A.2 14:25-14:45

Environmental Impact Analysis of Tritium around Nuclear Power Plants

Juyoul Kim*

KEPCO International Nuclear Graduate School, Republic of Korea

O4A.3 14:45-15:05

Tritium Releases to the Environment from the ESS Facility: Assessment of the Impact and Monitoring Strategy

Ene Daniela[1]*, Rodolfo Avila[2], Sigrid Kozielski[1]

[1]ESS ERIC, Sweden,[2]2AF Energy (Nuclear), Sweden

O4A.4 15:05-15:25

Measurement of Tritium Trapped in Natural Soil by Microwave Assisted Acid Dissolution Method

Kazunari Katayama*, Daiki Ishii, Toshiharu Takeishi, Satoshi Fukada

Kyushu University, Japan

Oral Sessoion 04

[O4B]

Tuesday, April 23 / 14:00-15:30

Room B (Grand Ballroom B, 2F)

O4B.1 14:00-14:25

Status of Design and Performance Validation of Metal Hydride Bed for Fusion Fuel Cycle

Hyun-Goo Kang*, Dong-You Chung, Jae-Uk Lee, Min Ho Chang

National Fusion Research Institute, Republic of Korea

O4B.2 14:25-14:50

Tritium Support for the National Ignition Facility

Jacqueline Meeker, Jorge Sanchez

Lawrence Livermore National Laboratory, USA

O4B.3 14:50-15:10

R&D Activities on ZrCo Tritium Storage Alloy in CAEP

Huaqin KOU*, Wenhua LUO, Tao TANG, Zhiyong HUANG, Ge SANG, Guanghui ZHANG, Changan CHEN

China Academy of Engineering Physics, China

O4B.4 15:10-15:30

All-Metal Scroll Vacuum Pumps for Tritium Processing Systems

Nathan Nicholas, Bryce Shaffer

Air Squared, USA

Poster Session 2

Tuesday, April 23 / 15:50-18:00
Room C (Grand Ballroom C, 2F)

P2_01

Rigorous Tritium Wet Scrubber Column Modeling and Design

Anthony Busigin

NITEK USA, Inc., USA

P2_02

Zr2Fe modification for Tritium Absorption

Yong Yang

China Academy of Engineering Physics, China

P2_03

Application of Pt Loaded Honeycomb Catalyst in Air Detritiation

Quanwen Wu*, Zhenhua Zheng, Jinchun Bao, Zhiyong Huang

China Academy of Engineering Physics, China

P2_04

Preparation and Characterization of Super-Hydrophobic Pt-Based Catalysts for H/D Isotope Separation between Hydrogen and Water

Jiamao Li*, Chao Chen, Xiulong Xia, Yu Gong, Heyi Wang, Shuming Peng

China Academy of Engineering Physics, China

P2_05

Mass Transfer Performance Test of Structured Packings for Tritiated Water Distillation Detritiation

Chao Chen*, Jingwei Hou, Heyi Wang, Team of DT Fuel Cycle

China Academy of Engineering Physics, China

P2_06

Effect of Ultraviolet Light on Hydrogen Exchange Reaction between Hydrogen Gas and Tritiated Water

JiEun Yang, TaeJun Kim, Minsik Kim, Jei-Won Yeon

Korea Atomic Energy Research Institute, Republic of Korea

P2_07

Experimental Results and Experience with LPCE Process

O.A. Fedorchenko*, I.A. Alekseev, S.D. Bondarenko, T.V. Vasyanina

National Research Center "Kurchatov Institute", Russian Federation

P2_08

Development of Technology for the Liquid Radioactive Waste Detritiation by Two-Temperature Catalytic Isotope Exchange Method in a Water-Hydrogen System

Pak Yu.S., Bukin A.N.*, Moseeva V.S., Marunich S.A., Rosenkevich M.B.

