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WEEKLY EDITION

## China's Lunar Exploration Enters Phase-4: International Lunar Research Station Built by 2035

By Staff Reporters

Approved at the end of 2021, the fourth phase of China's lunar exploration program included launching Chang'e-6, Chang'e-7 and Chang'e-8 missions by 2030, according to Wu Weiren, chief designer of China's lunar exploration program.

Phase-4 missions are planned to land on the south pole of the moon, after which a basic lunar research station will be established. "This is the main goal of the entire Phase-4 missions," said Wu.

The three missions have their own tasks. Chang'e-6 is expected to collect lunar samples and return them to the Earth, whereas Chang'e-7 plans to conduct field reconnaissance for water ice, climate and landform. Scientists hope that water ice can be detected on the lunar south pole, which is another crucial aim of the missions. On the other hand, Chang'e-8 is to determine how to make use of the resources on the south pole of the moon. Wu said that all the exploration

will lay a foundation for long-term work on the moon in the future.

On the lunar south pole, there are deep craters in which there could be water. The water could exist in the form of water ice, as the craters are not exposed to sunlight being located at a depth of 10 kilometers. "If water can be found, I think the research station at the lunar south pole could be run for a long time," said Wu.

Preparing for the construction of the International Lunar Research Station (ILRS) is also to be carried out, starting with the basic research station. According to Wu, China aims to complete construction of the ILRS by 2035. He also assumes that there could be coordinated operations of multiple rovers, landers and small flying equipment on the surface of the moon under the command of a control center.

Many countries and international organizations have demonstrated their willingness to be involved in the ILRS, said Wu, adding that the ILRS hopes to act as a transfer in the foreseeable future.

## More COVID-19 Antigen Self-test Kits Approved

By Staff Reporters

The National Medical Products Administration (NMPA) of China approved 17 varieties of COVID-19 antigen self-test kits by March 18, enabling those who need to test to do so in just 15 minutes.

Antigen tests detect the novel coronavirus by identifying the protein shell. The antibody on the test paper sets out to look for the shell and reveals the virus after combining specificity. The nucleic acid test, on the other hand, breaks the virus, extracts the nucleic acid and conducts amplification, which takes more time.

Comparing the two test methods, the antigen test can be widely applied and is easy to conduct with high efficiency and low cost, which could greatly ease the burden of medical staff and institutions, said Huang Ailong, professor at Chongqing Medical University.

Not requiring any medical instrument or facility, antigen tests can be conducted by a single person at home, providing maximum convenience. In addition, home testing can also prevent

people from cross infection when they gather to queue up for nucleic acid tests.

Convenient as it is, the antigen test shows a lower accuracy rate than nucleic acid tests, which is still needed to confirm the diagnosis of COVID-19, according to the National Health Commission. However, antigen tests can still be used to detect COVID-19 in most patients when there is a heavy concentration of the virus.

Antigen tests can therefore be used as a supplementary approach for the detection of the virus, especially when the pandemic is spreading swiftly over a short period of time. With the fast and convenient antigen test, less transmission can be realized with early detection of the infected.

Jilin province, which has recently been hit by a large wave of infections, distributed millions of antigen self-test kits to its residents, aiming to accelerate large scale screening.

The antigen self-test kits can be purchased both online and offline (*see concerned article on page 4*).



The "Deep Sea No.1" energy station at the Lingshui 17-2 gas field off south China's island province of Hainan. (PHOTO: XINHUA)

## Editor's Pick

### Exploring Energy Supplies and Secrets Far Beneath the Sea

By LU Zijian

The natural gas generated by Deep Sea No.1, China's first self-operated, 1500-meter, ultra-deep-water gas field, reached more than one billion cubic meters recently after the gas field was put into operation last June. Despite being a late comer in exploration for petroleum and natural gas in deep water, China has managed a quick catch up.

#### Deep water drilling and exploration

The deep water zone usually refers to water deeper than 300m, and ultra-deep water zone deeper than 1500m. More than 70 percent of the global petroleum and natural gas reserves lie under the sea, and around 40 percent of the reserves are in deep water, which makes deep water drilling and exploration extremely important.

Located 150km to the southeast of Sanya, Hainan province, Deep Sea No.1 is expected to hold an energy reserve of more than 100 billion cubic meters. However, because the gas field is in such

deep water, the process of exploration and extraction faces many challenges.

