

Technical Sessions, Thursday

Plenary Session 03

Date / Time : Thursday, April 25 / 08:30-10:30

Place : 2F, Room A (Grand Ballroom A)

Session Chair : Toshihiko Yamanishi (QST, Japan) / Ion Cristescu (KIT, Germany)

PL7 08:30-09:10

Update on the ITER Tritium Plant

Ian Bonnett*, Robert Michling, Wataru Shu, David Demange, Scott Willms
International Thermonuclear Experimental Reactor, France

PL8 09:10-09:50

Tritium Trapping in Tungsten for Nuclear-Fusion Devices: Impact of Pre-Existing Defects, Material Morphology and Helium Irradiation

Bernard^{1*}, Sakamoto², Kreter³, Grisolia¹, Payet¹, Garcia-Argote¹, Corr⁴, Doerner⁵, Schwarz-Selinger⁶, Bisson⁷, Pardanaud⁷, Markelj⁸, Martin⁷, Barthe⁹, Thompson⁴

¹The French Alternative Energies and Atomic Energy Commission, France, ²National Institute for Fusion Science, Japan, ³Forschungszentrum Jülich, Germany, ⁴Australian National University, Australia, ⁵University of California San Diego, USA, ⁶Max-Planck-Institut für Plasmaphysik, Germany, ⁷Aix Marseille University, France, ⁸Jozef Stefan Institute, Slovenia, ⁹French National Centre for Scientific Research, France

PL9 09:50-10:30

Progress of Tritium Related Activities in QST

Takumi Hayashi^{1*}, Rie Kurata¹, Yuki Edao¹, Yasunori Iwai¹, Kanetsugu Isobe¹, Nobuyuki Asakura¹, Suguru Masuzaki², Makoto Oyaizu¹, Masaru Nakamichi¹, Toshihiko Yamanishi¹, Hisashi Tanigawa¹, Yasunori Kawamura¹, Takumi Suzuki³, Masayuki Yamada³

¹National Institutes for Quantum and Radiological Science and Technology, Japan, ²National Institute for Fusion Science, Japan, ³Japan Atomic Energy Agency, Japan

Oral Session 06

06A

Date / Time : Thursday, April 25 / 11:00-12:50

Place : 2F, Room A (Grand Ballroom A)

Session Chair : Masashi Shimada (INL, USA) / Takuji Oda (Seoul Nat'l Univ., Republic of Korea)

06A.1 11:00-11:25 [I.O]

Retention and Transport of Tritium and Hydrogen Isotopes in Fusion Reactor Materials

Yuji Hatano*

University of Toyama, Japan

06A.2 11:25-11:50 [I.O]

Review of Tritium and Helium-3 in Metal Tritides

Clark S. Snow*, Caitlin A. Taylor, Brittany R. Muntifering

Sandia National Laboratories, USA

06A.3 11:50-12:10

Characterization of Tritium Transport in Molten $2\text{LiF}\cdot\text{BeF}_2$ Salt and Graphite by Electrochemistry Techniques.

Francesco Carotti*, Huali Wu, Raluca Scarlat

University of Wisconsin, USA

06A.4 12:10-12:30

The Cryosorbent and Regeneration Properties of Activated Charcoal for Tokamak Exhaust

Yu Gong*, Lei Yue, Xiaolong Fu, Heyi Wang

China Academy of Engineering Physics, China

06A.5 12:30-12:50

Microstructural Evolution During Neutron Irradiation of Lithium Aluminate for Tritium Production

DJ Senor*, DE Burkes

Pacific Northwest National Laboratory, USA

Oral Session 06

06B

Date / Time : Thursday, April 25 / 11:00-12:50

Place : 2F, Room B (Grand Ballroom B)

Session Chair : Takumi Hayashi (QST, Japan) / Ian Bonnett (ITER Organization, France)

06B.1 11:00-11:25 [I.O]

Tritium R&D Activities at the Savannah River National Laboratory

Paul Cloessner*

Savannah River National Laboratory, USA

06B.2 11:25-11:50 [I.O]

