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ISC Konstanz upgrades R&D infrastructure to accelerate industrial solar cell innovation, including tandem technologies

Konstanz, Germany – March 2026 – The International Solar Energy Research Center (ISC Konstanz) has completed a major upgrade of its photovoltaic research and development laboratories, strengthening its capabilities to support industrial solar cell technologies ranging from advanced silicon concepts such as TOPCon and TBC to future tandem architectures.

The facilities were officially inaugurated during a recent visit by Baden-Württemberg's Minister for the Environment, Climate and Energy, Thekla Walker. The upgraded laboratories provide industrial partners with a development environment aligned with manufacturing conditions, enabling faster innovation and technology transfer.

"Our upgraded infrastructure enables processing of industrial wafer sizes such as G12, automated batch processing, and advanced depositioning and metallization technologies required for both current TOPCon and future tandem architectures," says Dr. Kristian Peter, Managing Director of ISC Konstanz. "This allows companies to develop and validate new technologies under conditions closely aligned with industrial production."

Enabling industrial-scale development and faster process optimization

The modernized laboratory integrates equipment from leading European manufacturers, including wet chemical processing systems from RENA, advanced sputtering systems from Von Ardenne, upgraded metallization and automation solutions from ASYS, and module interconnection equipment from Mondragon. These upgrades allow ISC Konstanz to process larger batches with improved precision, reproducibility, and throughput.

The infrastructure supports the full development chain from wafer processing to metallization and module integration. This enables industrial partners to evaluate new materials, optimize processes, and validate production concepts prior to high-volume manufacturing.

Supporting industrial TOPCon and TBC technologies

ISC Konstanz continues to support industrial partners in developing and optimizing high-efficiency silicon solar cell technologies such as TOPCon and TBC (TOPCon Back Contact). Through its laboratory and technology transfer activities, ISC Konstanz has contributed to achieving conversion efficiencies of up to 25.5% for TOPCon solar cells under industrial manufacturing conditions.

The upgraded facilities allow continued process development and optimization for current mass-production technologies while ensuring compatibility with industrial wafer formats, including G12.

Preparing for next-generation tandem solar technologies

In addition to supporting current silicon technologies, ISC Konstanz is expanding its infrastructure to enable development of bottom cells and module integration solutions for tandem solar technologies. Tandem architectures with c-Si bottom cells are widely expected to drive the next generation of efficiency improvements in industrial photovoltaics.

The institute is establishing dedicated capabilities for tandem bottom-cell development, including advanced deposition, metallization, and integration processes. This will allow industrial partners to develop and validate tandem-compatible processes and accelerate their path toward industrial implementation. At a time when global photovoltaic manufacturing capacity is expanding rapidly—particularly in Asia—the upgrade strengthens Europe's industrial research infrastructure and supports efforts to maintain technological competitiveness in high-efficiency silicon and tandem solar technologies.

Industrial collaboration and global technology transfer

ISC Konstanz operates as an independent, non-profit research institute focused on bridging the gap between laboratory innovation and industrial production. Companies worldwide collaborate with ISC Konstanz to develop solar cell technologies, manufacturing processes, and production equipment.

About ISC Konstanz

Founded in 2005, ISC Konstanz has contributed to photovoltaic manufacturing lines across Europe, Asia, and North America. With its upgraded infrastructure, the institute is strengthening its role as a key partner for industrial photovoltaic innovation and the development of next-generation high-efficiency solar technologies.

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Figure 1: Baden-Württemberg's Environment Minister Thekla Walker during the inauguration of ISC Konstanz's upgraded photovoltaic research laboratories, which support industrial solar cell technologies including TOPCon and tandem concepts. (left to right: ISC project leader Christoph Peter, ISC director Dr. Kristian Peter, minister Thekla Walker and ISC director Dr. Radovan Kopecek)

Figure 2: Guests and staff at the laboratory opening at ISC Konstanz with Environment Minister Thekla Walker (center).