



## *MatISSE/JPNM workshop on cross-cutting issues in structural materials R&D for future energy systems*

*25 – 26 November 2015*

*JRC - Institute for Energy and Transport*

*Petten, The Netherlands*

### *Objective*

Structural and functional materials are key for the development & implementation of low-carbon, clean, efficient and reliable energy technologies.

**The purpose of this Workshop, organised within the EU-FP7 project MaTISSE, is to discuss the status of structural materials R&D for future nuclear energy systems, opening the discussion to all low-carbon energy technology, with a view to identifying common topics and sharing knowledge between different technologies.**

### *Background*

Structural materials are the ones the safety, the efficiency and the economy of energy systems relies on.

Concentrated solar power and geothermal systems as a whole are by definition exposed to high temperatures, thereby requiring structural materials that can maintain their integrity and mechanical properties up to the temperature required. The components of these systems and e.g. off-shore wind turbines or ocean energy must face not only mechanical stresses, but also the environmental degradation. The requirement of resilience of energy systems implies that power stations must be able to respond fast to the variation of energy demand, thereby subjecting structural materials to intense thermal fatigue. In short, **advances in materials qualification and development underlie many of the 10 priority actions on which the SET-plan is currently focusing.**

Structural materials qualification and development are costly activities. In the nuclear energy field, the overarching imperative of guaranteeing ever improved safety has always imposed that a lot of attention should be given to prevent or limit materials degradation during operation. Materials with appropriate properties increase significantly both safety and economy of power stations, not only of nuclear ones. The quality requirements imposed on nuclear materials are very strict and the conditions they are expected to face, that combine irradiation, environmental degradation and thermal loads, are especially severe. These facts led over the decades to the **establishment of advanced competences in materials qualification and development.**

**These two items become all the more important for nuclear energy systems of so-called 4<sup>th</sup> Generation**, that bear the promise of increasing safety and sustainability of nuclear energy, leading to an improvement in the efficiency of the use of available resources and to a minimisation of nuclear wastes. Advanced structural materials of appropriate kind are also key for the development of thermonuclear fusion energy.

Although different energy systems have different challenges, there are many cross-cutting issues and needs. It is believed that the competences developed in the nuclear energy field on materials can be of use also for other communities. It is also believed that **collaboration on materials qualification and development across low carbon energy technologies on cross-cutting issues is a way to accelerate the energy system transformation towards the highest possible standards of safety, cost reduction and increased efficiency.**

## Organisation

The Workshop is a two day event. It will be organised around four cross-cutting issues:

- High temperature applications: Steels and metallic alloys & Ceramics
- Liquid metal/metal (or other) compatibility
- Design Codes
- Advanced steels – development and manufacturing

## Audience

The Workshop is targeting stakeholders from research organisations, academia, industry and national and international funding organisations.

## Fee

The number of participants is limited but there is no participation fee.

## Registration to the workshop

Please fill in the registration form at: <http://goo.gl/forms/3XTDxzASTG>

The Workshop is promoted through the official website of MatISSE project [here](#) and also in the EERA/JPNM website [here](#).

For accommodation, a number of hotel rooms have been pre-booked at a special rate at the Amrath Hotel, but they need to personally be booked by following the indications given while accessing the links above.

## Contact

Karl-Fredrik Nilsson ([karl-fredrik.nilsson@ec.europa.eu](mailto:karl-fredrik.nilsson@ec.europa.eu) )

Patricia Ho-Hune ([patricia.hohune@lgi-consulting.com](mailto:patricia.hohune@lgi-consulting.com) )

Teodora Virban ([teodora.virban@lgi-consulting.com](mailto:teodora.virban@lgi-consulting.com) )

