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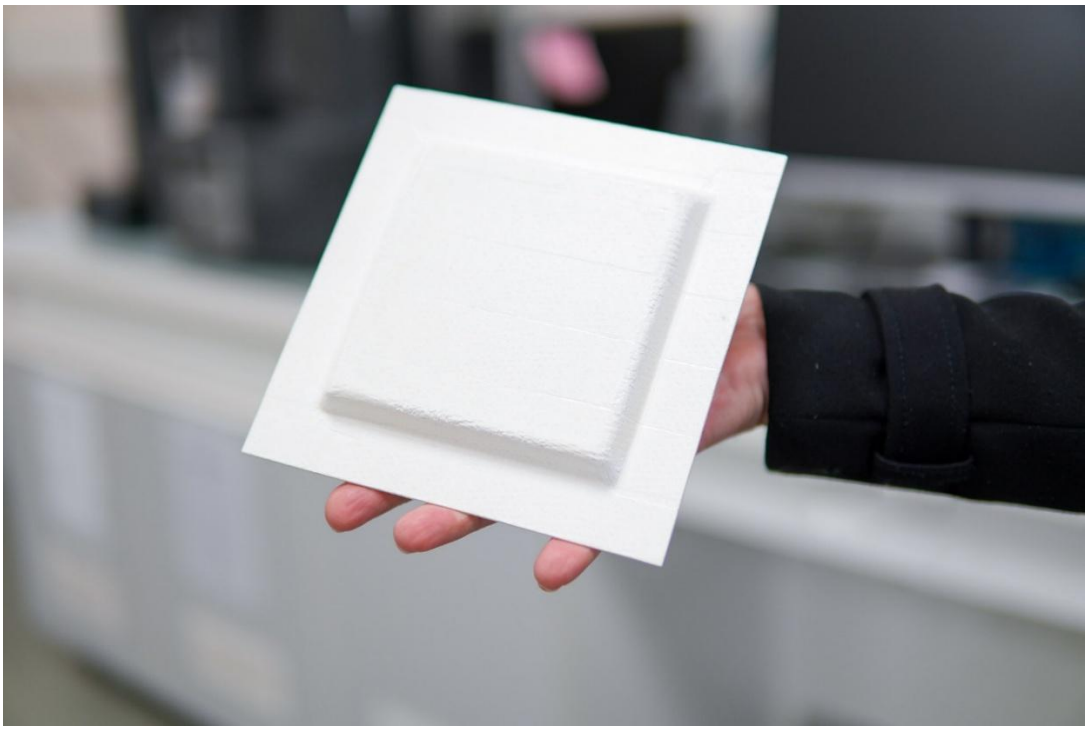
Press Release

DiOXYGEN launches a new era for France's Oxide Ceramic Matrix Composites sector !

Bordeaux, June 2026 – Industrial and academic partners, together with the Institute of Research and Technology Saint Exupéry (IRT Saint Exupéry), are celebrating the first year of the ambitious collaborative project DiOXYGEN, dedicated to the development of oxide ceramic matrix composites (O-CMCs). These next-generation materials, capable of withstanding extreme operating conditions, offer significant opportunities for strategic sectors including aerospace, space, defense, energy, and radioactive waste management.

Building on the roadmap outlined in the White Paper *"Ceramic Matrix Composites: a French area of excellence"* published in March 2024, the project represents the first structured national program dedicated to a strategic industrial sector, with the objective of establishing a coherent, sovereign, and competitive French supply chain. It is also the first time that the entire French oxide ceramic matrix composites community has united around a common initiative, creating an unprecedented collaborative dynamic in support of national industry.



O-CMC tile

Materials designed to withstand the most severe conditions

Oxide ceramic matrix composites combine ceramic fibers and a ceramic matrix, providing a unique combination of properties: lightweight performance, high-temperature resistance, stable mechanical behavior under extreme conditions, and exceptional durability against thermal gradients. These characteristics make them prime candidates for applications where metals and polymer-matrix composites reach their performance limits. As such, they constitute a strategic enabler for critical applications in propulsion systems, thermal protection, and equipment operating in highly demanding environments.

A collaborative program to build a strategic sector

Launched in December 2024, the DiOXYGEN project brings together more than ten industrial, institutional, and academic partners to strengthen a French industry dedicated to O-CMCs. The program builds upon the momentum generated by discussions within the GDR (CMC)² Research Group while providing an operational response to the need for a coherent value chain capable of supporting the maturation of associated technologies.

« I welcome the momentum created by DiOXYGEN in bringing together several members of our community. This is a highly positive signal. Beyond the development of O-CMCs and their emerging applications, the project opens up stimulating scientific opportunities and fosters stronger collaboration between academic teams and industrial stakeholders. It represents a genuine opportunity for the French CMC community. » **Gérard L. Vignoles, Director of GDR (CMC)² and LCTS (Laboratoire des Composites Thermo Structuraux)**

This collective effort is built upon several key pillars:

- The contribution of application-specific requirements across multiple industrial sectors, ensuring the relevance of the research activities;
- Complementary scientific and technical expertise aimed at improving manufacturing processes;
- Harmonized testing methodologies, enabling greater comparability and reliability of results;
- The collective definition of demonstrators and Technology Readiness Level (TRL) milestones, ensuring a coherent path toward industrialization.

Together, these contributions provide a structured approach to establishing a robust, competitive French supply chain capable of addressing strategic sovereignty challenges.