Deep Sea No.1 is also the world's first 100,000-ton class deep water semi-submersible platform for producing and storing petroleum and natural gas. With self-developed technologies for the past 20 years, China overcame three major technical problems, namely deep water, high temperature and high pressure in petroleum and natural gas exploration.

Now, it takes only one day for the natural gas to be extracted from the 1500m-deep water and sent to households, and the gas field is able to deliver three billion cubic meters of natural gas per year to south China's Guangdong and Hainan provinces and Hong Kong.

With its system of technologies for such exploration, China has now become one of the few countries that are able to independently explore petroleum and natural gas in deep water.

#### Deep-sea diving

Apart from extracting fossil fuels from the sea, people also go deeper to

explore the mysteries of the Earth, since oceans deeper than 2,000 meters cover 60 percent of the planet. It was through manned deep diving that China discovered polymetallic nodules on the seamount, the ancient hydrothermal district and cold water coral forests in the South China Sea.

In 1986, the country's first manned submersible was developed, only able to dive to a depth of 300 meters. More than 20 years later, the self-designed Jiaolong came into being in 2012, successfully diving as deep as 7,062 meters.

On November 10, 2020, the domestically-developed Fendouzhe dived in the Mariana Trench in the Western Pacific, reaching 10,909 meters, setting a new record for China's manned deep-sea diving. This means that China leads the world in the field of large-depth manned deep-sea diving.

The country has also had much progress in unmanned submersibles for deep-sea diving.

*See page 2*

## International Cooperation

### RCEP Effective in Malaysia

By Staff Reporters

The Regional Comprehensive Economic Partnership (RCEP), the world's largest free trade agreement, came into effect in Malaysia on March 18. Within ASEAN, Malaysia is expected to be the largest beneficiary of the agreement in terms of exports, with a projected 200 million USD increase, according to Malaysia's Ministry of International Trade and Industry (MITI). Meanwhile, China-Malaysia economic relations will be greatly promoted.

According to the agreement, 67.9 percent of Malaysian goods receive instant zero tariff when exported to China whereas 69.9 percent vice versa. Both countries added new market entry promises on the basis of China-ASEAN free

trade zone, such as mechanical equipment and parts from China to Malaysia, and chemical and paper products from Malaysia to China.

Based on data from the MITI, China has remained Malaysia's largest trading partner for 13 consecutive years, and the trade volume between the two countries accounted for 18.9 percent of Malaysia's total trade volume in 2021, increasing by 20.7 percent compared with that of 2020.

The MITI said that RCEP represents a significant milestone in the vibrant growth and revitalization of economies, adding that "RCEP would spark the creation of new regional supply chains apart from strengthening existing networks, thereby boosting the growth of domestic businesses as they immerse in to the global trading ecosystem."

RCEP has 15 members, including 10 ASEAN members and five free trade partners of ASEAN, namely China, Japan, South Korea, Australia and New Zealand, composing about one third of global GDP and population. The agreement has come into effect in 12 member states.

The agreement includes tariff reduction and exemption, trade convenience, service investment and intellectual property rights protection, and more than 90 percent of goods within the partnership will realize zero tariff gradually.

Taking effect on January 1, RCEP has already demonstrated its positive influence on trade within the partnership. Based on China's customs data, the total volume of import and export of China with RCEP partners reached 1.85 trillion RMB, increasing 9.5 percent year-on-year.

## Optimum Astro-observation Base Built on Qinghai-Tibet Plateau

By Staff Reporters

Nine optical astronomical telescope projects, with a total investment of nearly 2 billion RMB, have been settled in the Qinghai Lenghu astronomical observation base.

The base, located on Saishiteng Mountain, near Lenghu Town in Qinghai province, has proved to be a quality astronomical observatory site after three years of monitoring and testing by researchers from the National Astronomical Observatories of the Chinese Academy of Sciences (NAOC).

According to the research result published in the journal *Nature* in August 2021, the area of over 100,000 sq kms, with an extremely arid climate, unusually clear local sky (day and night) and very stable local surface air, could become one of the world's best observatory sites, as good as the existing sites in Hawaii and Chile.

