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Xuelong Completes Survey for 42nd Antarctic Expedition

By Staff Reporters

The ocean team of Chinese icebreaker Xuelong, also known as Snow Dragon, finished the ocean survey tasks of China's 42nd Antarctic Expedition on February 19, with the last acoustic release transponder retrieved from the Ross Sea.

Zhang Haifeng, head of the team, said they carried out a comprehensive survey of the hydrological environment, marine organisms, marine chemistry and atmospheric environment in the Amundsen Sea, the Ross Sea and nearby waters.

Survey of penguin habitats was conducted simultaneously.

The work started on January 24, with the team battling unfavorable weather with wind and snow, thick fog, surging waves and severe ice conditions. Focusing on the key elements of the marine ecosystem, they deployed and retrieved subsurface moorings, used new type krill trawls, and made observations using disposable conductivity-temperature-depth instrument, Zhang said.

The team retrieved four sets of ecological buoys and deployed four new sets. Abundant biological samples were also collected, including krill, midwater fish and benthic organisms, which will help understand the nutrition structure of key pelagic species as well as track and understand the changing trend of key populations.

The mission used new technologies and new equipment. The polar ecological buoys were equipped with domestically produced acoustic and optical detection modules, which enable sequential continuous observation for a long time in the ocean under ice.

Antarctic krill are very sensitive to climate and ecological environment changes. For example, the reduction of sea ice could threaten their food sources and habitat, and the rising seawater temperature could trigger their retreat to higher altitude.

The new type of improved krill trawl has a multi-layer design, which increased catch rates and facilitated monitoring krill distribution across different water layers, according to Li Shuai, head of the quarter deck working group.

The team analyzed the regularity of krill distribution, their interannual variations, feeding habits, and trophic relationships within the food chain. The objective is to promote sustainable utilization of biological resources and protection of marine environment in the Southern Ocean, Li said.

As a member of the Convention on the Conservation of Antarctic Marine Living Resources, China is contributing research data and scientific solutions, which not only help evaluate krill resources, but are also crucial to understand how climate change influences polar ecosystems, according to Li.

The ocean team members of Xuelong and summer team members of the Qinling Station will board the vessel to the Port of Hobart in Australia, and then fly back to China.

Xuelong will sail to the Zhongshan Station in east Antarctica for subsequent tasks.



Humanoid robots play football in Wuhan city, Hubei province, February 24, 2026. A variety of electric vertical takeoff and landing aircraft and humanoid robots made their debut at an event in Wuhan, showcasing the province's latest achievements of low-altitude economy and artificial intelligence. (PHOTO: XINHUA)

STI Frontier

Development of 4th Gen OLED Screens

By Staff Reporters

High energy efficiency, long lifespan and high color purity have always been essential to the display industry. However, furthering the success of Organic Light-Emitting Diode (OLED) beyond conventional low-luminance display applications used to be hampered by the low power efficiency (PE) at high luminance.

With more than 10 years of commitment, scientists from Tsinghua University, in collaboration with domestic enterprises such as Visionox Technology Inc., have demonstrated the strategic implementation of an exceptionally high-PE, high-luminance OLED, using a phosphor-assisted thermally activated delayed fluorescence (TADF)-sensitized narrowband emission. They ultimately achieved mass production and commercial application of the fourth-generation OLED adopting phosphor-assisted TADF-sensitized fluorescence (pTADF).

Breakthrough luminance strategy

Previously, OLED technology had advanced to the third generation, and the breakthrough to high PEs was made possible by using phosphorescence and TADF emitters. However, a problem with OLEDs remained unresolved, namely the tendency for efficiency to decrease with increasing luminance, known as efficiency roll-off.

Duan Lian, a chemistry professor at Tsinghua University, recalled that in 2011, when the third-generation TADF materials from abroad had made a breakthrough, he found the weakness of TADF materials after careful research, and proposed a solution to the exclusion of high PE and high luminance — instead of using a TADF emitter, using TADF materials to sensitize the energy transfer to high-color-purity fluorophores.

Deriving from their previous work on pTADF, the Tsinghua research team unveiled a breakthrough strategy for OLEDs

to fully exploit the potential of a high PE under a high luminance, which was implemented on the basis of a multiple sensitized narrowband emission from a pTADF emitting layer, constituting ternary components: a TADF sensitizing-host, a phosphor-assistant and a multiple resonance (MR) emitter.

As a consequence, pTADF devices could realize a 100 percent exciton utilization in a sub-microsecond-scale, which greatly relieved the critical issue of PE roll-off with increasing luminance, highlighting the potential for the continued success of OLEDs beyond conventional low luminance display applications.

