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# CAST Newsletter

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## Article Highlights

### Key messages from President Xi Jinping's 2023 New Year Address



President Xi Jinping delivering his 2023 New Year Address  
Photo credit: Xinhua News Agency

On December 31, 2022, President Xi Jinping delivered his 2023 New Year Address. One of the key messages from his speech was China's tight links with the world. As he reflected on hosting old and new friends in Beijing and traveling abroad to communicate China's propositions to the world, he declared that "China stands firmly on the right side of history and on the side of human civilization and progress." China has demonstrated its responsibility as a major country in terms of maintaining world peace and promoting common development.

Over the past year, President Xi has hosted and attended more than 10 important international multi-lateral conferences in China and abroad, met with over 60 foreign leaders and heads of international organizations, and held conference calls and video meetings with about 30 foreign leaders. On each occasion, he conducted an in-depth exchange of views on bilateral relations and major international

issues. "China cherishes peace and development and values friends and partners as it has always done," he stressed. By hosting the Beijing Olympic and Paralympic Winter Games, China sent a warm call to the people of all countries — "Together for a Shared Future." The China International Import Expo, the Canton Fair, the China International Fair for Trade in Services, and the China International Consumer Products Expo are all testaments of China's commitment to "open wider." In the first 11 months of 2022, the trade volume between China and Belt and Road countries increased by 20.4%, and the number of China-Europe freight trains hit a new high, with a slew of big projects ready to launch... These accomplishments show that by reinforcing friendships all over the world, China has grown more open and confident in the new era. It has set off on a new journey of

mutual integration and mutual achievement with the rest of the world.

A turbulent world requires a stabilizing force, and an era of change calls for global responsibility. Looking back, global struggles with the COVID-19 pandemic left the world economy more vulnerable. The tense geopolitical situation, coupled with multiple food and energy crises, has exacerbated the absence of global governance. Facing unprecedented challenges, the question of “where humanity is heading” has never felt more urgent. In his New Year address, President Xi emphasized the need to “contribute China’s wisdom and solutions to the cause of peace and development for all humanity.” China has secured agreements from 70 countries seeking to join the Group of Friends of the Global Development Initiative. The Global Security Initiative proposed by China has provided more in-

ternational public goods for the security deficit. China’s call to build a community of all life on Earth has promoted the milestone achievement of the United Nations Biodiversity Conference (COP-15). These achievements testify to China’s focus on the common interests of all mankind. Guided by the goal of building a global community of shared future, the country is actively coordinating its domestic concerns with those of the international community and working to contribute Chinese wisdom and strength to the common problems facing mankind. This has instilled confidence and hope to a turbulent and changing world and shown that China has grown into an important force for world peace and development.

This is an era full of challenges as well as hope. The future of mankind should be determined by the people of all countries. Going forward, all

countries need to work together to promote the common values of mankind and continue working on building a global community of shared future.

(Source: *People’s Daily*)

### **Basic scientific and technological capacity is key to China’s innovation system**

On December 22, 2022, Hou Jianguo, President of the Chinese Academy of Sciences (CAS), published a signed article in *People’s Daily* titled “Enhancing basic scientific and technological capacity—Studying and implementing the guiding principles of the 20th National Congress of the Communist Party of China.”

Basic scientific and technological capacity is the barometer of a country’s comprehensive scientific and technological strength, the cornerstone of its national innovation

system, and the strategic underpinning of its high-level scientific and technological self-reliance. Based on careful assessment of China's technological developments, President Xi emphasized the need to enhance basic scientific and technological capacity in his report to the 20th National Congress of the Communist Party of China. In the article, Hou Jianguo reaffirmed the strategic and fundamental importance of this task.

“Boosting basic scientific and technological capacity is a long-term and systematic endeavor,” wrote Hou. He called on Chinese scientists to follow the guidance of the report, make systematic, long-term, and continuous investment, and adopt a global mindset and forward-looking vision.

In terms of legal protection, Hou Jianguo called for more legislation and regulation to protect scien-

tific innovation and address emerging frontier fields such as artificial intelligence and biotech. He wrote that China would continue to protect intellectual property by introducing more incentive policies to promote respect for intellectual property rights and a punitive damages system for cases of infringement.

