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ISC Konstanz Produces First TOPCon Solar Cell in New Research Laboratory

First TOPCon solar cell manufactured entirely using new equipment – Modernization during ongoing research operations strengthens industry-oriented solar energy research

Konstanz, Germany, November 16, 2026 – A major milestone for the International Solar Energy Research Center (ISC) Konstanz: The first TOPCon solar cell has been successfully manufactured entirely using the equipment installed in its new research laboratory. This marks the first successful completion of the entire TOPCon solar cell manufacturing process using the modernized research infrastructure. Throughout the construction and modernization work, research and development activities continued in the existing laboratory with only minor disruptions. With the new state-of-the-art equipment now available, ISC has significantly expanded its capabilities for optimizing manufacturing processes, conducting research projects, and collaborating with industrial customers.

“With the first solar cell manufactured entirely using our new equipment, we have reached a major milestone,” says Dr. Kristian Peter, Chairman of the Board of ISC Konstanz. “Over the past few years, we have made substantial investments and overcome major challenges – while continuously carrying out our research activities and industrial projects. With the new infrastructure, we can now take our work to an even higher technological level and accelerate the transfer of new solar cell technologies into industrial applications together with our industry partners.”

Modernization Without Interrupting Research Operations

The expansion of the research center became necessary because large parts of the existing laboratory infrastructure and equipment needed replacement after almost 20 years of intensive use. To ensure that research activities could continue throughout the modernization process, ISC acquired a neighboring building previously used by the Konstanz Yacht Club.

Rather than constructing an expensive new building, ISC converted the existing hall into a modern research laboratory using a cost-effective and resource-efficient approach. The construction included prefabricated sandwich panels of the type commonly used in cold-storage facilities. This allowed the new infrastructure to be established step by step without interrupting ongoing research operations.

ISC adopted a pragmatic and economically efficient approach to enable the urgently needed modernization of its research infrastructure. A key contribution came from the State of Baden-Württemberg, which approved a total of approximately €10.15 million in funding for the modernization. This support made it possible to acquire numerous new pieces of equipment.

The modernization is supported by three main pillars: funding from the State of Baden-Württemberg, contributions from technology partners, and the commitment of donors such as halm elektronik GmbH, RCT Holding GmbH, RCT Power GmbH, and the Crescere Foundation.

State-of-the-Art Equipment for Industry-Oriented Research

The new laboratory is equipped with advanced process technology covering the essential steps of solar cell manufacturing. This includes equipment for wet-chemical processing, high-temperature treatments, deposition processes, laser processing, metallization, and automated material handling.

Equipment manufacturers and technology partners involved in the modernization include centrotherm, RENA, ASYS, InnoLas (Photonics Systems), halm, and BÜRKLE. The new equipment enables ISC to develop and optimize industrial manufacturing processes under realistic conditions and prepare them for transfer to mass production.

One example of the advanced infrastructure is the automated loading of centrotherm's high-temperature furnaces using industrial robots. Such automation solutions are an important part of industrial solar cell manufacturing, enabling highly reproducible processes.

New Research Projects and Industrial Collaborations Ready to Benefit

The successful production of the first TOPCon solar cell marks an important step in commissioning the new research infrastructure. The new equipment expands ISC's capabilities to continue existing research activities, further optimize manufacturing processes, and develop new technologies. It also creates additional opportunities for collaboration with industrial customers, with several partners already waiting to use the new equipment for joint development projects.

Several new publicly funded research projects will benefit from the laboratory's capabilities. In the LAPIS project, ISC is developing laser-structured passivated contacts for even more efficient TOPCon solar cells. In BC-Pilot, ISC and the Institute for Solar Energy Research Hamelin (ISFH) are combining their technologies for interdigitated back-contact (IBC) solar cells to jointly develop an industrially viable manufacturing process that can eventually be offered as a turnkey technology.

The international DREAM-PV project investigates new module concepts for high-efficiency TOPCon and IBC solar cells, aiming to improve their long-term reliability and cost-effectiveness. Through SPRINT, ISC is also working on future photovoltaic technologies and accelerating their transfer into industrial applications.

“Our goal is not only to achieve high efficiencies in the laboratory. What really matters is that new technologies can subsequently be manufactured on an industrial scale,” explains Dr. Radovan Kopeček, Member of the Board of ISC Konstanz. “That is why we work closely with machinery and equipment manufacturers. We want to help German companies succeed in the international solar market with innovative production technologies. Especially for Germany's machinery and equipment industry, photovoltaics offers new opportunities in a rapidly growing global market.”

A Joint Effort – Made Possible by Many Supporters

ISC would like to express its sincere gratitude to everyone who has contributed to the expansion through financial donations, equipment and other in-kind contributions, technical support, or personal commitment.

Thanks to a pragmatic construction approach, extensive in-house work, and careful management of available resources, the total project costs, originally estimated at €19 million, have been significantly reduced. The final project costs will be determined in early 2027, once the remaining work has been completed.

However, the expansion of the research center is not yet finished. As a non-profit research institute, ISC continues to rely on support for the further modernization and equipping of its research infrastructure. Companies and private individuals can contribute through donations, helping to advance solar energy research in Germany and the development of a sustainable energy supply.

Further information and donation opportunities: https://www.isc-konstanz.de/en/donations/

About ISC Konstanz

The International Solar Energy Research Center Konstanz e.V. (ISC Konstanz) is a non-profit research institute that has been developing high-efficiency crystalline silicon solar cells, solar modules, and photovoltaic systems since 2005. Its activities focus particularly on industry-oriented research and technology transfer. Together with international partners from research and industry, ISC develops technologies for an efficient, cost-effective, and sustainable solar energy supply.

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Images



ISC researchers Dr. Ignacia Devoto and Dr. Daniel Tune demonstrate a string of interconnected solar cells. The stringer machine in the background connects individual solar cells into strings, an essential step in photovoltaic module manufacturing.



Advanced equipment in ISC Konstanz's new research laboratory: ISC researchers Apoorva Gattu and Melike Eren at a new centrotherm deposition system. In the foreground, a robotic arm automatically loads graphite boats with silicon wafers – an important step towards automating industrial solar cell manufacturing processes.