Dmitry Mendeleev University of Chemical Technology of Russia, Russian Federation

P2_09

Hydrogen Isotope Abstraction by Protonic Metal Oxides with Various Crystal Structures

Chan Woo Park*, Kune-Woo Lee, In-Ho Yoon, Hee-Man Yang, Ilgook Kim

Korea Atomic Energy Research Institute, Republic of Korea

P2_10

Rigorous Dynamic Simulation of Cryogenic Distillation of Hydrogen Isotopologues in the Fuel Cycle of a Thermonuclear Reactor Based on UV-Flash

Andrey Ovcharov[1]*, Richard Szczepanski[2], Jacek Kosek[1], Nuno Pedrosa[2], Xiaofei Lu[3], Lorenzo Basili[4], Rosa Lo Frano[4], Donato Aquaro[4]

[1]International Thermonuclear Experimental Reactor, France, [2]KBC Advanced Technologies Ltd, UK, [3]Institute of Plasma Physics, China, [4]University of Pisa, Italy

P2_11

Commissioning of the LPCE and Purification Systems as Front-End of the Experimental Pilot Plant for D-T Separation

Gheorghe Popescu, George Ana, Anisia Bornea, Ciprian Bucur, Ovidiu Balteanu, Iulia Stefan, Marius Zamfirache

National Institute of Research and Development for Cryogenic and Isotopic Technologies, Romania

P2_12

Hydrogen Generator Modification in View of Tritium Compatibility

George Ana*, Anisia Bornea, Marius Zamfirache, Alina Niculescu, Mihai Vijulie, Ciprian Bucur

National Institute of Research and Development for Cryogenic and Isotopic Technologies, Romania

P2_13

Purity of Hydrogen Isotopes from the Thermal Cycling Absorption Process

Benton Randall, Henry T. Sessions, Lucas Angelette, Xin Xiao*

Savannah River National Laboratory, USA

P2_14

Pd Dense Membrane with Microchannel Structure for Hydrogen Isotope Purification under Different Pressures

Lei Yue*, Yu Gong, Jingwei Hou, Jiamao Li, Chao Chen, Chengjian Xiao, Heyi Wang

Institute of Nuclear Physics and Chemistry, China

P2_15

Study on Preparation of Palladium Film on Porous Stainless Steel Substrate

Yaqi Song[1], Feilong Yang[1], Guikai Zhang[1], Guanghui Zhang[1], Renjin Xiong[1], Zhanlei Wang[2], Changan Chen[1]*

[1]China Academy of Engineering Physics, China, [2]Science and Technology on Surface Physics and Chemistry Laboratory, China

P2_16

TCAP Parameter Optimization Using Fractional Factorial Experimental Design

Xin Xiao*, Henry T. Sessions

Savannah River National Laboratory, USA

P2_17

Thermodynamics, Kinetics and Selectivity of H2 and D2 on Zeolite under Low Temperature

Renjin Xiong[1]*, Michael Hirscher[2]

[1]China Academy of Engineering Physics, China, [2]Max Planck Institute for Intelligent Systems, Germany

P2_18

Hydrogen Isotopes Separation Using Frontal Displacement Chromatography: the Influences of Column Temperature and Gas Flow Rate

Xiaojun Deng[1]*, Deli Luo[2], Cheng Qin[1], Daqiao Meng[2], Tao Tang[1], Guikai Zhang[1], Wenhua Luo[2]

[1]China Academy of Engineering Physics, China, [2]Science and Technology on Surface Physics and Chemistry Laboratory, China

P2_19

Oxygen Regeneration of Palladium Silver Alloy Tubed Hydrogen Purifier

Melissa Golyski

Savannah River Nuclear Solution, USA

P2_20

Trace Tritium Recovery within the European DEMO Fuel Cycle

Tamsin Jackson[1]*, Joao Lopes[1], Nadeera Jayasekera[2], Barry Butler

[1]Culham Centre for Fusion Energy, UK, [2]Loughborough University, UK

P2_21

Design of Tritium Adsorption Systems in Molten Salt Reactors for Mitigation of Radioactive Release

