

The 21st International Workshop on
Ceramic Breeder Blanket Interactions (CBBi-21)
 19-20th October 2023
 Granada, Spain

THURSDAY, 19th October 2023

	9:00	WORKSHOP OPENING SESSION	
	Ceramic pebble production and properties. Chaired by T. Chikada		
1	9:20	INVITED. How to define a specification for ceramic breeder pebbles?	<u>Regina Knitter</u> , Milan Zmitko
2	9:40	ACB Pebble Production: Increasing the Capacity of the KALOS Process in Time for ITER	<u>Oliver Leys</u> , Julia Leys, Regina Knitter
3	10:00	R&D progress of the tritium breeding functional materials and pebble bed technology for the solid breeding blanket at SWIP	<u>Baoping Cong</u> , Juemin Yan, Hao Cheng, Long Wang, Long Zhang, Xiaoyu Wang, Yonglin Feng
4	10:20	System design to fabrication the Core-shell type tritium breeder	<u>Young Ah Park</u> , Young Soo Yoon, Yi-Hyun Park
5	10:40	Long-term annealing performance of Li-6 enriched biphasic Li ₄ SiO ₄ /Li ₂ TiO ₃ pebbles	<u>Julia Leys</u> , Christina Odemer, Oliver Leys, Regina Knitter
	11:00	COFFEE BREAK	
	Ceramic pebble production and Irradiation behaviour (I). Chaired by R. Knitter		
6	11:20	INVITED: Status of lithium ceramic breeder materials development, characterizations and R&D activities	<u>Paritosh Chaudhuri</u> , Harsh Patel, Chirag Sedani, Maulick Pancha, Aroh Shrivastava
7	11:40	Development of Lithium Titanate Ceramic Pebbles By Freeze Granulation and Freeze Drying Method	<u>Aroh Shrivastava</u> , Paritosh Chaudhuri
8	12:00	Fabrication and characteristics of Li ₂ TiO ₃ pebbles fabricated by using powder injection molding process	<u>Yi-Hyun Park</u> , Young Ah Park, Young Soo Yoon, Mu-Young Ahn
9	12:20	Results of neutron irradiation experiments with Li ₄ SiO ₄ /Li ₂ TiO ₃ at the WWR-K research reactor	Timur Kulsartov, <u>Zhanna Zaurbekova</u> , Regina Knitter, Gunta Kizane, Julia Leys, Asset Shaimerdenov, Saulet Askerbekov, Magzhan Aitkulov, Yevgen Chikhray, Inesh Kenzhina
10	12:40	In-situ neutron irradiation experiment for EU reference ceramic breeder material.	<u>Julia Leys</u> , A. Shaimerdenov, Sh. Gizatulina, T. Kulsartov, Y. Chikhray, I. Kenzhina, M. Ionescu-Bujor, R. Knitter
	13:00	LUNCH TIME	
	ITER TBMs and Compatibility issues. Chaired by P. Chaudhuri		
11	14:00	INVITED. The HCCP Test Blanket Module: Current Status in Development and Qualification of Ceramic Breeder Material and an Overview of Open Issues	<u>Milan Zmitko</u> , Regina Knitter, Alessandro G. Spagnuolo
12	14:20	Progress of design and analyses of CN HCCB TBM for ITER	<u>Xinghua Wu</u> , Qixiang Cao, Long Zhang, Xiaoyu Wang
13	14:40	ORNL Status and Progress in Research on Ceramic Breeder Blanket Materials	<u>Xiao-Ying Yu</u> , Yutai Katoh, Takaaki Koyanagi, German Samolyuk, and Weicheng Zhong
14	15:00	Development of a novel breeding blanket using the solid-type PbxLi _y eutectic alloy for CFETR	<u>Kecheng Jiang</u> , Qiuran Wu, Lei Chen, Songlin Liu
15	15:20	Corrosion of F82H in ceramic breeder pebble bed and its effect on hydrogen permeation	<u>Keisuke Mukai</u> , Shunsuke Kenjo, Naoto Iwamatsu, Bakr Mahmoud, Takumi Chikada, Juro Yagi, Satoshi Konishi
	15:40	AFTERNOON BREAK	
16	16:00	INVITED: Microstructural change and deuterium permeation of ZrO ₂ -coated steel exposed to solid tritium breeder pebbles	<u>Takumi Chikada</u> , Wataru Matsuura, Julia Leys, Marcin Rasinski, Suguru Nakano, Jae-Hwan Kim, Taehyun Hwang, Tsuyoshi Hoshino, Masaru Nakamichi
17	16:20	Corrosiveness of solid tritium breeders to RAFM steel considering evaporated lithium compound and irradiation.	<u>Qiang Qi</u> , Chi Wang, Yingchun Zhang, Haishan Zhou, Songlin Liu, Guang-Nan Luo
18	16:40	Microstructure, corrosion behavior, and mechanical properties of ARAA after compatibility test with Li ₂ TiO ₃ pebbles	<u>Yunsong Jung</u> , Yi-Hyun Park, Duck Young Ku, Youngah Park, Mu-Young Ahn, Seungyon Cho
	17:00	Round table "Ceramic breeding pebbles: production and behaviour". Chaired by M. Zmitko and K. Mukai	
		DAY'S SESSION CLOSING	

