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## Poster Session 1

**Monday, April 22 / 15:50-18:00**

**Room C (Grand Ballroom C, 2F)**

### P1\_01

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#### **Preparation of Y<sub>2</sub>O<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub> Multilayer Coating as Tritium Permeation Barrier**

Long Wang<sup>1\*</sup>, Yongjin Feng<sup>1</sup>, Xiaoyu Wang<sup>1</sup>, Ke Shi<sup>2</sup>, Jijun Yang<sup>2</sup>, Kaiming Feng<sup>1</sup>, Ning Liu<sup>2</sup>, Chuanhui Liang<sup>3</sup>, Wei Jin<sup>3</sup>, Aart Willem Kleijn<sup>3</sup>

*<sup>1</sup>Southwestern Institute of Physics, China, <sup>2</sup>Schuan University, China, <sup>3</sup>China Academic of Engineering Physics, China*

### P1\_02

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#### **Tritium Transport and Distribution in a High Temperature Gas-Cooled Reactor**

Sung Nam Lee, Nam-il Tak

*Korea Atomic Energy Research Institute, Republic of Korea*

### P1\_03

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#### **Development of 2/3D and Multi-Physics Tritium Transport Model for ITER TBM System**

Ni Muiyi<sup>1\*</sup>, Nie Baojie<sup>1</sup>, Zhao Xueli<sup>2</sup>, Vander Laan Jaap<sup>3</sup>

*<sup>1</sup>Sun Yat-Sen University, China, <sup>2</sup>Institute of Plasma Physics, China. <sup>3</sup>International Thermonuclear Experimental Reactor, France*

### P1\_04

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#### **A Study on the Risk Management of Fusion Exhaust Gas Recovery Process**

Woo-Chan Jung<sup>1\*</sup>, Pil-Kap Jung<sup>1</sup>, Young-Min Kim<sup>1</sup>, Hung-Man Moon<sup>1</sup>, Min-Ho Chang<sup>2</sup>, Hyeon-Gon Lee<sup>2</sup>

*<sup>1</sup>Daesung Industrial Gases, Republic of Korea, <sup>2</sup>National Fusion Research Institute, Republic of Korea*

### P1\_05

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#### **Estimation on Protection Unit for Tritium**

Sung Paal Yim\*, Cheo Kyung Lee

*<sup>1</sup>Korea Atomic Energy Research Institute, Republic of Korea, <sup>2</sup>Handong Global University, Republic of Korea*



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**P1\_06**

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**Conceptual Design of a Combined Tritium Extraction System with an Intermediate Heat Exchanger and Its Leakage to the Environment Analysis for Nuclear Fusion Reactors.**

Marta Velarde, J. Fradera, J.M. Perlado

<sup>1</sup>Institute of Nuclear Fusion, Spain, <sup>2</sup>IDOM, Spain

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**P1\_07**

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**Seismic Testing of Glovebox Feedthrough Connectors and Vacuum Pumps**

L. M. Angelette\*, A. S. Poore, J. E. Klein, P. R. Beaumont, W. A. Stafford, J. J. Grinnell

*Savannah River National Laboratory, USA*

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**P1\_08**

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**An Experiment-Oriented Analysis of a Non-Steady-State Model for the Permeation of Multi-Component Hydrogen Isotopes through Metals**

Nicolae Bidica<sup>1\*</sup>, Anisia Bornea<sup>1</sup>, Ion Cristescu<sup>2</sup>, Nicolae Sofilca<sup>1</sup>, Ciprian Bucur<sup>1</sup>, Marian Curuia<sup>1</sup>

<sup>1</sup>JCSI Rm. Valcea, Romania, <sup>2</sup>Karlsruhe Institute of Technology, Germany

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**P1\_09**

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**The Tests of the Deuterium Permeation through the Rohacell 71HF - a Candidate Material for the SIC-2 Windows for the ITER HFS Reflectometry**

Dmitrii Cherkez\*, Alexander Spitsyn, Dmitrii Shelukhin, Vladimir Vershkov

<sup>1</sup>National Research Center "Kurchatov Institute", Russian Federation

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**P1\_10**

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**New 3D Tritium Permeation Modelling Software Developed by the UKAEA**