Stephen Lam[1]*, Francesco Ambrogi[2], Raluca Scarlat[2], Ronald Ballinger[1], Charles Forsberg[1]

[1]Massachusetts Institute of Technology, USA, [2]University of Wisconsin-Madison, USA

P2_22

Large-Scale Hydrogen Isotopes Separation by Chromatography

Chengjian Xiao*, Xiaolong Fu, Heyi Wang

China Academy of Engineering Physics, China

P2_23

Catalytic Separation of Hydrogen Isotopes Using Nickel Modified Alumina PLOT Capillary Column

Weiwei Wang*, Xingbi Ren, Lidong Xia, Hairong Li, Weiguang Zhang, Xiaosong Zhou, Xinggui Long, Shuming Peng

China Academy of Engineering Physics, China

P2_24

Hydrogen Adsorption and Desorption Experiments for Cryogenic Molecular Sieve Bed

Yi-Hyun Park, Seungyon Cho, Mu-Young Ahn, Seok Kwon Son, Soon Chang Park*, Youngmin Lee

National Fusion Research Institute, Republic of Korea

P2_25

Design and Manufacturing Issues Related to a High Efficiency Microreactor in View of Tritiated Streams Conversion to Water

Mirela Draghia*, Gheorghe Pasca, Alin Fuciu

IS TECH SRL, Romania

P2_26

A Model to Relate Exhaust Processing Requirements to the Tokamak Operational Scenarios

Deepti Dubey[1]*, Anil K. Tyagi[1], Ranjana Gangradey[2], P. N. Maya[3], Shishir Deshpande[1]

[1]International Thermonuclear Experimental Reactor-India, India, [2]Institute for Plasma Research, India, [3]University of Greifswald, Germany

P2_27

A Study on Trace Amount of Q2 and CQ4 Treatment Process

Woo Chan Jung[1]*, Pil Kap Jung[1], Young Min Kim[1], Hung Man Moon[1], Min Ho Chang[2], Hyeon Gon Lee[2]

[1]Daesung Industrial Gases, Republic of Korea, [2]National Fusion Research Institute, Republic of Korea

P2_28

A Mathematical Design and Synthesis of Complex Column Model for Tritium Separation

Seon-Byeong Kim

Korea Atomic Energy Research Institute, Republic of Korea

P2_29

The Study of a CECE Process for Low Tritiated Liquid Waste prior to Experimental Phase

Anisia Mihaela Bornea[1]*, Marius Valentin Zamfirache[1], George Romulus Ana[1], Ovidiu Ioan Balteanu[1], Liviu Ovidiu Stefan[1]

National Institute of Research and Development for Cryogenic and Isotopic Technologies, Romania

P2_30

Study of Preparation and Hydrogen Isotope (H_2 and D_2) Sorption of CHA-Type Zeolite

Akira Taguchi[1]*, Takumi Nakamori[1], Yuki Yoneyama[1], Takahiko Sugiyama[2], Masahiro Tanaka[3], Kenji Kotoh[4], Yu Tachibana[5], Tatsuya Suzuki[5]

[1]University Toyama, Japan, [2]Nagoya University, Japan, [3]National Institute for Fusion Science, Japan, [4]Kyushu University, Japan, [5]Nagaoka University Technology, Japan

P2_31

A Theoretical Study On Tritium Calorimetry In Hydride Bed

S.-H. Yun*, M. Chang, H.-G. Kang, D. Chung, J.W. Lee, K.J. Jung

National Fusion Research Institute, Republic of Korea

P2_32

The Diffusion Permeation Behavior of Deuterium through the Niobium and its Composite Membrane with Different Grain Sizes

Guo Yakun, Zhou Xin, Ma Bangjun, Ye Xiaoqiu, Chen Changan*

Science and Technology on Surface Physics and Chemistry Laboratory, China

P2_33

Experimental Results of a Medium-Scale Pd-Ag Permeator for the Tritium Extraction and Removal System of DEMO-HCPB Blanket