## Final PROGRAMME

Day 1/November 25 <sup>th</sup>	
08:45-09:00	Welcome
09:00-09:15	Presentation EERA Joint Programme Nuclear Materials
09:15-09:55	Keynote lecture Steve ZINKLE ORNL, USA: <b>Research synergies for development of high performance materials</b>
09:55-10:15	<b>Coffee break</b>
10:15-12:55	<b>Session 1: High Temperature Steels/Alloys</b> <b>Chairman: Karl Fredrik NILSSON, JRC</b>
10:15-11:35	Keynote lectures <ul style="list-style-type: none"><li>○ Stuart HOLDSWORTH, EMPA Switzerland: <b>Cross-cutting issues relating to high temperature integrity</b></li><li>○ Chris BULLOUGH, Alstom Power: <b>Responsive power generation: materials models and life technologies for high-temperature plant</b></li></ul>
11:35-12:55	<ul style="list-style-type: none"><li>○ Jana KALIVODOVA, CV REZ: <b>Candidate materials for GFR concept ALLEGRO and R&amp;D related activities</b></li><li>○ Michael RIETH, KIT: <b>The EUROfusion program on 9CrWVTa steels</b></li><li>○ Pertti AUREKARI, VTT: <b>High temperature steels in conventional thermal plants – views on trends</b></li><li>○ Stefan HOLMSTROM, JRC: <b>Advances in high temperature property determination for Gen-IV materials</b></li></ul>
13:00-14:00	<b>Lunch break</b>
14:00-16:00	<b>Session 2: Behavior under aggressive environment</b> <b>Chairwoman: Konstantza LAMBRINO, SCK.CEN</b>
14:00-15:20	Keynote lectures <ul style="list-style-type: none"><li>○ Peter HOSEMANN, Berkeley University: <b>Liquid Metal coolants for high power heat transport systems</b></li><li>○ Jürgen KONYS, KIT: <b>Compatibility of structural steels with Heavy Liquid</b></li></ul>

	<b>Metals (HLMs): a cross cutting view</b>
15:20–16:00	<ul style="list-style-type: none"> <li>○ Marta NAVAS, CIEMAT: <b>Compatibility of structural materials with molten salts and liquid metals for CSP applications</b></li> <li>○ Marco UTILI, ENEA: <b>Compatibility of structural materials under high temperature thermal flux with Helium Cooling System for Fusion Reactor and Coolant Purification System</b></li> </ul>
16:00–16:20	<b>Coffee break</b>
16:20–18:20	<b>Session 3: Design Codes for Mechanical Components</b> <b>Chairman: Stefan HLMSTROM, JRC</b>
16:20–17:40	<p>Keynote lectures</p> <ul style="list-style-type: none"> <li>○ Cécile PÉTESCH, CEA: <b>RCC-MRx code: context, overview, on-going developments</b></li> <li>○ Mike SMITH, Manchester University: <b>Structural Performance of next-generation nuclear components: lessons from the UK's R5 and R6 structural integrity assessment procedures</b></li> </ul>
17:40–18:20	<ul style="list-style-type: none"> <li>○ Karl Fredrik NILSSON, JRC: <b>Design Code Development in EERA JPNM: Work done and future needs</b></li> <li>○ Hyeong-Yeon LEE, Korea Atomic Energy Research Institute (KAERI): <b>Comparison of RCC-MRx and ASME Subsection NH as Elevated Temperature Design Codes</b></li> </ul>
19:30	<b>Dinner</b>

Day 2/November 26 <sup>th</sup>	
08:30–10:15	<b>Session 4: Ceramics, Refractory Materials and Composites</b> <b>Chairman: Claudio Mingazzini, ENEA</b>
08:30–09:50	<p>Keynote lectures</p> <ul style="list-style-type: none"> <li>○ Jon BINNER, University of Birmingham: <b>Rapid fabrication of fibre reinforced CMCs by microwave CVI</b></li> <li>○ Jacques LAMON, LMT: <b>Issues for the life prediction of Ceramic Matrix Composite components</b></li> </ul>

09:50–10:10	<b>Coffee break</b>
10:10–11:10	<ul style="list-style-type: none"> <li>○ Konstantza LAMBRINO, SCK.CEN: <b>Exploring the potential of MAX phases for select applications in extreme environments</b></li> <li>○ Antonio RINALDI, ENEA: <b>Possible applications of SiC-based technology for durable design in CSP</b></li> <li>○ Michael RIETH, KIT: <b>Possible Cross-cutting Applications for EUROfusion High Heat Flux Materials</b></li> </ul>
11:10–12:50	<b>Session 5: Advanced Steels (new alloys, novel manufacturing technologies etc)</b> <b>Chairwoman: Marta SERRANO, CIEMAT</b>
11:10–12:30	<p>Keynote lectures</p> <ul style="list-style-type: none"> <li>○ Pertti AUREKARI, VTT: <b>Advanced steels for thermal power – status, challenges and progress</b></li> <li>○ Pascal JACQUES, UCL: <b>Tailoring the Mechanical Response of Advanced High Strength Steels Through Microstructure Design</b></li> </ul>
12:30–13:30	<ul style="list-style-type: none"> <li>○ Marta SERRANO, CIEMAT: <b>Activities on ODS steels for Gen IV cladding tubes</b></li> <li>○ Bernd KUHN, FZ JUELICH: <b>Microstructure stability of ferritic-martensitic, austenitic and fully ferritic steels under fluctuating loading conditions</b></li> </ul>
13:30–14:30	<b>Lunch break</b>
14:30–15:30	<b>Wrap-up session</b>
16:00	End of meeting