

**6th November 2017****9:00-9:20 Opening:** A. Hasegawa (Tohoku Univ.)**Main Hall (1F)****9:20-10:50 6S Special Session**

Chair: T. Muroga (NIFS, Japan)

**Main Hall (1F)**9:20-10:05 **6S1** Y. Ikeda (QST, Japan) Status and Future Plan of BA Activities and Japanese TBM Programme10:05-10:50 **6S2** S. Matsuura (MEXT, Japan) Policy on Fusion Research and Development in Japan**11:20-13:00 6A Ferritic/Martensitic Steels (1)****Main Hall (1F)**

Chair: C. Henager (PNNL, USA), L. Tan (ORNL, USA)

11:20-11:50 **6A1I** W. Renterghem (SCK.CEN, Belgium) Mechanical and Microstructural Properties of Neutron Irradiated Ferritic/Martensitic Alloys and Steels11:50-12:20 **6A2I** J. Gao (Kyoto Univ., Japan) Dual Ion Irradiation Effects on F82H and its Ferrite Model Steel12:20-12:40 **6A3O** Y. Yamamoto (ORNL, USA) Advanced Bainitic Steels for Large Fusion Structures12:40-13:00 **6A4O** D. Hamaguchi (QST, Japan) Study on the Synergetic Effect of H and He with Displacement Damage of F82H by means of Ion-Irradiations**11:20-13:00 6B Environmental Effects****Large Meeting Room (5F)**

Chair: M. Nakamichi (QST, Japan), T. Hoshino (QST, Japan)

11:20-11:50 **6B1I** B. Pint (ORNL, USA) Compatibility of Alumina-Forming Steel in Flowing PbLi at 450-650°C with Temperature Gradients11:50-12:20 **6B2I** H. Zhou (ASIPP, China) D Retention in High-Energy He-Ion Irradiated RAFM Steel: Surface and Bulk Damage Effects12:20-12:40 **6B3O** S. Horikoshi (Shizuoka Univ., Japan) Microstructure Change and Deuterium Permeation Behavior of Ceramic-Metal Multi-Layer Coatings after Immersion in Liquid Lithium-Lead Alloy12:40-13:00 **6B4O** T. Hernández (CIEMAT, Spain) Purge Gas Effect on the Corrosion Process of EUROFER in Contact with Lithium Ceramic Breeders for the HCPB Concept**14:20-16:40 6C Ferritic/Martensitic Steels (2)****Main Hall (1F)**

Chair: Y. Yamamoto (ORNL, USA), S. Ukai (Hokkaido Univ., Japan)

14:20-14:50 **6C1I** L. Tan (ORNL, USA) Development of Castable Nanostructured Alloys as a New Generation of RAFM Steels14:50-15:20 **6C2I** Y. De Carlan (CEA, France) From Production of a 100 kg 14%Cr Ferritic ODS Batch to First Wall Mock-up Fabrication and Test in a High Heat Flux Facility

- 15:20-15:40 **6C30** M. Xia (USTB, China) Vacuum Casted F/M Steels Containing a Dense Uniform Dispersion of Oxides Nanoclusters with High Strength and Irradiation Resistance Stability
- 15:40-16:00 **6C40** E. Gaganidze (KIT, Germany) Development of EUROFER97 Database and Material Property Handbook
- 16:00-16:20 **6C50** D. Hoelzer (ORNL, USA) High-Temperature Creep of MA957
- 16:20-16:40 **6C60** J. Stubbins (Univ. of Illinois, USA) Neutron Radiation Response of Ferritic ODS Steel MA957

**14:20-16:40 6D Advanced Materials and Fusion-Specific Applications of Materials**

**Large Meeting Room (5F)**

Chair: H. Tanigawa (QST, Japan), M. Rieth (KIT, Germany)