R&D Progresses of D-T Fuel Cycling for CFETR

Heyi Wang*, Shuming Peng, Xiaolin Wang

China Academy of Engineering Physics, China

06B.3 11:50-12:10

Tritium Processing Systems and First Tritium Operation of the KATRIN Experiment

Florian Priester*, David Hillesheimer, Alexander Marsteller, Marco Roellig, Michael Sturm

Karlsruhe Institute of Technology, Germany

06B.4 12:10-12:30

Activities and Capabilities at LANL's Weapons Engineering Tritium Facility (WETF)

Chandra Savage Marsden*, Brad Meyer

Los Alamos National Laboratory, USA

06B.5 12:30-12:50

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

Oral Session 07

07A

Date / Time : Thursday, April 25 / 14:00-15:30

Place : 2F, Room A (Grand Ballroom A)

Session Chair : Mu-Young Ahn (NFRI, Republic of Korea) / Dave Robinson (SNL, Mexico)

07A.1 14:00-14:25 [I.O]

Simultaneous Measurement of Deuterium Permeation and Lithium-Lead Corrosion for Tritium Permeation Barrier Coatings

Takumi Chikada^{1*}, Moeki Matsunaga¹, Kazuki Saito², Kazuki Nakamura¹, Keisuke Kimura¹, Hikari Fujita³, Yoshimitsu Hishinuma⁴, Teruya Tanaka⁴

¹Shizuoka University, Japan, ²SOKENDAI, Japan, ³The University of Tokyo, Japan, ⁴National Institute for Fusion Science, Japan

07A.2 14:25-14:50 [I.O]

Molecular Dynamics Simulation for Behaviors of Helium in Uranium and Uranium Tritide

Takuji Oda^{1*}, Jae-Uk Lee², Hyun-Goo Kang², Min Ho Chang²

¹Seoul National University, Republic of Korea, ²National Fusion Research Institute, Republic of Korea

07A.3 14:50-15:10

Study of Electrolyser Materials at High Tritium Concentrations

H. Boniface*, T. Whitehorne, C. Muirhead, H. Li, R. Carson, S. Suppiah

Canadian Nuclear Laboratories., Canada

07A.4 15:10-15:30

Thin-Alumina Films as a Tritium Adsorption Inhibitor for Stainless-Steel 316

Cody Fagan*, Daniel Bassler, Matthew Sharpe, W.T. Shmayda, W.U. Schroeder

University of Rochester, USA

Oral Session 07

07B

Date / Time : Thursday, April 25 / 14:00-15:30

Place : 2F, Room B (Grand Ballroom B)

Session Chair : Sam Suppiah (CNL, Canada) / Heyi Wang (CAEP, China)

07B.1 14:00-14:25 [I.O]

Preparations at JET for DT Operations

S Knipe*, T Jones, R Warren, R Lobel, R King, A Whitehead, B Wakeling, R Marshall, S Forbes, K-D Zastrow, A Manning, G Jones, S Emery
United Kingdom Atomic Energy Authority, UK

07B.2 14:25-14:50 [I.O]

Design and R&D on Tritium Plant Systems for China Fusion Engineering Test Reactor

Changan Chen*, Jinguang Cai, Guangming Ran, Heyi Wang, Wenhua Luo, Shuming Peng, Xiaolin Wang
China Academy of Engineering Physics, China

07B.3 14:50-15:10

Preparation of the JET Fuel Cycle for Deuterium-Tritium Operations

B.R. Wakeling*, A. Cobalt, A. Davies, R. George, T. Huddleston, T. Jackson, M. Knight, X. Lefebvre, S. Medley, R. Olney, G. Papadopoulos, S. Romanelli, P. Staniec, A. Withycombe, R.J. Walker
United Kingdom Atomic Energy Authority, UK

07B.4 15:10-15:30

The RMC Method to Handle Tritium Efficiently and Safely.