In recent years, a number of astronomical telescope projects have been established in Lenghu area, said Tian Cairang, executive deputy director of the Lenghu Industrial Park Management Committee. *See page 4*

## WEEKLY REVIEW

### Guidelines Released to Strengthen Governance over Sci-tech Ethics

Ethics should be emphasized throughout the process of scientific research and technological development, according to the guidelines issued by the General Office of the Communist Party of China Central Committee and the General Office of the State Council recently.

### Second Space Class Delivered from China's Space Station

The second lecture from China's Tiangong space station was delivered on March 23, according to the China Manned Space Agency. The lecture, consists of diverse experiments, was given by the Shenzhou-13 astronauts Zhai Zhigang, Wang Yaping and Ye Guangfu.

### Yaogan-34 02 Remote Sensing Satellite Launched

A new remote sensing satellite of the Yaogan-34 series was sent into space from the Jiuquan Satellite Launch Center at 3:09 pm (BT) on March 17. It will be used for the survey of land resources, urban planning, crop yield estimation, and disaster prevention and reduction.

### Diverse Dinosaur Fauna Confirmed in Northeast China

Chinese and international scientists confirmed on March 16 the discovery of a diverse fauna that contains at least five dinosaur species more than 100 million years ago in Fuxin, northeast China's Liaoning. The finding was published in the journal *Cretaceous Research*.

WECHAT ACCOUNT E-PAPER



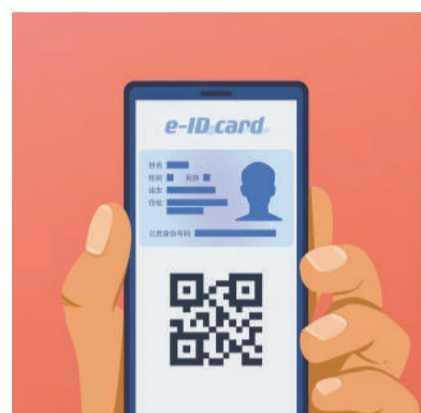
A staff at Zhongda Hospital Southeast University is taking the COVID-19 antigen test. (PHOTO: XINHUA)



# China to Introduce e-ID Cards Nationwide

By ZHONG Jianli

The Chinese government will introduce electronic national identity cards, or e-ID cards, across the country later this year, enabling better services for an increasing interprovincial population, according to Premier Li Keqiang.



(PHOTO: VCG)

Speaking at the annual briefing at the end of the National People's Congress in March, Li said currently some 100 million Chinese are in interprovincial migration. One aim of introducing e-ID cards is to better meet the basic living needs of this demographic.

"Some are elderly people, living away from their hometowns, with their children in cities. Some migrate for employment or education. They are facing many challenges of travel in getting certain things done. Hence, obtaining governmental services interprovincially has become a new constant demand among the people," said Li.

One of these government services this year is to make ID cards electronic, which helps people manage their lives better via a simple code-scan on their cell phones, according to Li.

The premier added that the government will also provide more convenience for people who do not use smart phones, especially the elderly, and will adopt measures to ensure information security and individuals' privacy.

China's Ministry of Public Security started a pilot trial of e-ID cards in 2018, allowing residents in major cities including Quzhou, Hangzhou, and Fuzhou to apply for e-ID cards. Currently, e-ID is accepted in more than 15 major cities in China, with more than six million people using it.

Residents can use facial recognition mechanisms to authenticate their e-ID cards, which are valid for banking, ticketing, hotel registration, and other services. In February this year, the General Office of the State Council issued a document to further expand the application of digital certifications and licenses, so as to bring more convenience to people's lives.

The document says the application of digital certifications and licenses should be linked to the national integrated government service platform and be streamlined so that they are recognized across the country.

The document also calls for accelerating the application of new technologies, such as big data, cloud computing, and artificial intelligence, so that electronic licenses can be more widely used. Different regions are encouraged to introduce the "one e-card for all" service, bringing more convenience to residents in traveling and domestic tourism.

Guo Xu, a human resource manager working in Tianjin, said digital cards make her daily life easier. "With an e-ID card, I don't have to bring my physical ID card or driving license with me any more. When I am stopped by traffic police, all I need is to show a digital code on my smartphone," she said.