- 14:20-14:50 **6D11** J. Waite (Univ. Oxford, UK) Radiation Resistant High-Entropy Alloys and Paradigm Shifting Alloy Selection Techniques
- 14:50-15:20 **6D21** M. Nakamichi (QST, Japan) Thermal Properties of Beryllides as Advanced Neutron Multipliers For DEMO
- 15:20-15:40 **6D30** K. Fukumoto (Univ. of Fukui, Japan) Effects of Ti Addition for Microstructural Evolution on V-Cr-Ti Alloys to Balance Irradiation Hardening and Swelling Suppression
- 15:40-16:00 **6D40** R. Vila (CIEMAT, Spain) Radiation Hardness Testing of Optical Materials for DEMO Diagnostics in the Framework of EUROfusion WPMAT-FM
- 16:00-16:20 **6D50** P. Edmondson (ORNL, USA) Microstructural and Conductivity of Second-Generation High Temperature Superconductors Irradiated in HFIR
- 16:20-16:40 **6D60** T. Hoshino (QST, Japan) Increasing Li Additive on  $\text{Li}_{2+x}\text{TiO}_{3+y}$  with  $\text{Li}_2\text{ZrO}_3$  Solid Solution as Super Advanced Tritium Breeders

**7th November 2017**

- 8:30-10:30 7PL Plenary Session (1)** Chair: A. Kimura (Kyoto Univ., Japan) **Main Hall (1F)**
- 8:30-9:10 **7PL1** M. Rieth (KIT, Germany) Materials for DEMO
- 9:10-9:50 **7PL2** H. Tanigawa (QST, Japan) The Achievement of the R&D on Reduced Activation Ferritic/Martensitic Steel in Japan under the Broader Approach Activity
- 9:50-10:30 **7PL3** J. Henry (CEA, France) Recent Progress in the Development of Oxide Dispersion Strengthened (ODS) Ferritic/Martensitic (FM) Steels
- 11:00-12:40 7A Fundamentals of Radiation Effects and Advanced Characterization (1)** **Main Hall (1F)**
- Chair: C. Parish (ORNL, USA), P. Vladimirov (KIT, Germany)
- 11:00-11:30 **7A11** R. Kasada (Tohoku Univ., Japan) Evaluation of Mechanical Properties of Ion-Irradiated F82H by Micro-Pillar Compression Test and Nanoindentation Hardness Test

- 11:30-12:00 **7A2I** T. Chikada (Shizuoka Univ., Japan) Deuterium Permeation Behavior and its Iron-Ion Irradiation Effect in Yttrium Oxide Coating Deposited by Magnetron Sputtering
- 12:00-12:20 **7A3O** R. Schaeublin (ETHZ, Switzerland) Nature of Radiation Induced Dislocation Loops in Pure Fe(Cr) in Presence of He and H
- 12:20-12:40 **7A4O** L. Peng (USTC, China) Barrier Strength of Defect and Helium Bubble for Hardening on Martensitic Steels Irradiated in STIP

**11:00-12:40 7B Plasma Facing Materials and High Heat Flux Materials (1)**

**Large Meeting Room (5F)**

Chair: G. Luo (ASIPP, China), S. Zinkle (Univ. of Tennessee, USA)

- 11:00-11:30 **7B1I** R. Neu (MPI fur Plasmaphysik, Germany) First Results on the Use of Tungsten Heavy Alloys in the Divertor of ASDEX Upgrade
- 11:30-12:00 **7B2I** Y. Ueda (Osaka Univ., Japan) Systematic Study of He Induced Nano-Fiber Formation of W and Other Period 6 Transition Metals
- 12:00-12:20 **7B3O** Q. Zhou (Shizuoka Univ., Japan) Helium and Deuterium Retention in Simultaneous Helium and Hydrogen Isotope Implanted Tungsten
- 12:20-12:40 **7B4O** M. Rubel (KTH, Sweden) Plasma-Facing Components in JET with ITER-Like Wall: Strategy in Studies and Lessons for Next-Step Devices

**14:00-16:20 7C Advanced Steels and ODS Steels**

**Main Hall (1F)**

Chair: Y. De Carlan (CEA, France), Y. Katoh (ORNL, USA)