Sandro M.O.L. Schneider*, Patrick Burkhalter
smolsys ltd., Switzerland

Poster Session 3

Date / Time : Thursday, April 25 / 15:50-18:00

Place : 2F, Room C (Grand Ballroom C)

- P3_01 Modeling the Formation of Organically Bound Tritium and Deuterium in Plants**
Lars Brinkmann*, David Rowan, Volodymyr Korolevych
Canadian Nuclear Laboratories, Canada
- P3_02 Comparative Study of DNA Double-Strand Break Induction in Human Mesenchymal Stem Cells Exposed to Tritiated Water, Organically Bound Tritium and X-Rays**
Andreyan N. Osipov*, Oleg Kochetkov, Natalia Vorobyeva, Margarita Pustovalova, Anna Grekhova, Andrey Osipov, Dmitry Kabanov, Valeriy Barchukov
Burnasyan Federal Medical Biophysical Center of Federal Medical Biological A, Russian Federation
- P3_03 Quickly Analytical Determination of Tritium in Urine by a New Resin Column**
Yun Xie*, Zhilin Chen, Zhongtang Wang
China Academy of Engineering Physics, China
- P3_04 Environmental Impact Analysis of Tritium around Nuclear Power Plants**
Juyoul Kim*
KEPCO International Nuclear Graduate School, Republic of Korea
- P3_05 Evaluation of Tritium Transport in a Forest Environment**
Brian Viner*, Wendy Kuhne, Martine Duff, Ashley Swindle
Savannah River National Laboratory, USA
- P3_06 Environmental Impact Considerations of Tritium Released from Fusion Reactor**
Baojie Nie*, Muyi Ni, Fengchen Li
Sun Yat-Sen University, China
- P3_07 Kinetics of Double Strand Breaks of Genome-Seized DNA in Low Concentration Tritiated Water Evaluated Using Single Molecule Observation Method**
H. Shimoyachi^{1*}, Y. Hatano², T. Kenmotsu³, Y. Oya⁴, H. Nakamura⁵
¹University of Toyama, Japan, ²Doshisha University, Japan, ³Shizuoka University, Japan, ⁴National Institute for Fusion Science, Japan
- P3_08 Measurement of Tritium Distribution in Graphite by Tritium Imaging Plate Technique**
Huali Wu^{1*}, Guiqiu Zheng², David M Carpenter², Raluca O Scarlat¹
¹University of Wisconsin-Madison, USA, ²Massachusetts Institute of Technology, USA
- P3_09 High-Level Tritium Determination in Organics by Combustion**
T. Whitehorne*, C. Muirhead¹, M. Byers, S. Suppiah
Canadian Nuclear Laboratories, Canada

- P3_10 A Generic CODAC Prototyping for Real-Time Dynamic Tritium Mass-Balance Monitoring Demonstration**
Daniel Marchante^{1*}, Pau Pais¹, Lluís Batet², E. MAs De Les Valls², L. Sedano³
¹PROCONSYSTEMS, Spain ²Polytechnic University of Catalonia, Spain ³FUS_ALIANZ Science, Engineering & Consulting, Spain
- P3_11 Calorimetry : an NDA Method for Tritium Measurement and Accountancy**
Bachelet^{1*}, Lis¹, Andre², Mathonat²
¹The French Alternative Energies and Atomic Energy Commission, France, ²KEP Technologies, France
- P3_12 Development of Fast-Response Solved-Tritium Concentration Diagnostics**
Luis Sedano
FUS_ALIANZ Science, Engineering & Consulting, Spain
- P3_13 Real-Time Analysis of Hydrogen Isotope Gases in Second-Scale Reactions**
Yan Xiayan, Lv Junbo, Qin Cheng, Guo Shulan, Wu Quanwen, Xiong Renjin*
China Academy of Engineering Physics, China
- P3_14 Non-Exchangeable Organically Bound Tritium Concentration in Tree Rings around a Chinese Nuclear Power Plant**
Yuhua Ma¹, Ming He², Youshi Zeng¹, Qingzhang Zhao², Yijun Pang², Wei Liu^{1*}, Yan Li¹
¹Chinese Academy of Sciences, China ²China Institute of Atomic Energy, China
- P3_15 Preliminary Evaluation of Antech Model CD285-1540 Calorimeter**
Brian Price*, Chandra Marsden
Los Alamos National Laboratory, USA
- P3_16 Advances in Tritium Measurement and Detection**
Phillips Steve*, Werth Vincent
Premium Analyse, France
- P3_17 Development of a Monitoring Technique of Permeation Behaviors of Tritium in Metals to Pure Water**
Teppei Otsuka^{1*}, Takuma Shimada¹, Kenichi Hashizume², Toshiaki Hiyama²
¹Kindai University, Japan, ²Kyushu University, Japan
- P3_18 Material Studies to Reduce the Tritium Memory Effect in BIXS Analytic Systems**
Max Aker*, Marco Roellig
Karlsruhe Institute of Technology, Germany
- P3_19 Optimisations Made in Tritium Analysis and Inventory Measurement**
Antonio Provenzano*, Gemma Allen, Christopher Knott, Damaris Roffey, Rachel Wilson, Dario Castiglione
Atomic Weapons Establishment, UK
- P3_20 Experimental Measurement of Tritium from Molten FLiBe Salt under Neutron Irradiation**
Guiqiu Zheng*, David Carpenter, Kieran Dolan
Massachusetts Institute of Technology, USA