## Policy Watch

### Commercializing Sci-tech Achievements Stimulates China's Innovation

By CHEN Chunyou

In chapter 3 of the revised *Law on Progress of Science and Technology*, among eight newly-revised articles, seven are related to the commercialization of sci-tech achievements, which clearly demonstrates its significance in promoting national sci-tech progress.

In fact, some articles in this chapter are extracted from chapter 2 of the old version of the law. Xiao Youdan, research fellow at the Institutes of Science and Development, Chinese Academy of Sciences, said that articles concerning applied research and commercialization of sci-tech achievements were placed in a separate chapter in this revised law, which fills the gap of legislation in the organization and guarantee for making technological breakthroughs.

*The significance of commercializing sci-tech achievements*

According to Zhang Yafeng, special research assistant at the School of Public Policy and Management, University of Chinese Academy of Sciences, the commercialization of sci-tech achievements is an effective channel to accelerate innovation-driven development.

Article 2 of the revised law stresses that China would implement the innovation-driven development strategy, whose core is to emphasize the strategic supporting role of sci-tech innovation in improving social productivity and comprehensive national strength. The realization of this role does not fully depend on the achievements in the laboratory, but depends on how the achievements translate from the laboratory to the market. This process is called commercialization of sci-tech achievements.

The commercialization is the key to meeting national strategic needs, noted Zhang. For example, supporting the realization of the goal of carbon peaking and carbon neutrality is clearly stated in article 3 of the revised law.

In order to achieve this goal, it is necessary to transform and upgrade traditional industries, optimize the industrial structure, and form a production mode, which is conducive to resource conservation and environmental protection. These can not be achieved without the commercialization, especially the green and low-carbon technology, said Zhang.

*Highlights of the revised law*

In article 31, it is stipulated that enterprises, research institutions, universities and related organizations are expected to set up R&D platforms, technological innovation alliance and innovation

union based on the market mechanism, which aims to advance R&D and improve the efficiency of the commercialization.

Zhang said that the establishment of the Beijing Xueyuan Road Clinical Collaborative Innovation Alliance is such an example, which was initiated by Peking University Third Hospital. The alliance provides a platform for the commercialization of medical achievements, and effectively promotes the increase of the number of patent transfers. Another example is the  $\pi$  Laboratory, co-founded by the Chinese Academy of Sciences and Huawei, with the aim of strengthening the links between enterprises and research institutes, and promoting the commercialization.

Article 38 of the revised law puts forward new requirements for the construction of the technology market, noting that the market should be unified, open and interconnected, and the competition in the market should be orderly.

Article 33 stipulates that China would advance the reform of the ownership of intellectual property rights and the mechanism for the distribution of rights and interests, and would explore ways to grant researchers the ownership or long-term right to use their research achievements. Zhang said this article laid a legal foundation for encouraging the commercialization.

In recent years, many universities and research institutes in China have formulated their policies to specify the reward share and incentive mechanism for commercialization, which has played a positive role in stimulating the vitality of commercialization, said Zhang.

For example, Peking University stipulates that holders of research achievements can receive 70 percent of the income from commercialization, and the University of Science and Technology Beijing stipulates that the holders of research achievements and those involved in the commercialization shall enjoy 90 percent of the commercialization income.

The sci-tech achievements produced by research institutes and universities have always been faced with a lot of difficulties in commercialization in China. In this revised law, article 30 stipulates that the research institutes and universities should strengthen the construction of technology transfer institutions and quality talent teams. Zhang said this will be conducive to promoting the commercialization through professional capacity building.

## Xiamen Gets Smart with Foreign Sci-tech Commissioners

By FU Xiaobo & CHEN Chunyou

On March 15, four foreign sci-tech commissioners from the Institute of Urban Environment, Chinese Academy of Sciences, were awarded sci-tech commissioners' certificates by the Xiamen Bureau of Science and Technology, making them official members of the city's commissioner team.

Since the introduction of foreign sci-tech commissioners to Xiamen in September 2019, about 150 foreign experts have been selected for this role, bringing international innovative ideas to local sci-tech innovation and promoting high-quality industrial development.

In recent years, Xiamen's sci-tech commissioners' range of services has expanded from agriculture to engineering, science and technology and ecology.