- 14:00-14:30 **7C1I** S. Ukai (Hokkaido Univ., Japan) Proposed New Mechanism for High-Temperature Deformation in ODS Ferritic Steels
- 14:30-15:00 **7C2I** K. Field (ORNL, USA) Mechanical Properties of Oxide Dispersion Strengthened Steels after Neutron Irradiations up to 64 dpa
- 15:00-15:20 **7C3O** T. Graning (KIT, Germany) Long-Term Stability of Austenitic ODS Steel
- 15:20-15:40 **7C4O** A. Kimura (Kyoto Univ., Japan) Dispersion Control of Oxide Particles by Small Additions of Group IV Elements in FeCrAl-ODS Ferritic Steels
- 15:40-16:00 **7C5O** S. Dryepontd (ORNL, USA) New Creep Resistant ODS FeCrAl(Zr) Alloys with Improved Pb-Li Compatibility
- 16:00-16:20 **7C6O** H. Oka (JAEA, Japan) Effect of Nitrogen on Nano-Structure and High Temperature Strength of 9Cr-ODS Steel

**14:00-16:20 7D Plasma Facing Materials and High Heat Flux Materials (2)**

**Large Meeting Room (5F)**

Chair: Y. Oya (Shizuoka Univ., Japan), C.-C. Ge (USTB, China)

- 14:00-14:30 **7D11** S. Zinkle (Univ. of Tennessee, USA) Prospects for Designing High Performance Copper Alloys for High Heat Flux Structural Applications
- 14:30-15:00 **7D21** J. You (IPP, Germany) Novel Plasma-Facing Components for DEMO Divertor: Impact of Materials on Design Concepts and High-Heat-Flux Performance
- 15:00-15:20 **7D30** Y. Hatano (Univ. of Toyama, Japan) Heat Load Resistanc and Hydrogen Isotope Retention of Tungsten Coating Prepared by Low Pressure Plasma Spray Coating
- 15:20-15:40 **7D40** Y. Yamauchi (Hokkaido Univ., Japan) Deuterium Retention and Desorption in Neutron-Irradiated Tungsten at Elevated Temperature
- 15:40-16:00 **7D50** Y. Yuan (Beihang Univ., China) Effect of Neon Seeding on Surface Modification and Deuterium Retention of Tungsten Exposed to Deuterium Plasmas and Combined with Transient Heat Loads
- 16:00-16:20 **7D60** D. Zhu (ASIPP, China) Thermal-Mechanical Response of Tungsten Plasma Facing Material/Component under Both Steady-State Heat Load and Transient Heat Flux

#### **8th November 2017**

**8:30-9:50 8PL Plenary Session (2)** Chair: E.A. Diegele (EUROfusion, UK) **Main Hall (1F)**

- 8:30-9:10 **8PL1** C. Henager (PNNL, USA) Tungsten Materials for Plasma Facing Components –Status of World Programs and Research Directions
- 9:10-9:50 **8PL2** G. Luo (ASIPP, China) Recent Progress of Plasma-Facing Materials and Components in China

#### **10:20-12:40 8A Fundamentals of Radiation Effects and Advanced Characterization (2)**

**Main Hall (1F)**

Chair: M. Rubel (KTH, Sweden), Y. Hatano (Univ. of Toyama, Japan)

- 10:20-10:50 **8A11** P. Vladimirov (KIT, Germany) Modeling and Experimental Validation of Hydrogen Behavior in Beryllium
- 10:50-11:20 **8A21** X. Hu (ORNL, USA) Helium Interactions with Displacement Defects in Neutron Irradiated Materials
- 11:20-11:40 **8A30** X. Li (ASIPP, China) Atomistic Study of Hydrogen Behavior around Dislocations in Alpha Iron
- 11:40-12:00 **8A40** L. Niu (Beihang Univ.; Univ. of Michigan, USA) Multiple Effects of Interstitial Defects on Stress-Driven Grain Boundary Migration
- 12:00-12:20 **8A50** N. Hashimoto (Hokkaido Univ., Japan) Effect of Grain Boundaries on Microstructure Evolution in F82H Under Irradiation
- 12:20-12:40 **8A60** K. Nordlund (Univ. of Helsinki, Finland) Effects of Channeling on Ion Ranges in Polycrystalline Materials

#### **10:20-12:40 8B Tungsten, refractory alloys and other high-Z materials Large Meeting Room (5F)**

Chair: S. Ohira (QST, Japan), A. Ibarra (CIEMAT, Spain)