Alistair Joyce\*, Anthony Hollingsworth

*United Kingdom Atomic Energy Authority, UK*

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**P1\_11**

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**Assessment of Tritium Inventory in the Tritiated Metallic Waste from a Fusion Reactor**

Zhibin Chen\*, Chao Chen, Zhen Wang, Shanqi Chen, Daochuan Ge

*Chinese Academy of Sciences, China*

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**P1\_12**

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**The Study of Tritium Removal from Irradiated Nuclear Graphite Base on Hydrogen Isotope**

Ke Deng<sup>1</sup>, Xijun Wu<sup>2</sup>, Mingjun Zhang<sup>1</sup>, Qin Zhang<sup>1</sup>, Guo Yang<sup>1</sup>, Zhaowei Ma<sup>1</sup>, Guanghua Wang<sup>1</sup>, Wei Liu<sup>1\*</sup>

<sup>1</sup>Chinese Academy of Science, China, <sup>2</sup>University of South China, China



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**P1\_13**

**A Summary of the Tritium Source Term Study in the 10 MW High Temperature Gas-Cooled Reactor**

Mengqi Lou<sup>1</sup>, Xuegang Liu<sup>1</sup>, Liqiang Wei<sup>1</sup>, Feng Xie<sup>1\*</sup>, Jiejuan Tong<sup>1</sup>, Xianbao Duan<sup>2</sup>, Bin Shan<sup>3</sup>, Guiqiu Zheng<sup>4</sup>

<sup>1</sup>Tsinghua University, China, <sup>2</sup>Wuhan Institute of Technology, China, <sup>3</sup>Huazhong University of Science & Technology, China,

<sup>4</sup>Massachusetts Institute of Technology, USA

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**P1\_14**

**Tritium Distributions in LILWs of Korean Candu Reactor**

Young-Ku Choi<sup>1</sup>, Min-Hoon Baik<sup>2</sup>, Jae-Kwang Lee<sup>2</sup>, Tae Hyung Kim<sup>2</sup>, Hong Joo Ahn<sup>2\*</sup>, Jong Kwang Lee<sup>2</sup>

<sup>1</sup>Sun Kwang T&S, Republic of Korea, <sup>2</sup>Korea Atomic Energy Research Institute, Republic of Korea

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**P1\_15**

**Tritium Research and Development Status at KAERI**

Hongsuk Chung<sup>1\*</sup>, Jisoo Kim<sup>1</sup>, Kwangjin Jung<sup>1</sup>, Samuel Park<sup>1</sup>, Min Ho Chang<sup>2</sup>, Heeseok Kang<sup>3</sup>

<sup>1</sup>KAERI-UST, Republic of Korea, <sup>2</sup>National Fusion Research Institute, Republic of Korea, <sup>3</sup>Korea Atomic Energy Research Institute, Republic of Korea

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**P1\_16**

**New Technologies for Conditioning Liquid Radioactive Wastes**

Nikolay Kazakovsky, Vladimir Korolev\*, Arkadiy Yukhimchuk

*The Russian Federal Nuclear Center – All-Russian Scientific Research Institute of Experimental Physics, Russian Federation*

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**P1\_17**

**Detritiation of Tungsten After Tritium Gas Exposure**

N. Bobyr<sup>1\*</sup>, A. Spitsyn<sup>1</sup>, A. Anikin<sup>2</sup>, B. Ivanov<sup>2</sup>, A. Bukin<sup>2</sup>, N. Zabirova<sup>2</sup>, Y. Hatano<sup>3</sup>

<sup>1</sup>National Research Center "Kurchatov Institute", Russian Federation, <sup>2</sup>Joint Stock Company "A.A. Bochvar High-technology Research Institute of Inorganic Materials", Russian Federation, <sup>3</sup>University of Toyama, Japan

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**P1\_18**

**Radiological Characterisation of Solid Waste Resulting from the Refurbishing of Tritium Laboratory**

Viorel Fugaru\*, Cristian Postolache, George Bubueanu, Catalin Stelian Tuta, Mihail-Razvan Ioan

*Horia Hulubei National Institute of Research & Development for Physics and Nuclear Engineering, Romania*

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**P1\_19**

**Tritium Emissions and Monitoring during KSTAR Device Operation**

Hee-Soo Kim\*, Sangtae Kim<sup>1</sup>, Kaprai Park<sup>1</sup>, Si-Woo Woon<sup>1</sup>