To build a high-level innovation organization system, Hou Jianguo suggested China “attract talent from all over the world through high-level innovation institutions, actively organize and participate in international science programs and big science projects, and deeply integrate into the global innovation network.”

(Source: people.com.cn)

## CAST holds 2023 Chinese New Year reception online for overseas Chinese science and technology groups



CAST representatives extending 2023 Chinese New Year greetings to overseas Chinese science and technology groups  
Photo credit: Official WeChat account of CAS

On January 16, 2023, CAST held a special online reception for overseas Chinese science and technology groups in celebration of the 2023 Chinese New Year. The participants also took the opportunity to discuss ways to advance future cooperation and common development.

The online reception was attended by 73 representatives of overseas Chinese science and technology groups, which come from 26 countries in Asia, Europe, North America, and Oceania. Many raised proposals to boost exchange and cooperation with CAST. CAST representatives expressed gratitude for the support received and pledged to make more efforts to serve overseas Chinese science and technology workers.

(Source: Official website of CAST)

## 20th China Hall of Science and Technology Forum discusses new developments in nuclear medicine



Q&A session of the 20th China Hall of Science and Technology Forum  
Photo credit: Official website of CAST

On January 14, 2023, the 20th China Hall of Science and Technology Forum was held in Beijing under the theme “New Advances in Nuclear Medicine—Prospect of Cancer Diagnosis and Treatment”. The forum was organized by CAST in partnership with other organizations.

Zhan Wenlong, member and former Vice President of the Chinese Academy of Sciences (CAS), made

a special report titled “Precision Radiotherapy Based on Advanced Accelerators.” He introduced the basic principles and key physical and biological properties of precision radiotherapy and expounded on why he believed ion beam therapy and targeted radionuclide therapy hold promise of better treatment of human cancer. He also provided advice to develop China’s nuclear medicine.

In the Q&A session, participants held an in-depth discussion on a wide range of relevant topics, including the precision rate of radiotherapy on cancer cells, the interplay between radiation, chemotherapy, and nuclear medicine diagnosis and treatment, the acceptance of nuclear medicine by cancer patients in clinical treatment, the effectiveness and the pricing trends of nuclear medicine diagnosis and treatment for specific tumors.

(Source: Official website of CAST)

## CAST launches special action plan to help seniors cross the digital divide



China's rapidly aging population will cross 400 million by 2035 as it enters the phase of "severe aging," according to a forecast from China's National Health Commission. This would bring formidable challenges to the country's provision of public services and sustainable development of its social security system.

The China Association for Science and Technology (CAST) recently joined hands with the Bank of China and telecom operator China Unicom to launch a special action plan to help seniors cross the digital divide in everyday life.

The campaign seeks to help older adults become more tech-savvy and able to use digital applications for daily commuting, medical services, banking, shopping, and dining. It aims to build a basic multi-tiered nationwide service system for the elderly by 2025, raise their science literacy, and help them recognize and avoid financial and cyber scams.

(Sources: people.com.cn, official website of CAST, and chinanews.com.cn)

## Local Events

### 2022 China Future Factory Conference and 4th Yangtze River Delta Digital Economy Conference held in Hangzhou

On December 27, 2022, the 2022 China Future Factory Conference and the 4th Yangtze River Delta Digital Economy Conference were held in Hangzhou, Zhejiang Province. Themed "integrating digital and real economy and manufacturing for future," the conferences discussed opportunities unleashed by the digital revolution and business strategies to achieve digital integration and high-quality development.

The "Future Factory" is a smart manufacturing model first proposed by Zhejiang Province to apply smart manufacturing to traditional manufacturing. It was designed to provide clear directions and means to

transform, upgrade and digitalize traditional manufacturing.



2022 China Future Factory Conference and 4th Yangtze River Delta Digital Economy Conference

Photo credit: Official website of the Zhejiang Association for Science and Technology

## Alibaba Cloud shares solutions and practices in smart manufacturing

Xu Guojing, general manager of smart manufacturing, energy, and retail products for Alibaba Cloud, offered the digital factory, data middle platform, intelligent control and optimization, and procurement and supply chain solutions for closed loop manufacturing. He shared various use cases of intelligent manufacturing and digital twin technology and outlined his understanding and vision of future smart factories.

