EUROPEAN COMMISSION

Community research

FIRST-Nuclides

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Poster presentation of the project (Generic poster)

Author(s): **AMPHOS 21**

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Start date of project: **01/01/12** Duration: 36 Months

Project co-funded by the European Commission under the Seventh Euratom Framework Programme for Nuclear Research &Training Activities (2007-2011)		
Dissemination Level		
PU	Public	X
RE	Restricted to a group specified by the partners of the FIRST-Nuclides project	
CO	Confidential, only for partners of the FIRST-Nuclides project	

FIRST Nuclides

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DISTRIBUTION LIST

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Mr. Christophe Davies (European Commission)	One electronic copy submitted via participant portal	
All consortium members and European Commission	One electronic copy available on the restricted area and the public part of the FIRST-Nuclides webportal	

FIRST Nuclides

7th Framework Programme Collaborative Project:

Fast / Instant Release of Safety Relevant Radionuclides from Spent Nuclear Fuel (FIRST-Nuclides)

Objectives

Understanding the fast / instant release of radionuclides from high burn-up spent UO_2 fuels in geological repositories.

- Experimental investigations of irradiated fuel.
- Provide for improved data for the fast/instant release fraction for high burn-up spent UO_2 fuel.
- Study correlations between the Fission Gas Release and non-gaseous fission products, in particular ^{129}I, ^{79}Se and ^{135}Cs.
- Reduce uncertainties with respect ^{129}I, and ^{14}C releases.
- Determine the chemical form of the relevant elements.
- Discuss the impact of the results on the peak-dose.

Consortium

The project is implemented by a consortium with 10 **Beneficiaries** from 7 EURATOM Signatory States, and the EC Institute for Transuranium Elements:

KIT, AMPHOS 21, JÜLICH, SCK·CEN, CTM, AEKI, Studsvik

Associated Groups: Groups participating in the project at their own costs with specific RTD contributions or particular information exchange functions. **End-User Group:** Waste Management / Regulating Organizations.

Structure of the project

WP 1: **Samples and tools**: Selection, characterization and preparation of materials and set-up of tools.
WP 2: **Gas release + rim and grain boundary diffusion:** Experimental determination of fission gases release. Rim and grain boundary diffusion experiments.
WP 3: **Dissolution based release:** Dissolution based fast/instant radionuclide release.
WP 4: **Modelling**: Modelling of migration/retention processes of fission products in the spent fuel structure.
WP 5: **Knowledge, reporting and training**: Knowledge Management, State-of-the-Art report, general reporting, documentation up-date, dissemination and training.
WP 6: **Project management.**

Planned efforts (PM = Person Month):

WP No	Lead	Person-months
WP 1	KIT	48
WP 2	JRC-ITU	85
WP 3	SCK-CEN	111.50
WP 4	CTM	44
WP 5	AMPHOS21	38
WP 6	KIT	12
	Sum: PM:	338.50

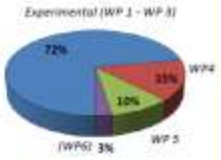


Figure 1. *Use of staff resources committed for different types of activities within the project.*

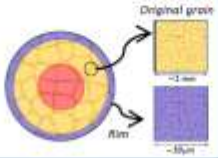
Details of the experimental programme (WP 1-WP 3):

- Chemical form, specifically for fission gases, ^{135}Cs, ^{129}I, ^{14}C compounds, ^{79}Se, ^{99}Tc and ^{126}Sn.
- Determination of gap and grain boundary inventories.
- Dependency of fast/instant release on
  - UO_2 fuel and the respective manufacturing process,
  - evolution of higher burn-up and burn-up history,
  - linear power and fuel temperature history, ramping processes, and storage time.
- Accessibility / transport properties on grain boundaries.
- Exchange processes along the grain boundaries.
- Transition between instant/fast release and radiolytically driven matrix corrosion.

Modelling (WP 4)

- Fission product migration on grain boundaries.
- Effects of fractures in the pellets.
- Effects of holes/fractures in the cladding.
- Chemical state of relevant elements.

Figure 2. *Microstructure of the pellet. (Different grain size)*



Dissemination, Mgt* and Training (WP 5-WP6):

Duration of the CP: *01 Jan. 2012 to 31 Dec. 2014*

Funding: Total Costs: 4 741 261 €
EC Contribution: 2 494 513 €

Events: Kick-off Meeting: ***(Jan./Feb. 2012)***, Annual Workshops, Training Course

*Mgt = Management

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