- P3_21 Assessment of Tritium Exposure in the Atmosphere from the Spray Ponds Balakovo NPP**
 Vasilyev Aleksey^{1*}, Ekidin Aleksey¹, Vasyanovich Maxim¹, Antushevskiy Alexander², Semenov Maxim², Murashova Ekaterina²
¹Institute of Industrial Ecology, Russian Federation, ²Federal State Unitary Enterprise “Mayak Production Association”, Russian Federation
- P3_22 The Substitutability of Liquid Scintillation Cocktail in the Measurement of Low-Level Tritiated Water for CaF₂(Eu) Powders**
 Jing Wu, Heyi Wang*, Zhilin Chen
 China Academy of Engineering Physics, China
- P3_23 Tritium Permeation Characterization of Al₂O₃/FeAl Coating as Tritium Permeation Barrier on Type 321 Stainless Steel Container**
 Feilong Yang*, Guikai Zhang, Xin Xiang, Tao Tang, Changan Chen, Xiaolin Wang
 China Academy of Engineering Physics, China
- P3_24 Application of High Energy Tritium Ions and Particles Formed in 6Li(n, α)T Nuclear Reaction to Excite the Luminescence of Inert Gas Mixtures**
 Yuriy Ponkratov^{1,3*}, Erlan Batyrbekov², Timur Kulsartov³, Mendykhan Khasenov³, Kuanysh Samarkhanov³, Zhanna Zaurbekova³, Yevgen Chikh-ray⁴
¹Tomsk Polytechnic University, Russian Federation, ²National Nuclear Center, Kazakhstan
³Institute of Atomic Energy, Kazakhstan, ⁴Institute of Experimental and Theoretical Physics, Kazakhstan
- P3_25 Fast Quantitative Determination of He and Ar in Fuel Cycle Based on LIBS**
 Tao Xu¹, Chuan Ke², Ying Li², Yongliang Chen², Hong Zhang², Yong Zhao^{2*}
¹Fujian Normal University, China, ²Southwest Jiaotong University, China
- P3_26 In-Situ Decontamination of Ion Chambers Using LEDs**
 George Larsen*, Simona E. Hunyadi Murph, Khai Nguyen, Kaitlin Lawrence
 Savannah River National Laboratory, USA
- P3_27 Influence of Internal Structure of Semiconductor Detector on β-ray Induced X-Ray Spectrum**
 S. E. Lee*, Y. Hatano, M. Hara, M. Matsuyama
 University of Toyama, Japan
- P3_28 The Area Measurements in the Tritium Laboratory (Tritiumlab), IFIN-HH, Romania**
 Mihail-Razvan Ioan*, Cristian Postolache, Viorel Fugaru, George Bubueanu, Catalin Stelian Tuta
 Horia Hulubei National Institute of Research & Development for Physics and Nuclear Engineering, Romania
- P3_29 Withdraw**
- P3_30 Design & Operation of a Monitoring System which Separates & Measures High & Low Concentration Tritium in Air**
 Dell Williamson*, Robert Goldstein
 US Nuclear Corp, USA