Xiamen plans to take advantage of the opportunity of establishing itself as a BRICS innovation base, carry out more international sci-tech exchanges and cooperation and create platforms for foreign experts to make their contributions to local enterprises' development, said Cao Weimin, vice director of the Xiamen Bureau of Science and Technology.

Franz Gatzweiler, a German researcher at the Institute of Urban Environment, is one of the four foreign sci-tech commissioners. He has been the executive director of the urban health and well-being program at the International Council of Scientific Unions, and has in-depth research in the areas of social ecosystems and institutional economics.

Gatzweiler hoped to introduce international advanced environmental technologies via an urban health and well-being program, to provide broader cooperation opportunities for enterprises in Xiamen.

Dr. Ricardo Llaguno is an Ecuadorian research assistant at the Institute of Urban Environment, and specializes in the research of the colloidal behaviour of nanoparticles. Before he was chosen as the sci-tech commissioner, he offered technical support in the area of extracellular vesicle for Xiamen's Lifeint Company.

According to Zhu Yongguan, director of the Institute of Urban Environment, foreign sci-tech commissioners are welcomed by local enterprises and research institutes. Xiamen has always attached great importance to high-end international experts and the industrialization of environmental technology.

Zhu said that the working mechanism of sci-tech commissioners provides sci-tech support for the innovation and development of enterprises, and he hopes to use this mechanism to introduce advanced ecological and environmental management technologies in the future.

## High-tech Industries Lead Growth in First 2 Months

By LI Linxu

China's economy beat expectations in the first two months of 2022, with high-tech industries leading the way.

"Overall, the momentum of January-February recovery remained relatively well," said National Bureau of Statistics (NBS) spokesman Fu Linghui, describing the growth "better than expected."

"Indeed, every data point has been rebounding, mainly because policy effects kicked in early this year," said Qu Qing, chief economist at Jianghai Securities.

Among the key indicators, industrial output rose 7.5 percent in January-February from a year earlier, the fastest pace since June 2021 and up from a 4.3 percent increase seen in December, according to NBS.

The high-tech manufacturing industries posted a stellar performance, jumping 14.4 percent year-on-year.

Specifically, the production of new-energy automobiles logged a marked increase of 150.5 percent, while that of industrial robots and solar cells grew by 29.6 percent and 26.4 percent year-on-year respectively.

Meanwhile, the investment in the high-tech industry grew by 34.4 percent year-on-year, significantly faster than

the overall fixed asset investment growth rate.

By category, the investment in high-tech manufacturing and high-tech services grew by 42.7 percent and 16.0 percent respectively.

"In January and February, the economy enjoyed good recovery momentum, though we must be aware that the external environment is still complex and severe, and China's economic development faces many risks and challenges," said Fu, adding that the country will deepen the reform and opening up, and promote high-quality development so as to maintain the economic operation within the appropriate range.



An industrial robot smart line, Changzhou city, Jiangsu province. (PHOTO: VCG)

## Becoming a Meteorological Powerhouse Through Innovation

By LI Linxu

Behind the smooth running of the Olympic Winter Games Beijing 2022, much credit must go to the precise meteorological services provided.

The 100-meter and minute-level operational weather forecast system employed at the Winter Olympics mirrors China's latest progress in meteorology science and technology.

And more exciting applications are on the way as the country strives to make key core sci-tech breakthroughs in meteorology.

According to a newly-released plan, China aims to become a meteorological powerhouse through sci-tech innovation.

The plan, titled *China's Meteorological Science and Technology Development Plan (2021-2035)*, details its goals and tasks for the country to develop its meteorological sci-tech undertakings in the following 20 years.

Sci-tech innovation is the first move

er for high-quality meteorological development, essential for accurate monitoring and precise forecasting, and a prerequisite for ensuring meteorology as the first line of defense for disaster prevention and mitigation, noted the plan.

By 2025, an open, solid, efficient, and robust meteorological sci-tech system is expected to be established.

By 2035, the overall strength will reach world advanced levels, making key core technology breakthroughs.

At that time China is expected to become a meteorological sci-tech innovation hub, with an improved original innovation capability.

To achieve these goals, the plan pledges to double and redouble its R&D efforts from the 2020 level by 2025 and 2035 respectively.