## China Computer Federation outlines paths for small and medium-sized enterprises to build the factory of the future

Xu Chi, deputy director of the Technical Committee of Industrial Control Computer of the China Computer Federation (CCF TCICC) and director of the Hangzhou Automation Institute of Technology,

said that various data management strategies will empower small and medium-sized enterprises to build future factories as well. He laid out an innovative three-phase path for small and medium-sized enterprises to evolve from a transparent factory to a smart factory and then to a future factory.

(Sources: Official website of the Zhejiang Association for Science and Technology, [cn.chinadaily.com.cn](http://cn.chinadaily.com.cn), and [xinhuanet.com](http://xinhuanet.com))

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## Academic Exchange

### Symposium on Frontier Technologies of Virtual Reality 2022

On December 24, 2022, the Symposium on Frontier Technologies of Virtual Reality 2022 was held online. Hosted by the Virtual Reality Committee of the

Chinese Institute of Electronics (CIE), the symposium invited China's top young scientists to discuss the latest developments in the field.

## Microsoft Research Asia develops Virtual-Cube to facilitate an immersive conference experience



A PowerPoint slide explaining the design of VirtualCube  
Photo credit: Official Bilibili account of the Chinese Institute of Electronics

At the symposium, Microsoft Research Asia introduced VirtualCube, a 3D conference system that enables an experience so immersive that remote participants can establish eye contact as if they were in the same room.

To overcome the limitations of conventional technologies, researcher Zhang Yizhong developed V-Cube View and V-Cube Assembly, two new algorithms that automatically capture gestures and eye changes of participants and render them in real time to form high-fidelity images. The technology provides people a more authentic experience in a virtual conferencing environment.

The V-Cube View algorithm, which is based on deep

learning, can synthesize images from RGBD data acquired by the six cameras mounted in VirtualCube while the V-Cube Assembly algorithm uses multi-view stereo to make more accurate depth estimations and provide real-time rendering of remote participants.

(Sources: Official website of the Chinese Institute of Electronics and Microsoft Research Asia)

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### *Recommended Case*

## International Competition of Autonomous Running Robots as a platform to engage young professionals and accelerate industrial applications

Since 2019, the Beijing Association for Science and Technology has worked with the Beijing Institute of Electronics



and the School of Integrated Circuits of Tsinghua University to host the International Competition of Autonomous Running Robots. The competition, now in its fourth year, promotes usage of autonomous intelligent robots in research and education, facilitates the integrated development of chip technology and robot technology, and fosters the growth of young professionals in the field. It has achieved big success in several realms:

#### 1. Finding and developing top AI and robotics talent

Since the first International Competition of Autonomous Running Robots, winning teams have been awarded opportunities to develop their professional career by presenting their papers at conferences hosted by the Institute of Electrical and Electronics Engineers (IEEE) and holding direct dialogue with established experts in the field.

#### 2. Accelerating industrial application of winning solutions

The competition's topics are proposed by industrial partners. The 2022 competition, for instance, challenged contestants to quickly and accurately use algorithms to identify the inflection points of welding seams in an authentic laser welding task.

#### 3. Launching remote labs for autonomous intelligent robot chip application

The competition brought the world's top talent together in online labs and promoted integration of artificial intelligence robotics technology and chip technology.

#### 4. Recognition from organizations and experts in the field

The competition continued to draw contestants from around the world to compete online despite the COVID-19 pandemic and has received congratulatory video messages from universities and institutions around the world.