*National Fusion research Institute, Republic of Korea*



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**P1\_20**

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**Influence of Thermal Aging on Deuterium Retention and Trapping in Reduced Activation Ferritic/Martensitic Steels**

Siwei Zhang, Zongming Shao, Wei Wang\*, Xiang Ji, Chunjing Li

*Chinese Academy of Sciences, China*

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**P1\_21**

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**Synthesis and Characteristic of Biomimetic Graphene Oxide/Al<sub>2</sub>O<sub>3</sub> Composite Tritium Permeation Barrier**

Hao YANG, Wei WANG, Siwei ZHANG, Xiang JI\*, Chunjing LI, FDS Team

*Chinese Academy of Sciences, China*

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**P1\_22**

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**Effect of Electron-Ion Interactions and Electronic Stopping on Irradiation Damage in  $\beta$ -Li<sub>2</sub>TiO<sub>3</sub>**

Woong-Kee Kim, Oda Takuji\*

*Seoul National University, Republic of Korea*

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**P1\_23**

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**Imaging Hydrogen Effects in Pinch Welded Materials**

Joy McNamara\*, Paul Korinko, Michael Morgan, Ross Smith, Andrew Duncan

*Savannah River National Laboratory, USA*

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**P1\_24**

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**Quality Assurance and Industrial Standardization of Eutectic Alloy Pb-15.7(2)Li**

Jose Luis Herranz, Luis A. Sedano

*FUS-ALIANZ Science, Engineering & Consulting, Spain*

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**P1\_25**

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**Tritium Effects on Aromatic Carbon Loaded Polymers**

Brent Peters<sup>1\*</sup>, Tim Krentz<sup>1</sup>, Jay Gaillard<sup>1</sup>, Steve Serkiz<sup>1</sup>, Mark Kranj<sup>1</sup>, Dale Hitchcock<sup>1</sup>, Josef Velten<sup>1</sup>, Timothy DeVol<sup>2</sup>

<sup>1</sup>Savannah River National Laboratory, USA, <sup>2</sup>Clemson University, USA

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**P1\_26**

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**Small Angle Neutron Scattering to Characterize Decay Helium Bubbles in Tritium Precharged Stainless Steels**

Dale A. Hitchcock\*, Timothy M. Krentz, Michael J. Morgan

*Savannah River National Laboratory, USA*



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**P1\_27**

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**Damage Distribution Dependence on Hydrogen Isotope Retention Behavior in Neutron - Fe<sup>2+</sup> Implanted W**

Moeko Nakata<sup>1\*</sup>, Akihiro Togari<sup>1</sup>, Zhao Mingzhong<sup>1</sup>, Fei Sun<sup>1</sup>, Yuji Hatano<sup>2</sup>, Takeshi Toyama<sup>3</sup>, Naoaki Yoshida<sup>4</sup>, Hideo Watanabe<sup>4</sup>, Masashi Shimada<sup>5</sup>, Dean Buchenauer<sup>6</sup>, Yasuhisa Oya<sup>1</sup>

<sup>1</sup>Shizuoka University, Japan, <sup>2</sup>University of Toyama, Japan, <sup>3</sup>Tohoku University, Japan, <sup>4</sup>Kyushu University, Japan, <sup>5</sup>Idaho National Laboratory, USA, <sup>6</sup>Sandia National Laboratories, USA

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**P1\_28**

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**Effects of Radiation Defects Induced by Ion Irradiation on Crystal Structure of Li<sub>2</sub>TiO<sub>3</sub>**

Donggyu Lee, Woong-Kee Kim, Takuji Oda\*

Seoul National University, Republic of Korea

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**P1\_29**

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**Effect of Heat Treatment on Deuterium Retention in CuCrZr Alloys**

Haodong Liu<sup>1\*</sup>, Haishan Zhou<sup>1</sup>, Sixiang Zhao<sup>2</sup>, Lu Wang<sup>1</sup>, Yuping Xu<sup>1</sup>, Fang Ding<sup>1</sup>, Guangnan Luo<sup>1</sup>

<sup>1</sup>American Society of Interventional Pain Physicians, China, <sup>2</sup>Lanzhou University of Technology, China

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**P1\_30**

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**The Deuterium Permeation Behavior in Fe Ions Damaged Tungsten Studied by Gas-Driven Permeation Method**

