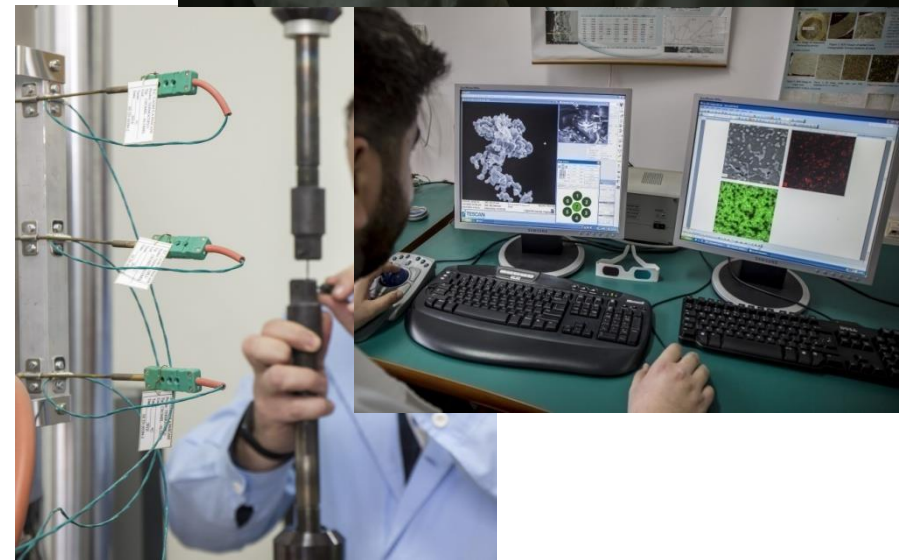
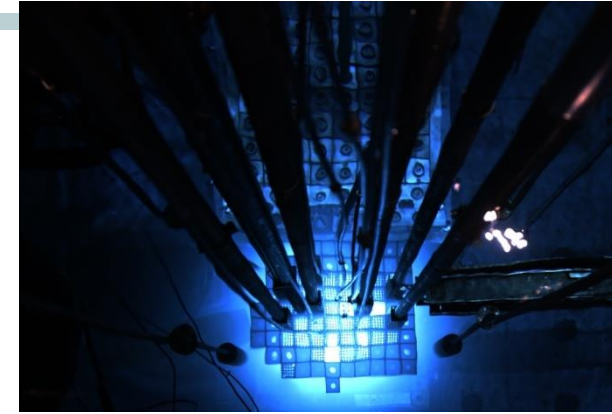


R&D Capabilities in the ICN Pitesti on Nuclear Fuel, including ATF

ICN played a key role in proving the necessary **technical and scientific support** for launching NNP in Romania by **developing techniques and technologies** for manufacturing CANDU nuclear fuel bundles, testing experimental fuel elements in the TRIGA Research Reactor and evaluating performance in operation, in the Post-Irradiation Examination Laboratory

Current R&D activities related to nuclear fuel development

- **Design and manufacture of experimental fuel element with $\text{UO}_2+\text{Cr}_2\text{O}_3$**
 - **Irradiation testing**
 - **Post-irradiation investigations**
- **Study of mechanical and chemical behavior of nuclear fuel**
- **Numerical simulations: neutronics, termal-hydraulics, safety analysis**



ATF – Accident Tolerant Fuel

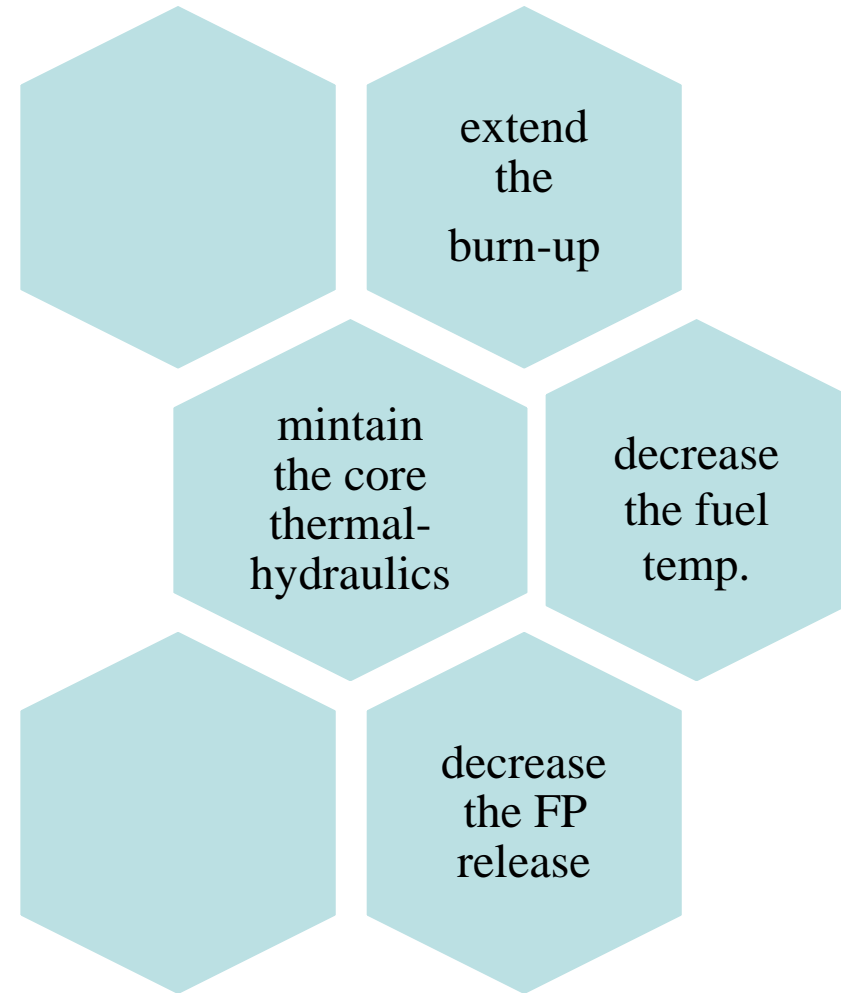
ATF

Increasing the time between loss of coolant and starting the fuel damage

Mentain or improve the operational, reactor control and safety operation parameters