(Sources: *Selected cases on CAST international cooperation and exchange for the 13th Five-Year Plan*, people.com.cn, official website of Beijing Association for Science and Technology and running-robot.net)

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Official website: <http://en.bast.net.cn/>

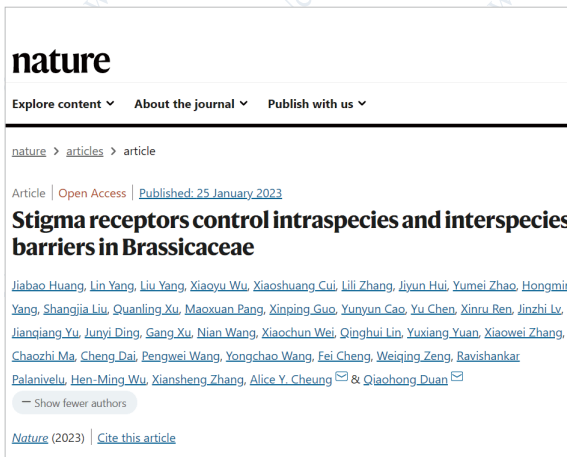


Photo credit: Official website of Beijing Association for Science and Technology

## Explainer

### Chinese scientists discover stigma receptors that can control intraspecies and interspecies barriers in Brassicaceae

A Chinese research team recently discovered the molecular mechanisms used by Brassicaceae crops to maintain interspecific reproductive isolation. They also developed a new way to achieve their distant breeding. The research, led by Professor Duan Qiaohong from Shandong Agricultural University, was published on January 25, 2023, in the prestigious academic journal *Nature*.



The screenshot shows the top portion of a Nature article page. At the top left is the 'nature' logo. Below it are navigation links: 'Explore content', 'About the journal', and 'Publish with us'. A breadcrumb trail reads 'nature > articles > article'. The article title is 'Stigma receptors control intraspecies and interspecies barriers in Brassicaceae', published on 25 January 2023. The authors listed are Jiabao Huang, Lin Yang, Liu Yang, Xiaoyu Wu, Xiaoshuang Cui, Lili Zhang, Jiyun Hui, Yumei Zhao, Hongmin Yang, Shangjia Liu, Quanling Xu, Maoxuan Pang, Xinqing Guo, Yunyun Cao, Yu Chen, Xinru Ren, Jinzhi Lv, Jiangjiang Yu, Junyi Ding, Gang Xu, Nian Wang, Xiaochun Wei, Qinghui Lin, Yuxiang Yuan, Xiaowei Zhang, Chaozhi Ma, Cheng Dai, Pengwei Wang, Yongchao Wang, Fei Cheng, Weiqing Zeng, Ravishankar Palanivelu, Hen-Ming Wu, Xiansheng Zhang, Alice Y. Cheung, and Qiaohong Duan. There is a 'Show fewer authors' button and a 'Cite this article' link.

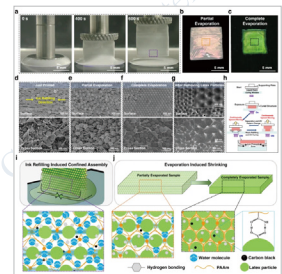
Screenshot of Professor Duan Qiaohong's article published in *Nature*  
Photo credit: Xinhua News Agency

The team first reviewed extensively the theoretical basis of self-incompatibility in flowering plants. They demonstrated empirically how self-incompatibility pollens can trigger reactive oxygen species at the stigma of Brassicaceae crops to restrain inbreeding. They also explored to what extent breaking their stigmatic barrier might promote interspecific and intergeneric

fertilization in distant breeding of cruciferous crops.

(Source: gmw.cn)

### Chinese scientists use 3D structural color printing to make photonic crystals



Diagrams illustrating mechanisms of 3D structural color printing  
Photo credit: Official website of the journal *Nature*

A team of Chinese scientists recently employed the continuous digital light processing (DLP) 3D printing strategy to make 3D photonic crystals (PCs) with unique optical properties. The team, led by researcher Song Yanlin and associate researcher Wu Lei from the Key Laboratory of Green Printing at the Institute of Chemistry of

the Chinese Academy of Sciences, published their research in the journal *Nature Communications*.

This method can successfully print complex high-fidelity and high-pre-

cision photonic crystal structures with desired single or multi-structural colors and smooth inner and outer surfaces, minimize optical loss, and enhance color and pattern selectivity. It will

innovate development of structural color and has shown great potential in the application of optical device preparation.

(Source: *Science and Technology Daily*)

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CAST is the largest non-governmental organization of scientific and technological professionals in the world. Through its 211 member societies and local branches all over the country, CAST maintains close ties with millions of Chinese scientists, engineers, and other professionals working in fields of science and technology.

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