100 Years of the Institute for Silicate Research

The Journey of a Research Institute from the Weimar Republic to the 21st Century

"Materials research uniquely combines science, innovation, and societal relevance. The fact that we have been able to contribute to this for 100 years is a special cause for celebration and a mission for the coming decades"

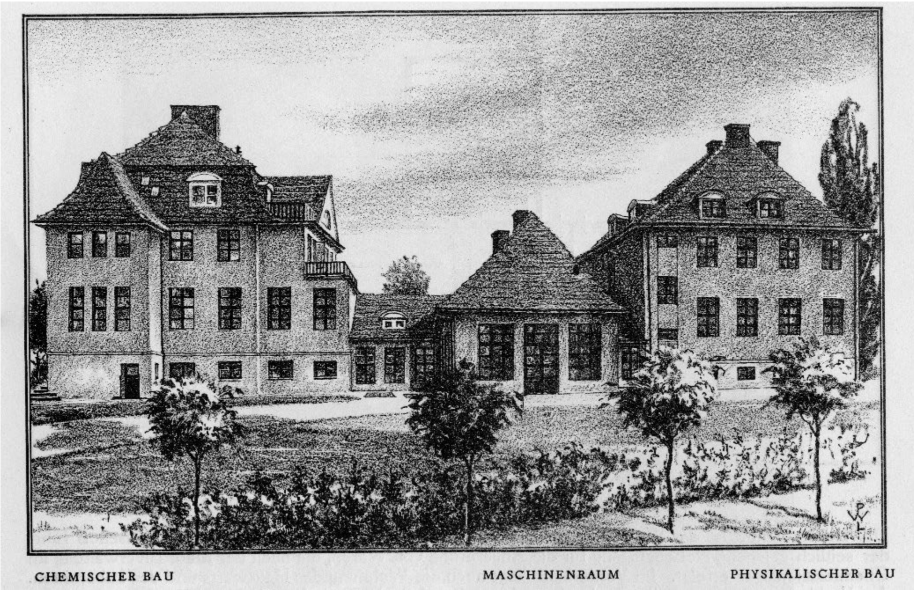
Prof. Miriam Unterlass, Director of the Fraunhofer ISC

With a century of experience, the Institute for Silicate Research is one of the most traditional materials research institutes in Germany. April 1, 2026, marks the 100th anniversary of its founding. What milestones were significant? What does the institute stand for today?

1926–1950: The Kaiser Wilhelm Institute for Silicate Research

In the 1920s, a new scientific self-confidence emerged in Berlin-Dahlem: the first research institutes of the Kaiser Wilhelm Society were established. On April 1, 1926, the Kaiser Wilhelm Institute for Silicate Research was also founded, driven by the conviction that science and industry must not be opposites, but allies in the economic recovery of a country weakened by World War I. Wilhelm Eitel, the equally ambitious, determined, and controversial founding director, outlined two guiding principles: the fundamental expansion of silicate research and its immediate practical application. He was supported by representatives from the glass, ceramics, and cement industries, with whose backing an unusual combination of basic and applied research took shape—a model that was rarely implemented so consistently in Germany for a long time.

It soon becomes clear how close ties between science and industry can open up new avenues. Research into glass and ceramics, complemented by studies of cement and building materials, becomes the institute's core focus. Eitel does not want to keep knowledge of silicates confined to an ivory tower, but rather to bring it into industry. At the same time, collaboration with universities is encouraged to ensure a steady flow of young talent and experts. But the political dimension of this path soon becomes undeniable: the Nazi dictatorship radically transforms Germany, and with it the state of science.



The first institute building in Berlin Dahlem © Max Planck Society

Between 1933 and 1945, the institute experiences turbulent times. Eitel seeks to align himself with the new rulers in order to keep the institute alive and secure its finances. Research becomes a tool of the arms and construction industries, and the Silicate Institute serves as a resource for major projects such as highways, cement research, and defense technologies. Under these circumstances, the focus shifts from pure basic research to practical, state-funded projects. However, it remains unclear to what extent Eitel's personal motives and political convictions shaped his actions and decisions. The war casts a deep shadow. To protect against bombing raids, several departments of the institute are relocated to the Rhön, yet research continues—albeit under extreme conditions. Eitel, Dietzel, and other leaders struggle to ensure survival, maintain infrastructure, and keep projects afloat.

