

SAMOFAR – A PARADIGM SHIFT IN REACTOR SAFETY WITH THE MOLTEN SALT FAST REACTOR

TU Delft, CNRS, JRC, CIRTEN, IRSN, CINVESTAV, AREVA, CEA, EDF, PSI, KIT

SAMOFAR – Safety Assessment of the Molten Salt Fast Reactor – is a 5M€ project of the European Union research program Horizon 2020. The project consortium consists of 11 participants and the fundamental research part is mainly executed by universities and research laboratories, like CNRS, JRC, CIRTEN, TU Delft and PSI, thereby exploiting each other's unique expertise and infrastructure. The grand objective of SAMOFAR is to prove the innovative safety concepts of the Molten Salt Fast Reactor (MSFR) by advanced experimental and numerical techniques, to deliver a breakthrough in nuclear safety and optimal waste management, and to create a consortium of stakeholders to demonstrate the MSFR beyond SAMOFAR.

Within SAMOFAR we will perform advanced experiments to proof the key safety features:

- The freeze plug and draining of the fuel salt.
- Measurement of safety-related data of the fuel salt.
- New coatings to structural materials like Ni-based alloys.
- The dynamics of natural circulation of (internally heated) fuel salts.
- The reductive processes to extract lanthanides and actinides from the fuel salt.

Furthermore, we will build a software simulator to demonstrate the operational transients, and we will show the mild responses of the MSFR to transients and accident scenarios, using new leading-edge multi-physics simulation tools including uncertainty quantification. All experimental and numerical results will be incorporated into the new reactor design, which will be subjected to a new integral safety assessment method.

Dr. J. Krepel

Dr. J. Krepel, from the Paul Scherrer Institut, Department of Nuclear Energy and Safety, is responsible in the FAST group of LRS for the fuel cycle analysis.

MSc in 2000 at Czech Technical University in Prague (Kinetics of subcritical source driven reactor with liquid fuel), PhD in 2006 (Dynamics of molten salt reactors) at Research center Dresden-Rossendorf in Germany and Czech Technical University in Prague, 2006. Experience in the neutronics and transient analysis of molten salt reactor and in neutronics and fuel cycle analysis of generation four reactors, participated in national and international R&D programs: MOST, PINE, EUROTRANS, ELSY, GCFR, ESRF.