Expanding color gamut

The team started by developing the pTADF red light, which significantly increased the lifespan of the device. However, the project was once again halted as no breakthrough was made in the key narrowband red light material.

See page 4

Report for Spring Festival

Innovation Unleashed: From Smart Cities, Trains to Rockets

By Staff Reporters

China's innovation journey never stops. From the AI-powered smart city ecosystem in Xiong'an and Shandong's gram-precision commercial rocket assembly to Datong's digitally transformed locomotive factories, sci-tech innovation is reshaping the country's development landscape.

Xiong'an: A model of innovation

In the Zhongguancun Science Park in Xiong'an New Area, the R&D team of Mech-Mind Robotics, a company that makes industrial 3D cameras and AI-powered software for intelligent robotics, is upgrading its intelligent production line. Since settling in Xiong'an in 2024, the company has attracted numerous talents

in the field of AI.

"In Xiong'an, there are changes every quarter, even every month," the company's representative Ma Xiaoqian said. Xiong'an's AI and other application scenarios are strengthening the foundation for smart cities and helping companies develop.

Currently, over 750 companies have signed agreements to operate the 33 themed buildings in Xiong'an, forming a distinctive development model of "one building, one industry."

The "upstream and downstream" industrial ecosystem, where adjacent buildings are essentially connected, has led to a high concentration of innovative elements in Xiong'an. Algorithm development, computing power support, and ap-

plication scenarios are all condensed within a single building so that companies can collaborate on innovation without leaving the premises.

This model has not only reduced communication costs and improved innovation efficiency, but also acts as a gravitational field attracting industrial clusters.

Rich scenarios such as smart transportation, ecological protection, and digital governance are also boosting the application of new technologies and industries, becoming an important engine for cultivating new quality productive forces.

In the underground utility tunnels, inspectors use a smart city system to remotely inspect the neatly arranged pipelines. See page 2

International Cooperation

APEC 'China Year' to Boost Regional Prosperity

Edited by LU Zijian

Chinese Foreign Minister Wang Yi called for building a prosperous and stable Asia-Pacific at the opening session of the First Asia-Pacific Economic Cooperation (APEC) 2026 Senior Officials' Meeting (SOM), held recently in Guangzhou, south China's Guangdong province.

The first SOM and related meetings took place from February 1 to 10 in Guangzhou. They were the first official event China held as host of APEC in 2026.

The APEC "China Year" adopted a theme of "Building an Asia-Pacific Community to Prosper Together." It carries forward both APEC's consistent vision and reflects a deeper commitment to further elevating regional cooperation, based on the achievements already made, Wang said.

China will focus on the three priorities of openness, innovation and cooperation, and advance the following key tasks: firmly upholding one main goal, exploring two key pathways, accelerating three major transformations, and deepening multifaceted cooperation.

"We should be more determined than ever to hold high the banner of building an Asia-Pacific community and explore objectives and a roadmap for community-building in the period ahead," Wang said.

He encouraged parties to advance the process of building a free trade area of the Asia-Pacific and improve the network of connectivity, saying the APEC connectivity blueprint for 2015-2025 proposed at the 2014 Beijing meeting has already delivered important progress. "We should build on that," Wang said. See page 3

WEEKLY REVIEW

World's Smallest Ferroelectric Transistor Developed

A research team from Peking University has developed the world's smallest nano-gate ferroelectric transistor that operates at an ultralow voltage of 0.6 volts, with the physical gate size reduced to 1 nanometer. The device has achieved voltage compatibility between ferroelectric memory elements and logic transistors. Their study was published in *Science Advances*.

New Breakthrough in Optical Communications and 6G

Chinese researchers have achieved a breakthrough in optical communications and 6G wireless technology by realizing cross-network convergence between fiber-optic and wireless communication systems. By integrating photonics with ultra-wideband devices, the research team demonstrated seamless fiber-wireless operation at record-breaking data rates.

Software Automatically Segments Brainstem Nerve Bundles

A research team of MIT, Harvard, and Massachusetts General Hospital have developed an AI-powered software capable of automatically segmenting eight distinct bundles of nerve fibers in the brainstem from any diffusion MRI sequence. The tool offers a new window into brainstem white matter pathways.

Revolutionary Long-term Data Storage System Created

Microsoft researchers have developed a data storage system capable of preserving readable information for at least 10,000 years, with the potential to last far longer. The team used a high-energy laser to imprint deformations into a 3D chunk of borosilicate glass, the kind used in ovenware.

WECHAT ACCOUNT



E-PAPER



New Graphic

TOTAL TREES IN CHINA

142.6 billion (by 2020)

Equivalent to about

100 trees for every person

Source: A Research Led by Professor Guo Qinghua, Peking University
Designed by SONG Ziyi / Science and Technology Daily