After the war ends, the Western Allies see for the first time the need to reorganize German science. The Max Planck Society is established in 1948; Adolf Dietzel, the former head of the technology department, is appointed interim director of the institute. A new beginning takes shape in Würzburg: glass and ceramics research are to take center stage, and the old officers' mess hall on Würzburg's Neunerplatz—modernized and equipped with state-of-the-art technology—becomes the new home of the Materials Research Institute. Dietzel is permanently appointed as institute director and becomes the driving force tasked with catapulting the institute back into the top international leagues.

1950–1971: The Max Planck Institute for Silicate Research

The transition from basic research to applied science clearly marked the decade beginning in 1950. Under Dietzel's leadership, silicate research in Würzburg grew into an internationally recognized institution. The expansion of the building complex, the enhancement of laboratory infrastructure, and the recruitment of top talent contributed to glass, ceramics, and enamels reaching new heights. Dietzel knew how to forge closer ties between the institute and industry: researchers worked hand in hand with industrial partners to develop products, optimize processes, and set global standards. This phase gave rise to patents, new materials, and technological breakthroughs that cemented the institute's position as a key driver of silicate research.

The new home in Würzburg: The former officers' mess of the 9th Bavarian Infantry Regiment is being converted for the Max Planck Institute – on the right, the first glass melting hall © Max Planck Society

But the 1960s once again present the researchers with organizational challenges. Dietzel's impending retirement and the reassessment of the institute's fundamental tasks lead to a thorough review and reevaluation. The Max Planck Society recommended a reorientation. The new goal: The institute was to reposition itself within the Fraunhofer Society as a partner to industry. In 1971, the official transition took place: The Max Planck Institute for Silicate Research became the Fraunhofer ISC. Horst Scholze, a pioneer in glass and ceramics research, takes over as director: The Max Planck Institute for Silicate Research becomes the Fraunhofer Institute for Silicate Research ISC. The focus on materials also broadens to include non-metallic inorganic materials.

Since 1971: The Fraunhofer Institute for Silicate Research ISC

The 1970s and 1980s are an era of intense transformation. Scholze establishes ORMOCER®– organically modified silicates – as a new central class of materials. These hybrid materials open up applications in the dental, environmental, electronics, and catalyst sectors. At the same time, laboratory and production capacities expanded, complemented by the first pilot plant and the Bronnbach branch as a center for instrument manufacturing and cultural heritage preservation. The ISC became more industry- and application-oriented, while basic research was increasingly transferred to other institutions. During this period, significant patents, awards, and international collaborations emerged; at the same time, research into environmental and cultural heritage preservation was strengthened.

The late 1980s and 1990s marked a new era of dynamism: German reunification, accession to the EU, and increased European cooperation opened up new horizons. Under Scholze's successor, Schmidt, the ISC re-established stronger international networks, and the ORMOCER®material class was further developed. Under the new institute director, Gerd Müller, the collaborations with universities—particularly in Würzburg—initiated by his predecessor were expanded, leading to a dynamic mix of fundamental knowledge, applied research, and industrial implementation. The Würzburg site was expanded with a large pilot plant complex that supports the transition of material innovations from the laboratory to industrial practice using large-scale research facilities.

At the same time, the ISC serves as a driving force for innovative technologies. The ORMOCER®family is becoming increasingly versatile: a whole family of dental materials is emerging, along with scratch-resistant coatings for plastic lenses and eyeglass lenses, barrier coatings, sensor technology, micromedicine, cultural heritage preservation, and electronics—the list of application areas is growing. Initial systematic internationalization efforts in Eastern and Southeastern Europe, China, Japan, and North America open the door to new partners and customers: a research institute that transforms ideas into products.