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T Inventory and Safety issues. Chaired by M. Roldán

1	9:00	INVITED. Design update of the European DEMO Helium Cooled Pebble Bed breeding blanket	Guangming Zhou , Anoop Retheesh, Jin Hun Park, Ion Cristescu, Francisco A. Hernández, Christina Köhly
2	9:20	Tritium transport model of lithium-based ceramic pebbles in Ecosimpro.	Carlos Moreno , Almudena Rueda, Jenifer Serna, Fernando R. Urgorri
3	9:40	Application of tritium transport model on a DEMO breeding blanket system.	Yonghee Lee , Alice Ying, Mu-Young Ahn, Hyung Gon Jin, Seong-bo Moon
4	10:00	Study on Hydrogen Isotope Permeation Behavior of High-Entropy Alloys Coatings.	Long Wang , Zhihao Hong, Yongjin Feng, Baoping Gong, Xiaoyu Wang, Long Zhang
5	10:20	Modelling transport of fragmentation and dust particles in granular tritium breeder material inside fusion reactors.	Dario Passafiume , Marc Kamlah
6	10:40	Development of a system-level code and application to the tritium transport for the water cooled ceramic breeder blanket.	Songlin Liu , Xueli Zhao, Lei Chen

11:00 **COFFEE BREAK**

Pebble Bed Thermomechanics. Chaired by F. Sánchez

7	11:20	INVITED: Plans for Breeding Blanket Test Facility in KFE	Mu-Young Ahn , Min Ho Chang, Yoo Lim Cheon, Seungyon Cho, Moses Chung, Hyoseong Gwon, Namil Her, SeongHee Hong, Hyun Wook Kim, Sungjin Kwon, Jae-Uk Lee, Yonghee Lee, Youngmin Lee, Sungbo Moon, Yi-Hyun Park
8	11:40	Effects of vibration conditions, spatial confinement and friction on mixing and segregation characteristics of mixed pebble beds for CFETR WCCB blanket.	Yong Liu , Lei Chen, Cong Wang, Chongyang He, Songlin Liu
9	12:00	Thermal, uniaxial compression and flow simulations of packed beds of spherical and elliptical shaped pebbles.	Harsh Patel , Maulik Panchal, Paritosh Chaudhuri
10	12:20	A study of purge flow characteristics and effective thermal conductivity of pebble bed: Experiments and Simulation by ANN	Chirag Sedani , Maulik Panchal, Paritosh Chaudhuri
11	12:40	Simulation of Mechanical, Thermal, and Flow Characteristics of Pebble Beds for Solid-type Ceramic Breeding Blanket	Youngmin Lee , Dongwoo Sohn, Mu-Young Ahn, Yi-Hyun Park, Seungyon Cho

13:00 **LUNCH TIME**

Ceramic pebble irradiation behaviour (II). Chaired by J. Leys

12	14:00	INVITED: The scope of the future IFMIF-DONES facility and how it can be applied in breeder ceramics	Santiago Becerril , in behalf of the IFMIF-DONES España team
13	14:20	Fabrication and tritium release properties of advanced tritium breeder: Li ₄ (Si,Ti)O ₄ ceramic pebble	Juemin Yan , Baoping Gong, Hao Cheng, Long Zhang, Xiaoyu Wang, Xiaojun Chen, Chengjian Xiao
14	14:40	Influence of various radiation types on radiation-induced processes in lithium orthosilicate-based ceramic breeder materials.	Arturs Zarins , Anna Ansone, Mareks Senko, Janis Cipa, Andris Antuzevics, Liga Avotina, Larisa Baumane, Gunta Kizane, Maria Gonzalez, Julia M. Leys, Regina Knitter
15	15:00	Secondary Ion Mass Spectrometry (SIMS) as an important tool to track compositional variations from ion-implanted and ion-damaged Advance Ceramic Breeder (ACB) compositions.	Guilomar Delgado , María González
16	15:20	TEM studies in support of the high radiation resistance of ion-irradiated advanced ceramic breeders.	Marcelo Roldán , María González, Fernando Sánchez

15:40 **AFTERNOON BREAK**

17	16:00	Is H-isotope effectively trapped in structural defects of ion-beam damaged ceramic breeders?	María González , Marta Malo, Alejandro Morofío, Arturs Zarins, Gunta Kizane, Marcelo Roldán, Fernando Sánchez
	16:20	Round table "Updating HCPB BB towards ITER and DEMO". Chaired by G. Zhou and M-Y Ahn	

WORKSHOP CLOSING SESSION