Mingzhong Zhao<sup>1\*</sup>, Moeko Nakata<sup>1</sup>, Fei Sun<sup>1</sup>, Yuji Hatano<sup>2</sup>, Yoji Someya<sup>3</sup>, Kenji Tobita<sup>3</sup>, Yasuhisa Oya<sup>1</sup>

<sup>1</sup>Shizuoka University, Japan, <sup>2</sup>University of Toyama, Japan, <sup>3</sup>National Institutes for Quantum and Radiological Science and Technology, Japan

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**P1\_31**

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**In-Situ Tritium Release Measurement from Lithium Aluminate Pellets during Irradiation**

Walter Luscher<sup>1\*</sup>, David Senor<sup>1</sup>, Matt MacDougall<sup>1</sup>, Gary Hoggard<sup>2</sup>

<sup>1</sup>Pacific Northwest National Laboratory, USA, <sup>2</sup>Idaho National Laboratory, USA

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**P1\_32**

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**Deuterium Retention Behavior in Tungsten: Comparison of Deuterium Gas Charging W and Plasma Irradiating W**

Xiaoqiu Ye\*, Wei Wang, Changan Chen, Wenhua Luo, Deli Luo

China Academy of Engineering Physics, China



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**P1\_33**

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**Tritium Aging Effects on Fracture Toughness of Stainless Steel Weldments**

Michael J. Morgan, Dale A. Hitchcock, Timothy M. Krentz, Scott L. West

*Savannah River National Laboratory, USA*

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**P1\_34**

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**A Kinetic Study on the Mechanism of Hydrogen Evolution From Er<sub>2</sub>O<sub>3</sub> Tritium Permeation Barrier**

Mingwang Ma\*, Ruiyun Wan, Binghua Tang

*China Academy of Engineering Physics, China*

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**P1\_35**

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**Predicting Tritium Uptake in Nuclear Graphite from In-Core Fluoride Salt Irradiations**

Kieran Dolan\*, Guiqiu Zheng, David Carpenter, Lin-wen Hu

*Massachusetts Institute of Technology, USA*

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**P1\_36**

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**Time Domain Thermoreflectance (TDTR) Signatures of He Bubbles in Metals**

Elieel Villa-Aleman\*

*Savannah River National Laboratory, USA*

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**P1\_37**

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**H/He Co-Irradiation Induced Structural Change and the Evolution of Gas Bubbles in Li<sub>4</sub>SiO<sub>4</sub>**

Jingwen Ba, Rui Li, Quanwen Wu, Rongguang Zeng, Xiayan Yan, Tao Tang\*

*China Academy of Engineering Physics, China*

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**P1\_38**

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**Results from Tritium Capable Experiments at the New H3AT Facility**

Anthony Hollingsworth<sup>1\*</sup>, A. De Backer<sup>1</sup>, M.Y.Lavrentiev<sup>1</sup>, J.Hess<sup>1</sup>, J. Likonen<sup>2</sup>, K. Heinola<sup>3</sup>, I. Jecu<sup>4</sup>, M-F. Barthe<sup>5,6</sup>, P. Desgardin<sup>5,6</sup>, E. Meslin<sup>7</sup>

<sup>1</sup>United Kingdom Atomic Energy Authority, UK, <sup>2</sup>VTT Technical Research Centre of Finland, Finland, <sup>3</sup>University of Helsinki, Finland, <sup>4</sup>National Institute for Laser, Plasma and Radiation Physics, Romania, <sup>5</sup>Conditions Extrêmes et Matériaux Haute Température et Matériaux Haute Température et Irradiation, France, <sup>6</sup>Centre National de la recherche scientifique, France, <sup>7</sup>Service de Recherches de Métallurgie Physique, France



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**P1\_39**

**Towards Accurate Molecular Dynamics Simulations of Helium Bubble Nucleation and Growth in Palladium Tritide**

Xiaowang Zhou, Norman C. Bartelt\*, Ryan B. Sills

*Sandia National Laboratories, USA*

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**P1\_40**

**Microstructural Evolution During Neutron Irradiation of Lithium Aluminate for Tritium Production**

DJ Senor\*, DE Burkes

*Pacific Northwest National Laboratory, USA*

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**P1\_41**

**The Tritium Release Performance of Li<sub>4</sub>SiO<sub>4</sub>-Based Solid Solutions as Advanced Tritium Breeders**

Linjie Zhao, Xiaojun Chen, Chengjiang Xiao, Heyi Wang, Xingui Long, Shuming Peng\*