Marco Incelli*, Alessia Santucci, Silvano Tosti

European Nuclear Energy Agency, Italy

P2_34

Permeator Simulations for the Exhaust Processing System of the EU-DEMO Fuel Cycle

Yannick Hoerstensmeyer[1]*, Silvano Tosti[2], Alessia Santucci[2], Giacomo Bruni[2]

[1]Karlsruhe Institute of Technology, Germany, [2]European Nuclear Energy Agency, Italy

P2_35

Technology Development for Isotope Rebalancing and Protium Removal in the EU-DEMO Fuel Cycle

Cyra Neugebauer*, Yannick Hoerstensmeyer, Christian Day

Karlsruhe Institute of Technology, Germany

P2_36

Use of SAES Getter ST 909 for the Complete Cracking of Methane Contained in Small-Volume Tritiated Dihydrogen Batches with High Concentrations of Impurities

Haudebourg*, Gauvin, Milleton, Macaud

The French Alternative Energies and Atomic Energy Commission, France

P2_37

Non-Evaporable Getters for Tritium Recovery in the Helium Coolant Purification System of DEMO

Alessia Santucci*, Antonio Frattolillo, Marco Incelli, Silvano Tosti

European Nuclear Energy Agency, Italy

P2_38

Evaluating All-Metal Diaphragm Valves for Use in a Tritium Environment

Paul R. Beaumont, Levi R. Houk, Lucas M. Angelette, Andrew N. Payton, James E. Klein, Anita S. Poore

Savannah River National Laboratory, USA

P2_39

Tritium Transport Characteristics Analysis of TMSR-SF under Accident Conditions

Hao Qin, Chenglong Wang*, Wenxi Tian, Suizheng Qiu, G.H. Su

Xi'an Jiaotong University, China

P2_40

Process Design of the Water Detritiation System for China Fusion Engineering Test Reactor

Peilong Li, Wenhua Luo*, Zhi Zhang, Xiaojing Qian, Yan Shi, Jiangfeng Song, Deli Luo

China Academy of Engineering Physics, China

P2_41

The Coolant Purification System of China HCCB TBM: Preliminary Design and Testing of Principle Prototype System

Huang Zhiyong*, Song Jiangfeng, Yao Yong, Chen Changan

China Academy Of Engineering Physics, China

P2_42

The WWR-K Reactor Experimental Base for Studies of the Tritium Release out of Materials under Irradiation

Shaimerdenov Asset*, Gizatulin Shamil, Dyussambayev Daulet, Askerbekov Saulet, Kenzhina Inesh

Institute of Nuclear Physics, Kazakhstan

P2_43

Cryogenic Tritium Delivery and Recovery System

C.R. Shmayda[1]*, W.T. Shmayda[2], N. Roberts[3]

[1]Torion Plasma, Canada, [2]University of Rochester, USA, [3]SHINE Medical, USA

P2_44

Wolsong TRF Operation Status, Operation Experience

Jeon Woo Jin, Lee Dong Min, Park Hyun Je, Kwon Hye Jin

Korea Hydro & Nuclear Power, Republic of Korea

P2_45

The Current Status of the Heavy Water Detritiation Facility at PNPI

Alekseev I.A., Bondarenko S.D.*, Vasyanina T.V., Fedorchenko O.A.

National Research Center "Kurchatov Institute", Russian Federation

P2_46

Simulation of Gas Flows in DT-Fueling Systems of DEMO-FNS Hybrid Facility Accounting for Integrated Modeling of Core and Divertor Plasmas

Sergey Ananyev*, Andrei Kukushkin, Alexei Dnestrovskij, Alexander Spitsyn, Boris Kuteev

National Research Center "Kurchatov Institute", Russian Federation

P2_47

Research Facilities of IAE NNC RK (Kurchatov, Kazakhstan) for Investigations of Tritium Interaction with Structural Materials of Fusion Reactors