- P3_31 Numerical Simulation Study of the Adsorption of Water and Water Radiolysis Products in NaA Zeolite**
J. Randrianandraina¹, M. Grivet^{1*}, J. E. Groetz¹, C. Ramseyer¹, B. Cardey¹, F. Torrealba Anzola¹, D. Ducret², C. Chambelland²
¹University of Burgundy Franche-County, France, ²The French Alternative Energies and Atomic Energy Commission, France
- P3_32 Development of a Cost-Effective Type B Tritium Shipping Package**
Paul S. Blanton, Josh P. Flach, Christopher P. Cable
Savannah River National Laboratory, USA
- P3_33 Scale-Up Study for Depleted Uranium (DU) Beds via Numerical Simulation of Hydrogen Absorption Process**
Masoomah Ghasemi, Jaeyoo Choi, Muhammad Faizan Chinnanai, Hyunchul Ju*
Inha University, Republic of Korea
- P3_34 Analyzing Hydriding Performance in Real-Scale Depleted Uranium (DU) Beds**
Seongjin Yun, Geonhui Gawk, Masoomah Ghasemi, Muhammad Faizan Chinnanai, Hyunchul Ju*
Inha University, Republic of Korea
- P3_35 Measurement of Palladium Hydride and Palladium Deuteride Isotherms between 77 and 393 K**
M. Sharpe^{1*}, K. Glance², W. T. Shmayda¹
¹Laboratory for Laser Energetics, USA, ²Pittsford Sutherland High School, USA
- P3_36 Alloying Effects on Hydrogen Isotope Storage and Disproportionation of ZrCo Alloys - Experimental and Theoretical Investigation**
Guanghui Zhang*, Ge Sang, Huaqin Kou
China Academy of Engineering Physics, China
- P3_37 Development of 3He Bubble Microstructure in TiT2 Films During Aging**
Haifeng Wang*, Shuming Peng
China Academy of Engineering Physics, China
- P3_38 3D Tritium Transport Analysis for WCCB Blanket Based on COMSOL**
Xueli Zhao¹, Muye Ni², Baojie Nie², Bing Zhang¹, Lei Chen¹, Kai Huang¹, Songlin Liu^{1*}
¹Chinese Academy of Sciences, China, ²Sun Yat-Sen University, China
- P3_39 Design of a Metal Hydride Bed to Analyze the Sintered Metal Filters Effect on Hydrogen Isotope Devliery Rate.**
Jisoo Kim¹, Samuel Park¹, Kwangjin Jung¹, Min Ho Chang², Heeseok Kang³, Hongsuk Chung^{1*}
¹University of Science and Technology, Republic of Korea, ²National Fusion Research Institute, Republic of Korea, ³Korea Atomic Energy Research Institute, Republic of Korea
- P3_40 Preliminary Experimental Study on Application of Cu Foam as Internal Component of Metal Hydride Bed**
Dong-You Chung*, Hyun-Goo Kang, Min Ho Chang, Jae-Uk Lee, Sei-Hun Yun
National Fusion Research Institute, Republic of Korea