*China Academy of Engineering Physics, China*

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**P1\_42**

**Research Activities on Tritium Handling Materials in Caep**

Tao Tang\*, Guikai Zhang, Huaqin Kou, Xin Xiang, Quanwen Wu, Jingwen Ba, Xiaojun Deng, Renjin Xiong, Feilong Yang, Li Hu

*China Academy of Engineering Physics, China*

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**P1\_43**

**Hydrogen Isotope Retention and Release Properties of Beryllium Intermetallic Compounds as Advanced Neutron Multipliers for Fusion Applications**

Jae-Hwan Kim<sup>1\*</sup>, Mitsutaka Miyamoto<sup>2</sup>, Masaru Nakamichi<sup>1</sup>

<sup>1</sup>National Institutes for Quantum and Radiological Science and Technology, Japan, <sup>2</sup>Shimane University, Japan

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**P1\_44**

**Deuterium Retention in Advanced Steels for Fusion Reactor Structural Application**

Xunxiang Hu<sup>1\*</sup>, Lizhen Tan<sup>1</sup>, Kun Wang<sup>1</sup>, Caleb P. Massey<sup>2</sup>, David T. Hoelzer<sup>1</sup>, Yutai Katoh<sup>1</sup>

<sup>1</sup>Oak Ridge National Laboratory, USA, <sup>2</sup>University of Tennessee, USA



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**P1\_45**

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**Electron Tomography and Energy Loss Spectroscopy of Helium Nanobubbles Formed in a Palladium Tritide**

Noelle R. Catarineu\*, David B. Robinson, Norman C. Bartelt, Joshua D. Sugar, Warren L. York, Suzanne Vitale

*Sandia National Laboratories, USA*

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**P1\_46**

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**Trap and Release of Hydrogen Isotopes Absorbed in Nano-Structured Graphite**

Yuki Kondo\*, Hisao Atsumi

*Kindai University, Japan*

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**P1\_47**

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**Analysis on Thermal Desorption of Hydrogen Isotopes Released from Graphite**

Hisao Atsumi\*

*Kindai University, Japan*

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**P1\_48**

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**Fabrication of Li<sub>2</sub>TiO<sub>3</sub> Pebbles Using Nano-Powder for Tritium Breeding Material**

Yi-Hyun Park\*, Jongil Kim, Duck Young Ku, Mu-Young Ahn, Youngmin Lee, Seungyon Cho

*National Fusion Research Institute, Republic of Korea*

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**P1\_49**

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**Removing the Memory Effect of an Alumina-Based Catalyst**

David W. James\*, Gregory C. Staack, Kaitlin J. Lawrence

*Savannah River National Laboratory, USA*

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**P1\_50**

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**Tritium Retention in Beryllium and Titanium Beryllide after High-Dose Neutron Irradiation**

Vladimir Chakin<sup>1\*</sup>, Rolf Rolli<sup>1</sup>, Ramil Gaisin<sup>1</sup>, Michail Klimenkov<sup>1</sup>, Pavel Vladimirov<sup>1</sup>, Masaru Nakamichi<sup>2</sup>

<sup>1</sup>Karlsruhe Institute of Technology, Germany, <sup>2</sup>National Institutes for Quantum and Radiological Science and Technology, Japan

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**P1\_51**

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**First-Principles Calculation of Stability and Mobility of Helium in Alpha-Uranium**

Jae Hyuk Kim<sup>1</sup>, Jae Uk Lee<sup>2</sup>, Hyun Goo Gang<sup>2</sup>, Min Ho Chang<sup>2</sup>, Takuji Oda<sup>1\*</sup>

<sup>1</sup>Seoul National University, Republic of Korea, <sup>2</sup>National Fusion Research Institute, Republic of Korea





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**P1\_52**

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**In-Situ Determination of Parameters of Hydrogen Isotopes Interaction with Materials Using Dynamic Sorption/Desorption Method**

Timur Kulsartov<sup>1</sup>, Zhanna Zaurbekova<sup>1\*</sup>, Yuriy Ponkratov<sup>2</sup>, Vyacheslav Gnyrya<sup>2</sup>