Mentain or improve the fuel performances compared to the standard fuel while ensuring the compatibility with the reactor systems

**Taxonomy
requirements**



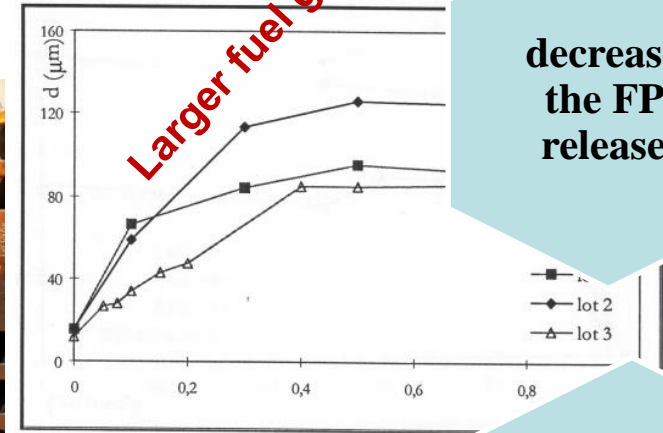
Preliminary materials for CANDU ATF

Term	Fuel	Rod
low	UO_2 dopped with Cr_2O_3 or Al_2O_3	Zr alloy with Cr coating
		Stainless steel (FeCrAl)
long	High density U_3Si_2	SiC (composite material)
	UN (uranium nitride)	
	Metallic fuel from U-Zr alloy with a Zr content around 50%	
long	TRISO – Tristructural-izotrop	

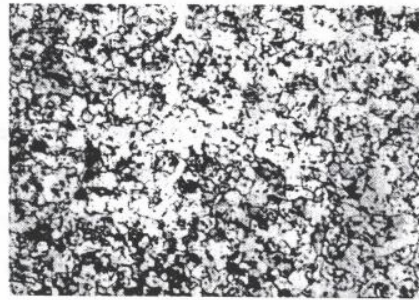
37 CANDU fuel assembly

- UO₂ pellets with added Cr₂O₃
- Zy rods covered with Cr

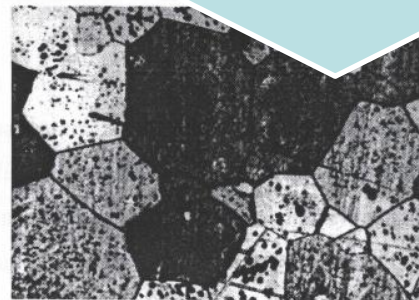
maintaining
the core
thermal-
hydraulics



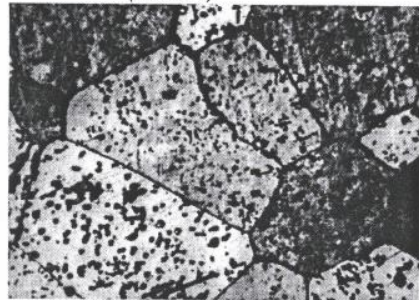
decrease
the FP
release



(martor)



(0.1% wt Cr/U)

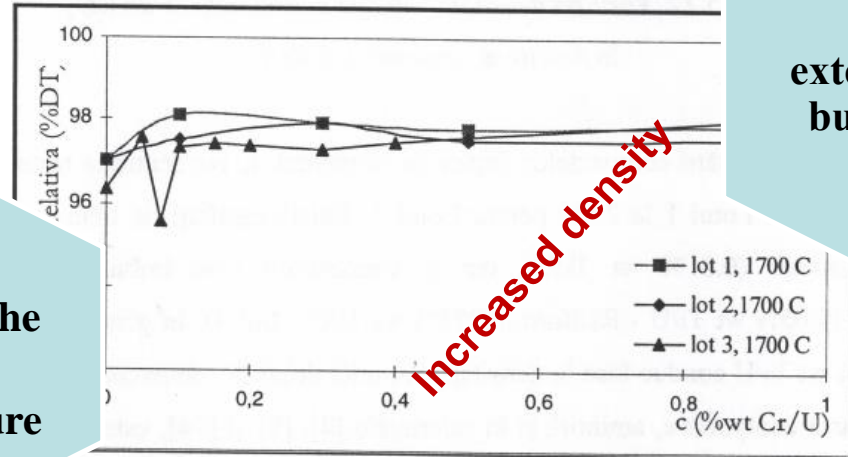


(0.3% wt Cr/U)



(0.5% wt Cr)

decrease the
fuel
temperature



extend the
burn-up

Improved thermal transfer on fuel rod

An optimal solution for CANDU ATF has to be found by 2025 when SNN, the operator of the two CANDU units in Romania, has to decide the nuclear fuel to be used in Unit 1 after its refurbishment