



FIRST FREDMANS TRAINING SESSION ON NUCLEAR FUEL

Venue: Institute for Nuclear Research, Pitesti – Mioveni, Romania

25 – 29 September 2023

Preliminary Programme

Day 1: Fuel characteristics and performances requested for an LFR reactor

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| 10:00 – 17:00 | Fuel characteristics and performances requested for an LFR reactor |
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Day 2: Nuclear fuel fabrication

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| (0.5h) | Types of nuclear fuel for existing and future reactors <ul style="list-style-type: none"> - Strategies and nuclear power plants technologies - Fuel requirements and characteristics - Types of nuclear fuels |
| (2.5h) | Oxides fuel fabrication <ul style="list-style-type: none"> - Fabrication flux - Chemical processes in UO₂ powder fabrication - Physical processes in UO₂ pressing and sintering - Fuel assembly |
| (2h) | Nitrides fuel fabrication <ul style="list-style-type: none"> - Techniques used for UN fabrication - Chemical processes involved - Advantages and drawbacks |
| (1h) | Advanced fuel manufacturing techniques |

Day 3: Nuclear fuel characterisation

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| (1.0h) | Irradiation effects in nuclear fuel |
| (1.5h) | Fresh nuclear fuel characteristics <ul style="list-style-type: none"> - Powder density, porosity and pore distribution; granulometry; isotope composition impurities content - Sinterability test - Pellet density, porosity, grain size, microstructure, stoichiometry |
| (1.5h) | Irradiated fuel characterisation <ul style="list-style-type: none"> - Fission gas pressure and fission gas release rate; - Fission products distribution - Burn-up - Microstructure |
| (1,0h) | Scientific visit: Fuel Fabrication Plant (FCN) |
| (1,0h) | Scientific visit: Hot Cells Facility |

Day 4: Hands on training on fuel fabrication and characterisation

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| (1.0h) | Equipment used in fuel fabrication |
| (2.5h) | Hands on training on characterisation techniques <ul style="list-style-type: none">- Powder and pellets density and porosity determination- Grain size determination (sample preparation and metallographic investigation);- Chemical composition (DRX)- Microstructure analysis (SEM); |
| (2.5h) | Practical applications |

Day 5: Verification

9:00 – 13:00

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| (1.5h) | Q&A and final discussions |
| (1.5h) | Verification |
| (0.5h) | Coffee break |
| (0.5h) | Awarding of diplomas |

Lecturers:

(the list of lecturers is not necessarily exhaustive)

Dr. Francesco Lodi, ENEA, Italy

Dr. Manuel Pouchon, PSI Switzerland

Dr. Daniela Diaconu, RATEN, Romania

Dr. Iulia Dumitrescu, RATEN, Romania

Dr. Marin Mincu, RATEN Romania