- 10:20-10:50 **8B11** Y. Dai (Paul Scherrer Institute, Switzerland) A Study of Hardening Effect in Pure Tungsten After Irradiation in A Mixed Spectrum of High Energy Protons and Spallation Neutrons and after Post-Irradiation Annealing
- 10:50-11:20 **8B21** Y. Katoh (ORNL, USA) Understanding the Response of Tungsten to Mixed Spectrum Neutrons
- 11:20-11:40 **8B30** J. Coenen (FZJ, Germany) Tungsten fiber-reinforced tungsten (Wf/W)
- 11:40-12:00 **8B40** T. Zhang (Institute of Solid State Physics, CAS, China) Recent Progress in R&D on Bulk W-ZrC Alloy Plates as Plasma-Facing Components in Fusion Devices
- 12:00-12:20 **8B50** S. Bonk (KIT, Germany) Mechanisms of Plastic Deformation in Cold-Rolled, Ultrafine-Grained Tungsten Sheets
- 12:20-12:40 **8B60** X. Yi (USTB, China) Stability of Helium-Vacancy Clusters in W & W-Re Alloys: Experiments and Modelling Validation

**14:00-16:20 8C Fundamentals of radiation effects and advanced characterization (3)**

**Main Hall (1F)**

Chair: J. Coenen (FZJ, Germany), F. Gao (Univ. of Michigan, USA)

- 14:00-14:30 **8C11** C. Parish (ORNL, USA) Applying Advanced Electron Microscopy to Fusion Studies of Plasma-Exposure and Neutron-Irradiation
- 14:30-15:00 **8C21** G.R. Odette (UCSB, USA) Innovative Approaches to Characterizing Irradiation Effects in Structural Alloys at High Helium and dpa
- 15:00-15:20 **8C30** M. Barthe (CEMHTI/CNRS, France) Microstructural Evolution of Tungsten under Self-ions Irradiation : Effect of dpa and Temperature
- 15:20-15:40 **8C40** K. Wang (ORNL, USA) Dose, Composition, and Helium Effects on Mechanical Properties of Neutron Irradiated Reduced-Activation Ferritic/Martensitic Steels
- 15:40-16:00 **8C50** B. Kaiser (KIT, Germany) Investigation of Microstructure Defects in EUROFER97 under  $\text{He}^+ / \text{Fe}^{3+}$  Dual Ion Beam Irradiation
- 16:00-16:20 **8C60** M. Klimenkov (KIT, Germany) Effect of Neutron Irradiation on Microstructure and Mechanical Properties of EUROFER-ODS Alloy

**14:00-16:30 8D Materials Technologies and Testing in IFMIF, ITER and Beyond, and Materials Design Interface Issues**

**Large Meeting Room (5F)**

Chair: S. Dudarev (UK Atomic Energy Authority, UK), R. Kasada (Tohoku Univ., Japan)

- 14:00-14:30 **8D11** K. Ochiai (QST, Japan) A plan of Advanced Fusion Neutron Source
- 14:30-15:00 **8D21** Y. Wu (INEST, China) Development of HINEG and its Irradiation Campaigns
- 15:00-15:30 **8D31** A. Ibarra (CIEMAT, Spain) The IFMIF-DONES Project: A Neutron Source for Fusion-Like Materials

Testing

- 15:30-15:50 **8D4O** M. Mahler (KIT, Germany) EUROFER97 Creep-Fatigue Assessment Tool for ANSYS APDL and Workbench
- 15:50-16:10 **8D5O** A. Rowcliffe (ORNL, USA) Materials-Engineering Challenges for the Core and Lifetime Components of the US Fusion Nuclear Sciences Facility (FNSF)
- 16:10-16:30 **8D6O** V. Barabash (ITER Organization, France) Application of Polymer Materials for ITER Components - Review of Radiation Damage Effects

**9th November 2017**

**8:30-9:50 9PL Plenary Session (3)** Chair: B.D. Wirth (Univ. Tennessee, USA) **Main Hall (1F)**

8:30-9:10 **9PL1** M. Merola (ITER, France) In-vessel Components in ITER

9:10-9:50 **9PL2** K. Arakawa (Shimane Univ., Japan) Dynamic Properties of Radiation-Produced Defects in Metals: In-Situ Transmission Electron Microscopy Studies