- P3_41 Hypothetical Operation Plan to Minimize Tritium Inventory of Fusion Fuel Cycle**
 Suh-Young Lee¹, Min Ho Chang², Jae-Uk Lee², Jin-Kuk Ha³, Sei-Hun Yun², In-Beum Lee¹, Euy Soo Lee^{3*}
¹Pohang University of Science and Technology, Republic of Korea, ²National Fusion Research Institute, Republic of Korea, ³Dongguk University, Republic of Korea
- P3_42 Hydride Bed Isotopic Exchange**
 P. J. Foster^{1*}, Z. J. Trotter¹, S. A. Schaufler¹, J. L. Clark¹, J. E. Klein²
¹Savannah River Nuclear Solutions, USA, ²Savannah River National Laboratory, USA
- P3_43 Hydride Bed He-3 Recovery & Partial Regeneration**
 Paul Foster^{1*}, Zechariah Trotter¹, Summer Schaufler¹, Jared Clark¹, Greg Staack²
¹Savannah River Nuclear Solutions, USA, ²Savannah River National Laboratory, USA
- P3_44 Engineering Analysis of HCCB-TBS Tritium Extraction System**
 Lei Yang*, Yong Yao, Ming Wen, Yongtao An, Kanghai He, Junguang Chen, Linzi Liu
 China Academy of Engineering Physics, China
- P3_45 Tritium Breeding Capabilities in Magnetized Target Fusion Reactors**
 Taylor Glover, Haseeb Ur Rehman, Yonghee Kim
 Korea Advanced Institute of Science and Technology, Republic of Korea
- P3_46 Study on the Trace Hydrogen Capture from Helium by Pd/Al₂O₃**
 Yong Yao*, Deli Luo, Lei Yang, Jiangfeng Song
 China Academy of Engineering Physics, China
- P3_47 Design, Synthesis, Calculation and Characterization of the Tritium Breeder: Li₄TiO₄ Ceramics**
 Juemin Yan^{1*}, Tao Gao¹, Xiaojun Chen², Chengjian Xiao²
¹Sichuan University, China, ²China Academy of Engineering Physics, China
- P3_48 Effect of MHD Velocity Profiles on Tritium Permeation in PbLi Channels**
 Fernando Roca Urgorri*, Carlos Moreno, Ivan Fernandez-Berceruelo, Elisabetta Carella, David Rapisarda, Angel Ibarra
 Centre for Energy, Environment and Technology, Spain
- P3_49 Tritium Release Behavior in Tritium Breeding Materials**
 Qiang Qi^{1*}, Guang-Nan Luo¹, Jing Wang¹, Qilai Zhou², Mingzhong Zhao², Maoqiao Xiang³, Moeko Nakata², Haishan Zhou¹, Yingchun Zhang³, Yasuhisa Oya²
¹Chinese Academy of Sciences, China, ²Shizuoka University, Japan, ³University of Science and Technology, China
- P3_50 Sensitivity Analysis and Dimensioning of Reactor-Scale Pd/Ag Permeators for the Tritium Extraction and Removal System of the EU-HCPB Blanket**
 Rodrigo Antunes^{1,2*}, Laetitia Frances^{1,2}, Marco Incelli³, Alessia Santucci³
 Karlsruhe Institute of Technology, Germany, ²Tritium Laboratory Karlsruhe, Germany, ³Energy and Sustainable Economic Development, Italy
- P3_51 Fundamental Analysis for Electrochemical Extraction and Monitoring of Impurities from Lead Lithium with Chloride Molten Salt**
 Hiroyuki Miyagaki, Tomohiro Okada*, Juro Yagi, Keisuke Mukai, Satoshi Konishi
 Kyoto University, Japan

P3_52 Electrochemical Extraction and Monitoring of Light Element Impurities in Liquid Lithium with Chloride Molten Salt

Juro Yagi*, Tomohiro Okada, Keisuke Mukai, Satoshi Konishi
Kyoto University, Japan

P3_53

P3_54 On the Optimum Tritium Breeding Blanket Configuration of a Tokamak Reactor

Bong Guen Hong*
Chonbuk National University, Republic of Korea

P3_55 Numerical Investigation of Purge Gas Flow through Pebble Beds Using Discrete Element Method and Computational Fluid Dynamics

Youngmin Lee^{1*}, Dongwoo Sohn², Mu-Young Ahn¹, Yi-Hyun Park¹, Seungyon Cho¹
¹National Fusion Research Institute, Republic of Korea, ²Korea Maritime and Ocean University, Republic of Korea

P3_56 Numerical Study of Hydrogen Reformer to Increase Methane Conversion Rate

Dohwan Kim, Kyeongmin Oh, Jaeseung Lee, Hyunchul Ju*
Inha University, Republic of Korea