<sup>1</sup>Kazakh-Britain Technical University, Kazakhstan, <sup>2</sup>Institute of Atomic Energy, Kazakhstan

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**P1\_53**

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**Analysis of the Reactor Experiments Results on Irradiation of Pb83Li17 Lead-Lithium Eutectic**

Timur Kulsartov<sup>1\*</sup>, Zhanna Zaurbekova<sup>1</sup>, Yergazy Kenzhin<sup>2</sup>, and Aset Shaimerdenov<sup>2</sup>

<sup>1</sup>Institute of Atomic Energy, Kazakhstan, <sup>2</sup>Institute of Nuclear Physics, Kazakhstan

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**P1\_54**

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**Diffusion Characterization of Hydrogen Isotopes in Hastelloy Nalloy for the Application of Fluoride-Salt-Cooled High Temperature Reactors (FHRs)**

Dongxun Zhang, Wei Liu, Wenguan Liu, Yuan Qian

Chinese Academy of Sciences, China

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**P1\_55**

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**Forging Process Effects on the Fracture Toughness Properties of Types 316L, 304L, and 21-6-9 Tritium-Precharged Stainless Steels**

Michael Morgan\*, Timothy Krentz

Savannah River National Laboratory, USA

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**P1\_56**

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**Isothermal Desorption Rate of Helium from Metal**

Lei Wang\*, Yuan Wang, Yongrong Xie

China Academy of Engineering Physics, China

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**P1\_57**

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**Effect of Ferrite Content on Fracture Toughness of Tritium-Precharged-and-Aged Stainless-Steel Weldments**

Michael Morgan, Timothy Krentz, Scott West, Joy McNamara, Andrew Duncan\*, Paul Korinko

Savannah River National Laboratory, USA



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**P1\_58**

**Modelling the Processes of Hydrogen Isotopes Interaction with Solids Surface**

Yevgen Chikhray<sup>1\*</sup>, Saulet Askerbekov<sup>1</sup>, Yergazy Kenzhin<sup>2</sup>, Yuriy Gordienko<sup>3</sup>, Etsuo Ishitsuka<sup>4</sup>

*<sup>1</sup>Institute of Experimental and Theoretical Physics, Kazakhstan, <sup>2</sup>Institute of Nuclear Physics, Kazakhstan, <sup>3</sup>National Nuclear Center of the Republic of Kazakhstan, Kazakhstan, <sup>4</sup>Japan Atomic Energy Agency, Japan*

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**P1\_59**

**Tritium Permeation through Ce-ODS Steel**

Yudai Urabe<sup>1</sup>, Kenichi Hashizume<sup>1\*</sup>, Teppei Otuka<sup>2</sup>, Kan Sakamoto<sup>3</sup>

*<sup>1</sup>Kyushu University, Japan, <sup>2</sup>Kindai University, Japan, <sup>3</sup>Nippon Nuclear Fuel Development, Japan*

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**P1\_60**

**Tritium Dissolution Behavior in Rare-Earth Oxides**

M. Khalid Hossain<sup>1</sup>, Kenichi Hashizume<sup>1\*</sup>, Shinnosuke Jo<sup>1</sup>, Kaname Kawaguchi<sup>1</sup>, Yuji Hatano<sup>2</sup>

*<sup>1</sup>Kyushu University, Japan, <sup>2</sup>University of Toyama, Japan*

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**P1\_61**

**Titanium Hydrides with Controlled H/T Ratio for AMS Facilities Calibration**

Cristian Postolache\*, Viorel Fugaru, Catalin Stelian Tuta, George Bubueanu, Andrei Antohe, Mihail-Razvan Ioan

*Horia Hulubei National Institute of Physics and Nuclear Engineering, Romania*

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**P1\_62**

**Synthesis of Sodalite Membrane toward the Enrichment of Hydrogen Isotopes**

Bangjun Ma\*, Xiaofang Wang, Chang-An Chen

*China Academy of Engineering Physics, China*

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**P1\_63**

**Highlight of Complex Reactional Scheme in LaNi<sub>4</sub>Mn and Al Reaction**

Chambelland\*, Pichot, Macaud

*The French Alternative Energies and Atomic Energy Commission, France*