**10:20-12:40 9A Ceramics, ceramic composites, SiC/SiC composites and other low-Z materials**

**Main Hall (1F)**

Chair: O. Ogorodnikova (Moscow Engineering Physics Institute, Russian),  
N. Hashimoto (Hokkaido Univ., Japan)

10:20-10:50 **9A1I** T. Nozawa (QST, Japan), Japanese Activities of the R&D on Silicon Carbide Composites in the Broader Approach Period and Beyond

10:50-11:20 **9A2I** L. L. Snead (State University New York, USA) Ceramic Matrix Composites for Fusion and Fission Applications

11:20-11:40 **9A3O** S. Kondo (Kyoto Univ., Japan) Effect of Irradiation on Corrosion Resistance of SiC

11:40-12:00 **9A4O** M. Ferraris (Politecnico di Torino, Italy) Joining Silicon Carbide: Progress and Challenges

12:00-12:20 **9A5O** W. Jiang (PNNL, USA) Defects, Precipitates and Voids in Cubic Silicon Carbide Implanted with Mg<sup>+</sup> Ions

12:20-12:40 **9A6O** Y. Zayachuk (Univ. Oxford, UK) Development of Microstructural and Micromechanical Tools for Characterization of Composite Materials with Application to SiC-SiC Fiber Composites

**10:20-12:40 9B Multi-scale modelling (1)**

**Large Meeting Room (5F)**

Chair: X. Hu (ORNL, USA), N. Ghoniem (UCLA, USA)

10:20-10:50 **9B1I** F. Gao (Univ. of Michigan, USA) Evolution of Nanosize Clusters and Dislocation Loops in Fe: Simulations in a Wide Range of Time Scales

10:50-11:20 **9B2I** L. Messina (KTH, Sweden) Origins of Diffusion-Driven Precipitation in Tungsten Alloys: A First Kinetic Study

- 11:20-11:40 **9B3O** D. Nguyen-Manh (United Kingdom Atomic Energy Authority, UK) First-Principles Modelling of Anomalous Precipitation in Neutron-Irradiated W(Re,Os) Alloys
- 11:40-12:00 **9B4O** S. Mohr (BSC, Spain) Accurate Linear Scaling DFT Calculations for Large Metallic Systems
- 12:00-12:20 **9B5O** Y. Watanabe (QST, Japan) Multiscale Modeling of Helium Effects on Microstructural Evolution of RAFM-Steel: Reaction Rate Theory Based Analysis
- 12:20-12:40 **9B6O** A. Sivak (Kurchatov Inst., Russia) Sink Strengths of Microstructure Elements for Radiation Defects in bcc Fe and V Metals

**14:00-15:40 9C Fundamentals of radiation effects and advanced characterization (4)**

**Main Hall (1F)**

Chair: S. Kondo (Kyoto Univ. Japan),

D. Nguyen-Manh (United Kingdom Atomic Energy Authority, UK)

- 14:00-14:30 **9C1I** O. Ogorodnikova (Moscow Engineering Physics Institute, Russian) Study of Defects in W and Fe Using Positron Annihilation Spectroscopy and Decoration with Deuterium
- 14:30-15:00 **9C2I** R. Abernethy (Univ. of Oxford, UK) Predicting the mechanical Behaviour of Tungsten in a Fusion Environment
- 15:00-15:20 **9C3O** L. Wang (Univ. of Tennessee, USA) Microstructural Evaluation of Iron Irradiated Model Binary Alloys
- 15:20-15:40 **9C4O** T. Nakasuji (Kyoto Univ. Japan) Energetics of Defect Clusters Produced in Fusion Structural Materials during Irradiation

**14:00-15:40 9D Multi-scale modelling (2)**

**Large Meeting Room (5F)**

Chair: K. Nordlund (Univ. of Helsinki, Finland), L. Messina (KTH, Sweden)

