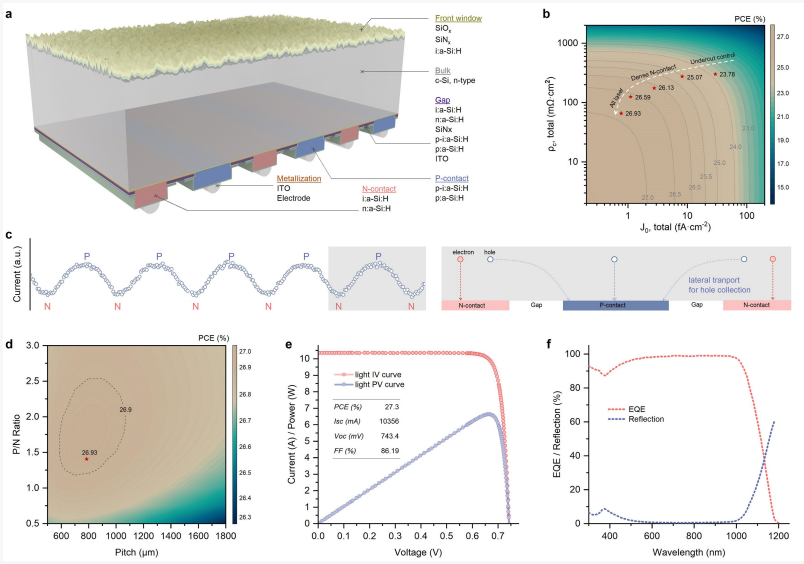
LONGi reveals breakthrough 27% solar cell efficiency in journal Nature

JIAXING, CHINA, November 4, 2024 /EINPresswire.com/ -- In the recent paper titled "Silicon heterojunction back contact solar cells by laser patterning", LONGi Green Energy Technology Co., Ltd. reported for the first time that crystalline silicon solar cells have broken the 27% efficiency barrier, marking a significant advancement in photovoltaic (PV) technology. This milestone not only highlights the potential of back-contact (BC) solar cells for high efficiency and cost-effectiveness but also sets a new benchmark for the industry.



LONGi R&D has established leadership in high-efficiency solar technology

LONGi's Central R&D Institute has driven this innovation through intensive research in silicon wafers and passivation technology, developing a dense heterojunction passivation contact and surpassing previous thermal constraints in heterojunction preparation. The developed process, involving a fully laser-patterned structure and a low-indium, silver-free metallization approach, enhances both efficiency and economic viability for future BC solar cell production.

This breakthrough comes after LONGi's record-breaking announcement in May, where the independently developed HBC (heterojunction back-contact) solar cells achieved an efficiency of 27.30%, setting a new world record for monocrystalline silicon cells. This follows the previous record of 27.09% in December 2023, solidifying LONGi's leadership in high-efficiency solar technologies.

Historically, crystalline silicon solar cells have seen three major technological advances: Al-BSF cells (below 20% efficiency), PERC cells (up to 25% efficiency), and TOPCon (breaking 25%). Looking forward, BC technology is positioned to lead the next wave of mass production, with efficiencies exceeding 26%. LONGi's research points to this future, combining heterojunction technology with a BC structure to push efficiency beyond 27%.

LONGi's long-term commitment to innovation is reflected in this being the third Nature publication by the Central R&D Institute since 2024, following earlier reports on world records in flexible silicon heterojunction and perovskite/crystalline silicon tandem cell efficiency. These achievements underscore LONGi's leadership in solar PV technology innovation.

As a global leader, LONGi remains dedicated to advancing solar energy, driving technological breakthroughs, and promoting a more efficient and sustainable photovoltaic future through continued innovation and industry collaboration.

nature

Explore content · About the journal · Publish with us · Subscribe

nature > articles > article

Article | Published: 01 October 2024

Silicon heterojunction back contact solar cells by laser patterning

Hua Wu, Feng Ye, Miao Yang, Fei Luo, Xiyan Tang, Qing Tang, Haoran Qiu, Zhipeng Huang, Genshun Wang, Zhaoqing Sun, Hao Lin, Junzhe Wei, Yunpeng Li, Xiaoqiang Tian, Jinsheng Zhang, Lei Xie, Xiaoyu Deng, Tuan Yuan, Mingzhe Yu, Yong Liu, Ping Li, Hao Chen, Shenghou Zhou, Qishu Xu, Peng Li, Jun Duan, Jiansheng Chen, Chunxiu Li, Shi Yin, Bo Liu, Chang Sun, Qiao Su, Yichun Wang, Hao Deng, Tian Xie, Pingqi Gao, Qian Kang, Yongzhe Zhang, Hui Yan, Ningyi Yuan, Fuguo Peng, Yunlai Yuan, Xiaoning Ru, Bo He, Lan Chen, Jianbo Wang, Junxiong Lu, Minghao Qu, Chaowei Xue, Jianning Ding, Liang Fang, Zhenguo Li & Xixiang Xu — Show fewer authors

Nature (2024) | Cite this article

4123 Accesses | 1 Altmetric | Metrics

Abstract

Back contact silicon solar cells, valued for their aesthetic appeal by removing grid lines on the sunny side, find applications in buildings, vehicles and aircrafts, enabling self-power generation without compromising appearance[1-3]. Patterning techniques arrange contacts on the shaded side of the silicon wafer, offering benefits for light incidence as well. However, the patterning process complicates production and causes power loss. Here we employ lasers to streamline back contact solar cell fabrication and enhance power conversion efficiency. Our approach produces the first silicon solar cell to exceed 27% efficiency. Hydrogenated amorphous silicon layers are deposited on the wafer for surface passivation and collection of light-generated carriers. A dense passivating contact, diverging from conventional technology practice, is developed. Pulsed picosecond lasers at different wavelengths are used to create back contact patterns. The developed approach is a streamlined process for producing high-performance back contact silicon solar cells, with a total effective processing time of about one-third that of emerging mainstream technology. To meet terawatt demand, we develop rare indium-less cells at 26.5% efficiency and precious silver-free cells at 26.2% efficiency. The integration of solar solutions in buildings and transportation is poised to expand with these technological advancements.

LONGi researchers published their findings in the journal Nature

About LONGi

Founded in 2000, LONGi is committed to being the world's leading solar technology company, focusing on customer-driven value creation for full scenario energy transformation.

Under its mission of 'making the best of solar energy to build a green world', LONGi has dedicated itself to technology innovation and established five business sectors, covering mono silicon wafers cells and modules, commercial & industrial distributed solar solutions, green energy solutions and hydrogen equipment. The company has honed its capabilities to provide green energy and has more recently, also embraced green hydrogen products and solutions to support global zero carbon development. www.longi.com

Maggie Bell
Sunbeam Communications GmbH
email us here