Between 2006 and 2012, the reorientation takes place under Müller's successor, Professor Gerhard Sextl. New centers are established: The Center for Smart Materials, where magnetically and electrically controllable materials are designed; the Center for Applied Electrochemistry—now established as the Fraunhofer R&D Center for Electromobility Bavaria at Fraunhofer ISC and one of the largest battery research groups in Germany. The project groups IWKS (Material Cycles and Resource Strategy) in Alzenau/Hanau, High-Temperature Materials and Design (HTL) in Bayreuth, and the Translation Center for Regenerative Therapies in Würzburg signify growth and open up new fields of research.

Design for the 21st Century: The futuristic glass building by Zaha Hadid Architects at the headquarters in Würzburg © K. Heyer for Fraunhofer ISC

The portfolio focuses on energy, the environment, and health, without neglecting the traditional strengths of glass, ceramics, and ORMOCER®. The expansion is also reflected in the architecture: the futuristic-looking glass building of Technikum III by Zaha Hadid Architects at the headquarters in Würzburg, new institute buildings in Alzenau, Hanau, and Bayreuth, a
large pilot plant for the production of ceramic fibers in Bayreuth, and the renovation of the listed former university eye clinic in Würzburg.

With Sextl's successor, Professor Miriam Unterlass, the concept of "sustainable chemistry"—raw materials, syntheses, and products are to become more sustainable, with a focus on the chemical industry and the shift "away from petroleum" in chemical production. This also involves accelerating material development through simulation, digitalization, and the use of artificial intelligence and robotics. Internationalization is gaining greater significance and is also reflected in the increasingly international composition of the workforce.

Looking ahead, it is clear that materials are always a decisive factor for the economy and can make a significant contribution to a more sustainable future. Fraunhofer ISC sees itself as a driver of innovation that brings together materials, processes, and products to deliver new, more sustainable solutions for industry and society. Departments, centers, locations, and the connection to university research and teaching form a hybrid organization that inextricably links teaching, research, and the economy. The architecture reflects this development: modern new buildings, historic buildings, state-of-the-art laboratory and pilot plant facilities—all serving an agile, international research landscape.

100 Years of the Institute for Silicate Research – Milestones in a Compact Chronology

1926–1948: Founding of the Kaiser Wilhelm Institute in Berlin-Dahlem; Prof. Eitel as a formative but controversial figure; close integration of glass, ceramics, and cement research; Nazi-era research subsidies directed toward military contracts; relocation to the Rhön.

1948–1971: New beginning in Würzburg as the Max Planck Institute; Prof. Dietzel shapes the institute’s development, with a focus on glass, ceramics, and enamels; 1952 inauguration of the new building; 1971 transition to Fraunhofer ISC.

1971–2006: New material developments, growth of technical centers and branch offices; under Prof. Scholze, the foundation is laid for the development of ORMOCER®-based material families; under Prof. Schmidt, further ORMOCER®-based applications in dentistry, the environment, cultural heritage preservation, and corrosion protection; under Prof. Müller, the research field of ceramic reinforcement fibers is established; environmental awareness and cultural heritage preservation gain importance; founding of the “Technology of Functional Materials” degree program at the University of Würzburg and expansion of research into the fields of “Health” and “Electronics.”

2006–2024: Realignment under Prof. Sextl; the degree program is brought to life; a cluster structure, further growth, and expansion of value chains through project groups focused on material cycles and resource strategies (IWKS) as well as high-temperature lightweight construction (HTL) and life sciences; closer ties to industry, prototype development, and pilot plants, including Europe’s first pilot plant for the production of ceramic reinforcement fibers on an industrial scale; globalization of markets and strengthening of the Fraunhofer profile as a driver of innovation.

2024 to present: New priorities under Prof. Unterlass: “Sustainable Chemistry” takes center stage, internationalization is being driven forward, and “Materials Acceleration”—i.e., the acceleration of materials development through digitalization, artificial intelligence, and robotics—is propelling materials research further into the 21st century.

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