Nine key fields for R&D have been proposed, including meteorological observation technologies, data analysis technologies, weather and climate mechanisms, earth system models, digital

forecasting technologies, meteorological service technologies, weather modification theories and technologies, climate change and ecological meteorology, and AI meteorological technologies.

46 priorities have been identified, such as ground-based meteorological observation, fusion analysis of meteorological data, mechanism of extreme weather, space weather forecast, industrial meteorological service, mechanism of weather modification, climate change risk assessment, and meteorological talent cultivation.

China will actively participate in global meteorological science governance and build international brands in meteorological equipment, disciplines, and sci-tech platforms, said Zhuang Guotai, administrator of China Meteorological Administration (CMA).

The plan was jointly issued by CMA, the Ministry of Science and Technology, and Chinese Academy of Sciences on March 3.

## Exploring Energy Supplies and Secrets Far Beneath the Sea

From page 1

In October 2021, the Shenyang Institute of Automation, Chinese Academy of Sciences announced that the unmanned submersible Haidou-1 completed the world's first full-coverage acoustic cruise of the western depression of the Challenger Deep, which is the deepest region of the ocean at a depth of 10,908 meters.

*Underwater observation networks*

Haidou-1 worked for more than 10 hours continuously under the water at 10,000 meters. Despite reaching a world-leading level, ten hours is still not long enough to explore the secrets of the sea. Underwater networks for long term observation are essential for further ongoing exploration.

Since the 1990s, scientists have begun to put sensors on seabeds, connected the sensors with optical cables and transited information to the surface. The networks can conduct long-term monitoring free from the impact of typhoons

or earthquakes. Such networks can act as weather stations and laboratories, uplifting the capability of ocean observation.

An important application of an underwater observation network is to give warnings for earthquakes and tsunamis. Eighty five percent of volcanoes in the world are underwater. The facilities set up on seabeds could monitor the eruption of volcanoes in real time.

In 2005, China began to promote the construction of underwater observation networks. After 12 years, the national underwater observation network was authorized to be built, aiming to conduct comprehensive monitoring from seabed to sea surface in all weather, real time and in high definition.

Despite the work scientists have done, a great many questions about the sea or related to it remain unsolved. Deep-sea exploration will still be a crucial approach to help humans discover more secrets about nature and human life.



# Science Knows No Borders

Voice of the World

By QI Liming

The escalating tension between the U.S.-led Western alliance and Russia over the Ukraine conflict has threatened their cooperation in space programs.

However, no matter how the sanctions and counter-sanctions between the U.S. and Russia evolve, it is still necessary for the sci-tech communities from various countries to abandon their differences and work together to solve common problems facing humanity, such as climate change and space exploration.

**International cooperation in space remains active**

Shortly after its military action in Ukraine, Russia was sanctioned by U.S. and Western countries in all fields of high technologies. In retaliation, Russia has decided to stop supplying the U.S. with rocket engines. Some analysts are now concerned that space cooperation between the U.S. and Russia will face a complete suspension.

Yet, according to British newspaper *The Observer*, "Despite the challenges here on Earth — and they are substantial — NASA is committed to the seven astronauts and cosmonauts onboard the International Space Station (ISS)," NASA Administrator Bill Nelson said during a meeting with the NASA Advisory Council on March 1.

NASA had said it intended to continue cooperating with Russia on the ISS, which is currently occupied by four American astronauts, a German astronaut, and two Russian cosmonauts. The U.S. and Russia had been negotiating a deal to regularly transport Russian cosmonauts to the space station using SpaceX's Crew Dragon launch system. The same spacecraft has been used to fly American astronauts to the ISS every six months since 2020.

According to spacepolicyonline.com, the ISS crew is continuing its plans for the space program as arranged. In addition, Russian Space Agency, Roscos-



Last minute preparations for the launch of Antares rocket on Feb. 18, 2022 to deliver supplies to the International Space Station. (PHOTO: VCG)

mos, has assured that NASA's Mark Vande Hei, together with two Russian cosmonauts, is set to return to Earth on a Russian spacecraft on March 30, as scheduled.

**Academic perspective: a glimmer of hope in space cooperation**

On February 19, 2022, an Antares rocket took off with the Cygnus cargo capsule to resupply the orbiting ISS currently crewed by American, Russian and German astronauts.

