



Press Release

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NAAREA takes a new step forward by designing the first silicon carbide molten salt loop

NAAREA, a French company developing an innovative, sustainable molten salt fast microreactor that will burn long-lived nuclear waste, has designed the first silicon carbide molten salt loop in close collaboration with Mersen and the ICAR-CM2T laboratory. This materials testing system will be used to study the resistance of silicon carbide as well as salt-gas interaction phenomena. After the development of the first phase of its digital twin, this represents a second key step for the company, which aims to mass-produce its reactors by 2030.

For the first materials tests that will serve to support the construction of a prototype, NAAREA worked with the Mersen Group, a global expert in advanced materials for high-tech industries that offers recognized expertise in technical ceramics such as sintered silicon carbide.

This partnership resulted in the design of the first silicon carbide loop. The chloride salt test loop, which operates using natural convection and at a temperature of 600°C at atmospheric pressure, will enable study of the dynamic corrosion behaviour of silicon carbide and salt-gas interaction phenomena. Ultimately, these tests will contribute to evaluating the impact of chlorine-based salts on silicon carbide and confirming this material's capacity to resist corrosion while meeting the safety and security requirements for Generation IV reactors.

In operation since August 2023 in the France's ICAR-CM2T materials engineering laboratory, which specializes in the thermo-mechanical characterization of high-temperature materials, the loop will be complemented by other test loops using different types of salts and creating conditions representative of the reactor.

After developing the first phase of its digital twin, which will be used and enriched throughout the life cycle of the project, NAAREA is now entering the second phase of its development plan. Over a period of 24 months, this phase will include laboratory testing and the production of physical prototypes, followed by 12 months of observation and feedback on their functioning. These initial tests thus mark a key step toward building a full-scale prototype and achieving the serial production of NAAREA's microreactors by 2030.

"This loop is the result of eight months of effort to launch the first technical tests in preparation for the production of our NAAREA reactors. It marks the first milestone of an ambitious testing programme planned over several years to qualify the materials for our future XAMR®, with the aim of meeting all applicable safety and security standards and legislative requirements. We are pleased to have taken this new step forward with our partners Mersen and ICAR-CM2T", stated Jean-Luc Alexandre, Founder and CEO of NAAREA.

"We are very proud to be working on such a crucial issue as the search for new ways to produce energy. In this scientific collaboration with NAAREA, we have been able to make our contribution to this effort by providing our expertise and the flexibility of our facilities", remarked Simon Aufranc, research engineer at ICAR-CM2T.

About NAAREA:

NAAREA (Nuclear Abundant Affordable Resourceful Energy for All) was founded in 2020 by Jean-Luc Alexandre and Ivan Gavriloff to respond to the objectives of energy sovereignty, decarbonization and improving the energy mix. NAAREA is developing a groundbreaking energy solution that will completely close the fuel cycle: the XAMR® (eXtrasmall Advanced Modular Reactor), a molten salt fast neutron microreactor capable of producing electricity (40 megawatts electric) and heat (80 megawatts thermal) that will burn plutonium and the most highly radiotoxic waste (with a lifetime of over 100,000 years) produced by nuclear power plants. The XAMR® is designed to be industrially mass-produced and installed in close proximity to consumers, namely in the mobility sector, electro-intensive industries and remote areas. NAAREA benefits from the support of the French Alternative Energies and Atomic Energy Commission (CEA) and French National Centre for Scientific Research (CNRS), as well as industry players such as Assystem, Dassault Systèmes, Orano and Framatome. A carbon-free and non-intermittent energy source planned to be on the market by 2030, the NAAREA XAMR® is opening the way for sustainable and innovative nuclear energy that supports energy independence, increased resilience and the circular economy. NAAREA is a winner of the “Innovative Nuclear Reactors” call for proposals under the France 2030 investment plan and a beneficiary of the French Tech 2030 support programme.

Learn more at: www.naarea.fr

About ICAR-CM2T:

ICAR-CM2T is a laboratory located in Moncel-lès-Lunéville (in the Meurthe-et-Moselle department of France) that holds the French Technological Resource Centre (CRT) label, ISO 17025 accreditation for refractory materials testing awarded by Cofrac, and Qualiopi certification. ICAR-CM2T has over 30 years of experience in the field of metallic, ceramic and refractory materials and related surface treatments and coatings.

With a staff of 15 employees, it provides a variety of services including standard-compliant testing, industrial and collaborative R&D, expert assessments, technical support and supervision, and training.

These activities are carried out in the laboratory’s 2500 m² of technical facilities by a team of PhDs, engineers and technicians experienced in metallurgy and ceramics. ICAR-CM2T is equipped to provide thermo-mechanic and thermo-chemical modelling as well as test beds to simulate the behaviour of materials exposed to extreme conditions (high temperatures, wear, hot gas corrosion, etc.).

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