Fraunhofer ISC



Materials. Digitalization.
Testing. Automation.

Materials Research for NewSpace

MATERIALS
ENABLING
INNOVATION

NEW MATERIALS. NEW POSSIBILITIES.

Material innovation is key to space exploration. Fraunhofer ISC combines decades of expertise in materials development, functional coatings, analytics, process development and digitalization to address the technological challenges of the NewSpace sector.

Our focus is on solutions that make space systems lighter, more powerful, more resilient and more cost-effective – from advanced materials and protective coatings to digital and automated processes for development, manufacturing and testing.

Working closely with industry, research organizations and other Fraunhofer Institutes, we translate materials research into practical technologies and support the journey from initial concept to application.

Our NewSpace Expertise

- Functional & Resilient Materials
- Coatings & Surface Technologies
- Lightweight Structural Materials
- Digitalization & Automation
- Materials & Component Testing
- Materials Analytics
- Functional Integration

Fraunhofer ISC connects materials science and digitalization through the development of advanced robotics and digital technology platforms.



NEW SOLUTIONS FOR NEWSPACE

Space access is becoming more commercial, faster, and increasingly technology-driven. New business models, small satellites, and constellations require solutions that can be scaled flexibly and manufactured cost-effectively.
Fraunhofer ISC develops technologies that make space systems more resilient, more powerful, and future-proof.

TECHNOLOGIES FOR EXTREME CONDITIONS

Selected examples of our work are presented below.

FUNCTIONAL MATERIALS AND COATINGS

Materials and surface technologies for extreme environments are essential for the protection and reliability of space systems. In the VLEO Demonstrator project, for example, innovative coatings for protection against atomic oxygen (ATOX) were successfully tested. Complementary thermal protection coatings improve the temperature resistance of spacecraft components, while advanced magnetic shielding addresses the specific requirements of sensitive satellite systems.

MAGNETIC SHIELDING

Flexible, lightweight shielding materials offer new possibilities for protecting sensitive satellite electronics, even in complex geometries. The MAGGIE project investigated spray-on materials that combined effective magnetic shielding with adaptable structures, including those used in additively manufactured components.

SUSTAINABLE MATERIALS SOLUTIONS

Reducing the use of critical substances is an important step towards more sustainable aerospace technologies. The exPFAS project combines materials science with artificial intelligence to identify PFAS-containing materials and support the search for suitable alternatives. We also develop material solutions for design for demise and reentry, as well as for emerging applications such as in-orbit manufacturing and regolith-repellent coatings.

HEALTH IN SPACE

The StellarHeal project developed cell-based “wound-healing patches” for use under space conditions. At the same time, this opened up possibilities for applications on Earth, such as the treatment of chronic wounds.

DIGITALIZATION AND AUTOMATION

Digital technologies are transforming the development, analysis and quality assurance of aerospace materials and components. Finite element simulations provide insights into material and structural behavior under mission-relevant loads. AI-based algorithms further enhance automated defect detection in non-destructive testing, supporting efficient and reliable quality assessment.

TESTING AND QUALIFICATION

Reliable space technologies require rigorous testing under realistic operating conditions. The NeTpioneer project is developing new testing capabilities to accelerate the qualification of innovative satellite technologies without compromising reliability. Mechanical and non-destructive testing methods complement these efforts by assessing component integrity, material quality and service life.

HIGH-TEMPERATURE MATERIALS AND THERMAL PROTECTION

Advanced ceramics are designed to withstand extreme thermal and mechanical loads, particularly during atmospheric reentry and in propulsion systems. Key material classes include ceramic matrix composites (CMC), ultra-high-temperature ceramics (UHTC) and ceramic fibers. In the HANT project, tailored textile processing techniques allow the fabrication of customized fiber architectures and complex component geometries for demanding high-temperature applications.

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NewSpace needs innovative ideas, advanced technologies and partners who turn them into reliable applications.

Fraunhofer ISC supports companies and research partners in developing innovative materials, coatings and processes for space applications. From initial material concepts and characterization to functionalization, prototyping and testing, we combine scientific expertise with application-oriented development.

Let us talk about your application, your material requirements or your technology challenge.

CONTACT

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