GENIORS

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Clustering Events 1

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Summary

The Clustering Event ?Partitioning meets Transmutation? was organized on 25/10/2018 and was open to the general public, with as target audience all communities with an interest in current recycling of spent nuclear fuel and future recycling strategies to be implemented in the 4th generation of reactors. The Topical Day intended to provide insight on the current state of the art of partitioning and transmutation and to put this in the context of the nuclear fuel back?end scenarios currently implemented or intended to be implemented.

Approval

Date	By
2020-12-01 11:07:37	Dr. Thomas CARDINAELS (SCK-CEN)
2020-12-01 11:12:36	Mr. Chris RHODES (NNL)
2020-12-02 18:54:30	Mr. Stéphane BOURG (CEA)

CONTENT

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SCOPE

The Clustering Event “Partitioning meets Transmutation” was organized on 25/10/2018 and was open to the general public, with as target audience all communities with an interest in current recycling of spent nuclear fuel and future recycling strategies to be implemented in the 4th generation of reactors. The Topical Day intended to provide insight on the current state of the art of partitioning and transmutation and to put this in the context of the nuclear fuel back-end scenarios currently implemented or intended to be implemented.

Partitioning is only part of the back-end of the nuclear fuel cycle: one might opt for further transmutation (“Partitioning + Conditioning”) or use advanced partitioning to reduce the footprint of a final disposal facility (“Partitioning + Conditioning” scenario). Since there is currently no integrated platform on which the partitioning community discusses with the transmutation or disposal technologies, the aim of the present Clustering Event was to create an interface between the involved communities and stakeholders to discuss and interact on technical-scientific, economic and political levels. The back-end of the nuclear fuel cycle is a topic of political debate in many countries and this is no different in the host country of the Topical Day (i.e. Belgium).

The emphasis of the present Event was to work on the interface between Partitioning and Transmutation. A logic follow-up hereof will be to organize a similar event on the interface between Partitioning and Conditioning.

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AGENDA

9:00 – Welcome and introduction, *Sven Van den Berghe, SCK•CEN, Belgium*

Session 1: Strategic consideration of the back-end

9:15 - Prospective study on the possible management strategies of Belgian spent nuclear fuel, *Alberto Fernandez Fernandez & Sophie Pedoux, Belgian Government, Belgium*
9:40 – IAEA and Gen IV, *Laura McManniman, IAEA*
10:05 – Advanced fuel cycles and final disposal of radioactive waste | mutually exclusive or useful allies?, *Eef Weetjens, SCK•CEN, Belgium*

Session 2 :Partitioning

11:00 - Partitioning for the 4th generation, *Manuel Miguirditchian, CEA, France*
11:30 - Long-term behaviour of solvent extraction systems for nuclear fuel recycling, *Hitos Galán (CIEMAT, Spain)*
11:45 - No P no T | European projects on actinides separation *Andreas Geist, KIT, Germany*
12:00 - Challenges in implementing separation processes – moving from lab to plant scale *Mike Carrott, Ross Harris, Chris Rhodes, Robin Taylor, NNL, United Kingdom*

Session 3: Conversion and fuel fabrication

13:30 - Conversion and minor actinide fuel fabrication: thirty years of experience, *Joseph Somers, JRC-ITU, Germany (presented by Didier Haas)*
14:00 - Internal gelation process for the production of simulated transmutation fuel particles: a comparison with ammonium diuranate precipitation *Christian Schreinemachers, SCK•CEN and KU Leuven, Belgium*
14:25 - Multiparametric study of the hydrothermal conversion of uranium (IV) oxalate *Jérémie Manaud, CEA, France*
14:50 - TRANSMEETS, a H2020 project proposal for investigation of TRANSmutation fuels in GEN IV reactors | modeling, experimental data and simulation *Annelise Gallais – During, CEA, France*

Session 4: Transmutation

15:45 - Transmutation needs Partitioning wants Transmutation, *Hamid Aït Abderrahim, SCK•CEN, Belgium*
16:15 - An innovative approach to an integral P&T system | a molten salt reactor directly operating on spent nuclear fuel, *Bruno Merk, University of Liverpool, United Kingdom*
16:40 - Transmutation, from paper to reality or how to avoid ‘garbage in, garbage out’, *Gert Van den Eynde SCK•CEN, Belgium*
17:30 - closing remarks, *Thomas Cardinaels, SCK•CEN, Belgium*

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CONCLUSIONS

On Thursday 25th of October, a Clustering Event “*Partitioning meets Transmutation*” was organized with 81 participants. The Clustering Event aimed to create a platform for exchange of ideas from four perspectives:

- Policy side regarding the management of the back-end of the nuclear fuel cycle, with input from the specifics of the Belgian situation, the outcomes of an earlier EU coordination action (Red-Impact) and a view given by IAEA.
- Current status of R&D on partitioning, including also practical case studies of ongoing research.
- Review of past programs on transmutation fuels and planned efforts in the field. Also here, practical case studies were presented.
- Transmutation: where do we stand with the large-scale transmutation project, MYRRHA, with some other innovative alternatives and what are the next steps for a truly integrated transmutation cycle.

From the presentations and discussions, it was clear that there is still a lot work ahead before advanced partitioning and transmutation will become an acquired technology. Regarding scoping studies and laboratory scale demonstration, a lot of work has been performed, but one faces challenges with minor actinide handling in the upscaling from laboratory to industrial plants and to move from lower “technology readiness levels” to “proven and acquired technology”. Also the specifications for the partitioning processes require improvement from the processes further down the line (conversion, fuel/target fabrication and transmutation). It was felt that a truly **integrated approach** for *combined partitioning and transmutation implementation* is currently lacking, which slows down progress in the field.

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