- 14:00-14:30 **9D1I** N. Ghoniem (UCLA, USA) Strain Bursts and Size-Controlled Dislocation Channel Formation Mechanisms in Irradiated Materials
- 14:30-15:00 **9D2I** S. Dudarev (UK Atomic Energy Authority, UK) Elastic Dipole Tensors of Crowdion Defects and Dislocation Loops in Irradiated Materials
- 15:00-15:20 **9D3O** B. Nguyen (PNNL, USA) Modeling Ductile-Phase Toughened Tungsten for Plasma-Facing Materials by means of Finite Element Analysis of W-Cu Bend Bar Tests
- 15:20-15:40 **9D4O** W. Jeong (Korea Univ., Korea) Modeling Deformation Behavior in RAFM Steel : Mesoscopic Crystal Plasticity Analysis

**10th November 2017**

**8:30-10:30 10PL Plenary Session (4)** Chair: Y. Ueda (Osaka Univ. Japan) **Main Hall (1F)**

8:30-9:10 **10PL1** T. Koyanagi (ORNL, USA) Recent Progress in the Development of SiC Composites for Fusion

9:10-9:50 **10PL2** A. Hasegawa (Tohoku Univ., Japan) Irradiation Effects of Tungsten, Current Understanding and Remaining Subjects

9:50-10:30 **10PL3** B. Wirth (Univ. of Tennessee, USA) Overview of Modeling Plasma Surface Interactions in Tungsten with a Focus on Connecting Computational Predictions to Experimental Observations

**10:30- Closing** A. Hasegawa (Tohoku Univ.)

**Main Hall (1F)**



## ICFRM-18 Program update

### Session title typo

### 8D Materials Technologies and Testing in IFMIF, ITER and Beyond, and Materials Design

### Interface Issues

### Chairperson change

8D Fundamentals of radiation effects and advanced characterization (3) T. Muroga (NIFS, Japan)

### Presenter change

8A60 F. Granberg (Univ. of Helsinki, Finland) Irradiation Damage in Equiatomic Multicomponent Alloys

8B40 X. Liu (SWIP, China) Recent Progress in R&D on Bulk W-ZrC Alloy Plates as Plasma-Facing Components in Fusion Devices

8D50 C.E.Kessel (PPPL, USA) Materials-Engineering Challenges for the Core and Lifetime Components of the US Fusion Nuclear Sciences Facility (FNSF)

8PT82 H. Zhou (Beihang Univ., China) Electrophobic Interaction Induced Impurity/Helium Clustering in Metals

9PT35 C. Long (Beihang Univ., China) Strong Surface Morphology Modification in Tungsten Exposed to High Fluence Deuterium Plasmas at Linear Plasma Device Step

9PT58 X. Chen (ORNL, USA) IAEA Coordinated Research Program on Small Specimen Test Techniques for Fusion Applications

### Time change

IEA SiC/SiC Coordination Meeting, **12:50 - 13:50, 8th November 2017 (Wednesday)**, Small Meeting Room 1 (4F),

### Presentation Cancellation

6PT62 A. Sand (Univ. of Helsinki, Finland) Effects of Cascade Overlap on Defect Morphology in Fusion Neutron-Irradiated Tungsten

6PT104 H. Liu (ASIPP, China) Effect of Irradiation on Hydrogen Isotope Permeation Behavior of Al<sub>2</sub>O<sub>3</sub> Coating

7PT6 C. Lee (Korea Inst. of Materials Science, Republic of Korea) Effect of Ti Addition on Microstructures and Mechanical Properties in RAFM Steels

7PT31 B. Wielunska (IPP, Germany) Radiation Damage and Deuterium Retention in Tungsten

7PT98 A. Ksenofontov (PhD, Russia) Numerical and Experimental Investigation of the Impact of High-Intensity Ionizing Radiation on the Model of Ferritic-Martensitic Steels with Substructural Surface Zones

8PT28 T. Yan (Inst. of Modern Physics, CAS, China) Irradiation Hardening of V-4Cr-4Ti and V-5Cr-5Ti Alloys due to Helium Implantation and Displacement Damage

8PT42 Y. Hatano (Univ. of Toyama, Japan) Deuterium Retention in CuCrZr Alloy Investigated using Thermal Desorption Spectroscopy and Atom Probe Tomography