«The DiOXYGEN project builds on six years of oxide composite development at IRT Saint Exupéry, initially supported by Safran and later by CEA/DAM and Pyromeral.
Since 2025, this work has reached a new scale through this industry-wide initiative, born from the rich discussions held within GDR CMC² during the drafting of the White Paper. Structuring a sovereign and high-performing supply chain is essential if we are to remain internationally competitive. I would like to sincerely thank all our partners for their trust. » **Laurent Ferres, Head of Bordeaux-Talence site, IRT Saint Exupéry**

Laurent Ferres, Head of Bordeaux-Talence IRT Saint Exupéry's site, and Céline Apheceixborde, DiOXYGEN Project Manager

« ONERA is proud to participate in the DiOXYGEN project, which aims at structuring the French oxide CMC community. Together with IRT, ONERA co-supervises both a PhD thesis and a postdoctoral research project. In this context, ONERA contributes to the Project with its expertise in the characterization and modeling of the thermomechanical behavior of these materials, helping accelerate their transfer to industry. » **Jean-Michel Roche, Director of the Materials and Structures Department - ONERA**

« Safran brings more than forty years of ceramic composites expertise to the DiOXYGEN project. Our contribution aims at supporting the emergence of a sovereign French supply chain through our experience in process development, integration, and certification. O-CMCs play a key role in reducing the weight of hot-section engine components and contributing to aviation decarbonization, particularly for exhaust nozzles and engine integration components. » **Marc Montaudon, CEO of Safran Ceramics**

«Airbus Helicopters is proud to be part of the DiOXYGEN project. Our commitment reflects our determination to support the emergence of a sovereign French O-CMC industry while exploring practical applications for our aircraft. This technology paves the way for innovative structural designs with enhanced thermal performance, enabling us to anticipate future certification requirements and deliver increasingly competitive architectures." **Olivier Bedus, Innovation Structures Design Engineer - Airbus Helicopters.**

« The DiOXYGEN project provides Pyromeral Systems with an opportunity to combine its expertise with that of major industrial stakeholders. This collective effort enables us to accelerate the development of more reliable and automated manufacturing processes, which are essential to prepare the industrialization of O-CMCs. As an SME with proprietary technologies and strong integration capabilities, we contribute to strengthening an emerging French value chain in support of a sovereign and competitive industry. » **Salim Benmedakhene, DiOXYGEN Project Team Leader – Pyromeral**

« A project such as DiOXYGEN is of major importance to MBDA. It enables the evaluation and adaptation of technologies suitable for the automation and industrialization of oxide matrix composite materials that will be integrated into future generations of MBDA products. By bringing together all stakeholders across an emerging French industrial ecosystem, it serves as a powerful accelerator for research and technology development. » **Denis Gardin, Director of Innovation and Future Technologies – MBDA Group**

« DiOXYGEN addresses the strategic challenge of structuring a national oxide ceramic matrix composite industry, essential for propulsion systems and applications exposed to extreme environments. By bringing together stakeholders across the entire value chain, from fiber producers to end users, the project accelerates the maturation of key technologies and strengthens national autonomy. O-CMCs will play a decisive role in the engines and systems of tomorrow, supporting both performance and sovereignty. » **Philippe Gomez, Head of « Materials and Technologies for Platforms and Propulsion » Department - DGA**

« For Saint-Gobain Advanced Ceramic Composites (SG ACC), DiOXYGEN represents a strategic opportunity to contribute to the emergence of a sovereign ceramic composites industry. As a supplier covering the entire value chain, from filaments to complex machined components, SG ACC benefits from direct interaction with potential end users within the project. This dynamic fosters a detailed understanding of future requirements and creates ideal conditions for addressing the evolving needs of the aerospace sector. » **Benjamin Blanchard, Business Manager – New Businesses - Saint Gobain**

A controlled progression towards industrialization

The first phase of the project focuses on developing more reliable and repeatable manufacturing processes. A robotic impregnation line installed at IRT Saint Exupéry's Talence facility is already being used to test a semi-automated process inspired by manufacturing methods employed for polymer composites and adapted to oxide ceramics. The second phase is based on the development of demonstrator components.

Scheduled for production by 2027, these parts will validate the industrial feasibility of the material through jointly defined designs while preserving each partner's confidentiality requirements. Finally, the partners are working to improve material characterization through thermal, mechanical, and combined testing campaigns. The resulting data will feed existing numerical models and support their further development, enabling performance assessments while reducing the need for costly physical testing.

Composite impregnation line at IRT Saint Exupéry's facilities in Talence

Expanding toward new application areas

Beyond the traditional O-CMC sectors, the project's technological advances offer promising opportunities in environments where long-term durability and resistance to extreme conditions are essential. Deep geological disposal of radioactive waste is one such example, where underground mechanical and environmental constraints require particularly robust materials.

« Andra's participation in the DiOXYGEN project highlights the potential of oxide ceramic matrix composites for applications beyond their traditional industrial domains. Their performance under harsh operating conditions could meet some of the requirements associated with deep geological disposal. Following these developments allows us to identify potential alternatives to steel for the future Cigéo disposal facility. » **Aurélien Debelle, Innovative Materials R&D Engineer – Andra**

Within the framework of DiOXYGEN, Andra is therefore evaluating the relevance of O-CMCs for the development of microtunnel lining systems intended for the storage of high-level radioactive waste at the Cigéo facility.

Project members

About IRT Saint Exupéry - www.irt-saintexupery.com

We accelerate science, technological research and transfer to the aeronautics and space industries for the development of reliable, robust, certifiable and sustainable innovative solutions.

At our sites in Toulouse, Bordeaux and Sophia Antipolis, we offer an integrated collaborative environment composed of engineers, researchers, experts and PhD students from academia and industry for research projects and R&T services supported by technological platforms around 4 axes: advanced manufacturing technologies, greener technologies, smart technologies and methods & tools for the development of complex systems.

Our developed technologies meet the needs of industry, integrating the results of academic research.

We are a private research foundation, supported by the French government.

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