Yuriy Gordienko[1]*, Yuriy Ponkratov[1], Timur Kulsartov[1], Zhanna Zaurbekova[1], Yerbolat Koyanbayev[1], Yevgen Chikhray[2]

[1]Institute of Atomic Energy, Kurchatov, Kazakhstan, [2]Al-Farabi Kazakh National University, Kazakhstan

P2_48

Monitoring and Recovery of Tritium in Fusion Test Facility

M. Tanaka[1,2]*, N. Suzuki[3], H. Kato[3], C. Iwata[3], N. Akata[3], H. Hayashi[3], H. Miyake[3]

[1]National Institute for Fusion Science, Japan [2]The Graduate University for Advanced Studies, Japan

P2_49

Analysis of the Transient Regimes of a Detritiation Facility Operation

Marius Valentin Zamfirache*, Anisia Mihaela Bornea, Liviu Ovidiu Stefan, Ovidiu Ioan Balteanu, George Ana

National R&D Institute for Cryogenics and Isotopic Technologies, Romania

P2_50

Concept Design of the Tritium Plant on the TRINITI Site for Ignitor Project Tasks

Alexander Gostev[1], Mikhail Subbotin[2]*, Vladimir Kochin[2], Vladimir Khripunov[2], Mikhail Rozenkevich[3], Alexander Perevezentsev[3], Galina Shrova[3], Yury Pak[3], Alexey Bukin[3], Sergey Marunich[3]

[1]JSC, Russian Federation, [2]NRC, Russian Federation, [3]D. Mendeleev University of Chemical Technology of Russia, Russian Federation

P2_51

Simulation of He-3 Collection Procedure in Tritium Storage System of Fusion Fuel Cycle

Jae-Uk Lee[1]*, Min Ho Chang[1], Hyun-goo Kang[1], Dong-you Chung[1], In-Beum Lee[2]

[1]National Fusion Research Institute, Republic of Korea, [2]Pohang University of Science and Technology, Republic of Korea

P2_52

Romania' Contribution to Manufacture and Use of Heavy Water

Ionita Gheorghe*, Marius Peculea, Ioan Stefanescu

National R&D Institute for Cryogenics and Isotopic Technologies, Romania

P2_53

Challenges of Fueling Fusion Plasmas with Deuterium-Tritium Pellets

Larry Baylor*, Steve Meitner, Robert Duckworth, Trey Gebhart

Oak Ridge National Laboratory, USA

P2_54

HYSYS/ASPEN+ Advanced Tritium Transfer Modelling Tools for ITER/DEMO Plant Systems

Jose M. Nougues[1], Josep A. Feliu[1], Oriol Millan[1], Luis A. Sedano[2,3]*

[1]Inprocess Technology And Consulting Group, Spain [2]FUS_ALIANZ Science, Engineering & Consulting, Spain, [3]E&C energy consulting, Spain

P2_55

Optimization of the Manufacturing of Beta Radiation Sources Based on Tritium for Betavoltaic Power Sources

A.S. Anikin*, M.I. Belyakov, A.N. Bukin, N.E. Zabirova, N.P. Bobyr, I.G. Lesina, A.A. Semenov, A.V. Lizunov, A.V. Demin

A.A. Bochvar High-technology Research Institute of Inorganic Materials, Russian Federation

P2_56

A Bibliometrics Analysis on Tritium Technology in the Field of Fusion Energy

Hansoo Chang[1]*, Jung-Suk Hong[2]

[1]National Fusion Research Institute, Republic of Korea, Korea Institute of S&T Evaluation and Planning, Republic of Korea

P2_57

Quenching Correction with Two-Dimensional Scintillation Spectrum in Tritium Measurement

Masanori Hara[1]*, Miki Shoji[1], Tsukasa Aso[2], Takayoshi Furusawa[3], Yuka Kato[3], Takuro Masuda[3]

[1]University of Toyama, Japan, [2]National Institute of Technology, Toyama College, Japan, [3]Hitachi, Ltd., Japan