

Nuclear Science Committee

Working Party on Scientific Issues of the Fuel Cycle

Activities on Innovative Fuels (EGIF)

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EGATFL Start-up Meeting, NEA HQ

28-29 April 2014

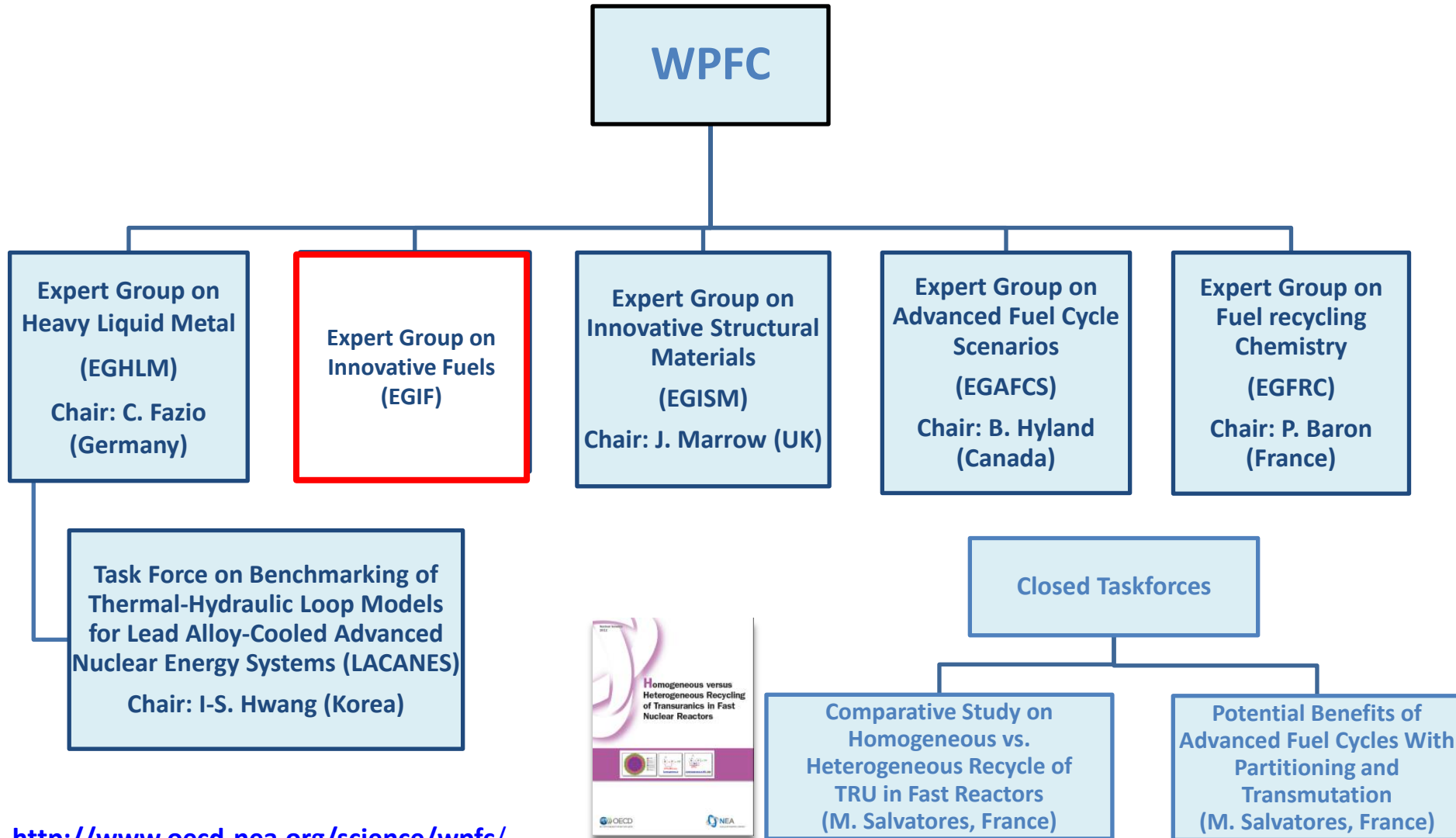
The WPFC

➤ Created in June 2004
Chair: Nathalie Chauvin (CEA, France) since 2013.

- The WPFC covers:
- ✓ Existing and advanced nuclear fuel cycles
 - ✓ Transition from thermal to fast nuclear fuel cycles
 - ✓ Heavy liquid metal coolant technology
 - ✓ Partitioning and transmutation
 - ✓ Fuel cycle physics, associated chemistry and flowsheets
 - ✓ Development and performance of fuels and materials
 - ✓ Accelerator driven systems



Structure of WPFC



Expert Group on Innovative Fuels

Objectives

Conduct joint and comparative studies to support the development of innovative fuels that can be implemented in advanced nuclear fuel cycles. The fuel types of interest for EGIF are those that contain Minor Actinides (MA) as opposed to standard fuels (i.e. uranium or uranium-plutonium fuels currently being used in the operating NPP).

Scope

- Innovative fuel fabrication techniques;
- Irradiation performance of innovative fuels;
- Characterisation and post-irradiation examination methods;
- Predictive models/codes for the innovative fuel fabrication and performance;
- Phenomenological experiments in support of model development or validation.

Activities

- compile experimental database,
- qualify methodologies,
- develop a process to TRL for various techniques,
- perform code-to-code, code-to-experiment benchmark

State-of-the-art report on Innovative Fuels

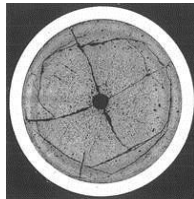
Different types of fuels (heterogeneous & homogeneous)

- Metal
- Oxide
- Nitride
- Dispersion Fuels
- Special mechanical forms (sphere pac, ...)

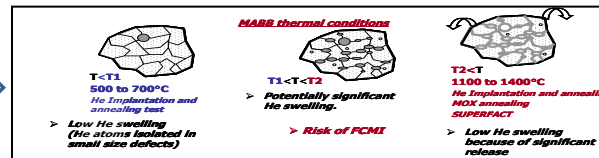
 *To be published in 2014*



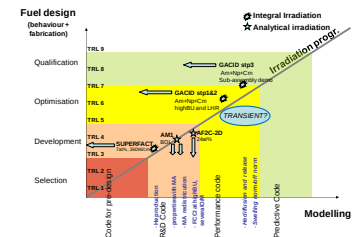
Fabrication & characterisation



Irradiation performance



Safety behaviour



Technology Readiness Level

Conclusions:

TRU bearing fuels are being developed at lab. scale and irradiation tests have been limited to small samples. Most advanced are metal and oxide fuels.

Benchmark Study on Fuel Performance Codes and Experiments

Scope

- ✓ Focus on experiments on MA bearing fuels with different chemical forms.
 - ✓ Benchmark exercise with fuel performance codes
 - ✓ Synthesis of future R&D needs
 - ✓ Results gathered into a database
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- Irradiation of MA bearing fuel is rare compared to fuels for LWRs and only about 20 irradiation experiments have been performed so far.
 - The first stage of the benchmark will focus on MA oxide and metal fuels (low content: 5% or less).
 - Available irradiation experiments, codes and interests were listed and first data will be shared at next meeting