The rocket is partly Ukrainian-built and partly American-built, and powered by engines made in Russia. The Cygnus cargo capsule is manufactured with components from all over Europe.

As Kuan-Wei (David) Chen, the Executive Director of the McGill Centre for Research in Air and Space Law, and professor Ram S. Jakhu, acting Director of Institute of Air and Space Law, McGill University said on the media platform Earthsky, "Like many space missions, this one shows that countries can come together and co-operate to accomplish great advancements in the exploration and use of outer space."

"Despite the ongoing military action against Ukraine, there is still a glimmer of hope that cooperation will persist in space," the two academics said. Regardless of the strained relations and sanctions, Roscosmos continues to work with its counterparts in the operation of ISS.

For more than 65 years of space exploration, Russian cosmonauts have flown on American spacecraft, while astronauts from the U.S. and other countries have relied on Russian spacecraft to access space. There is no indication that this mutually beneficial relationship will cease.

Indeed, space cooperation has been an enduring hallmark of how countries can come together despite political differences and disagreements.

Considering the growing need to promote multilateralism and international cooperation, it is hoped that tensions will subside and international peace can be brokered, on Earth as well as in space.

**Astronauts: sharing a common goal to explore and learn**

As former astronaut Scott Kelly told

ABC News in March, "When you're in space and you're flying around the Earth at 17,500 miles an hour and in a very hazardous environment, cooperation is the most important thing."

Kelly said the ISS is an example of where peace is possible because all astronauts share a common goal: to explore and learn.

"I just hope people realize and want to keep this partnership together, because it is one of the few things that unites all of humanity," said Kelly. "I think one of the biggest successes of the ISS is the international aspect of giving us something to work on together, that makes us friends."

According to spacepolicyonline.com, the ISS is a scientific research facility and a lot of experiments have been conducted there, but none that have resulted in a "killer app" with obvious benefits to people on the Earth.

Instead, the ISS wins praise as an engineering marvel and a model of international cooperation. On the latter, supporters argue it is worthy of a Nobel Peace Prize.

## Comment

# 6G Cannot be Developed in Isolation

By Staff Reporters

6G is widely predicted to be commercially available around 2030. China, the U.S., Japan, and European countries have already released their 6G development plans in quick succession. Meanwhile, experts in the field of communication agree that cooperation and sharing are vital for the development of 6G.

**Future expectations of 6G**

At present, 6G development plans released by the countries concerned, have elicited a wide range of opinions. One reason for this is that the currently proposed visions and candidate technologies include the wish list of several future generations, said Bi Qi, Chairman of the Global 6G Conference Program Committee and Chief Expert of China Telecom. He summarized these visions as moving in eight directions including: instant and fast, flexible and open, green and affordable, secure and trustworthy, simple and integrated, holographic and multidimensional, ubiquitous beyond 2D, as well as intelligent by design.

Wu Jiangxing, an academician of the Chinese Academy of Engineering, said that 6G will be an important supporting technology for smart network infrastructure beyond 2030, and a new paradigm that supports multi-objective sustainable and collaborative development should be opened up for 6G. He pointed out that research teams in China, Japan, the U.S. and the European Union have already put great efforts into 6G R&D. All of these countries have all emphasized the necessity to consider the simultaneous improvement and optimization of multiple objectives such as communication, security, energy consumption, service, and efficiency.

**Technology is ahead of demand**

6G is moving forward at a steady pace from demand to standards, while the world has just started the commercialization of 5G networks. This begs the question: Is that appropriate for humans to develop 6G at present? The Institute of Electrical and Electronics Engineers (IEEE) fellow You Xiaohu, also the Chief

scientist at China's Purple Mountain Laboratories, noted that 6G is not inconsistent with the development of the existing 5G, although it is a new generation of mobile communication for the period after 2030. In fact, the development of the existing 5G is laying the foundation for the development of 6G. Studying 6G is actually for the purpose of driving the development of the existing 5G. "Demands may be lagging, but never absent," said Hong Wei, professor of School of Information Science and Technology at Southeast University. Hong's view is based on the development of wireless communications. "Sometimes the technology may lag behind the demand, but more often than that, the technology is ahead of the demand. We have faced the same problem when developing 3G, 4G and 5G."

**The world needs a globally unified 6G standard**

It's inevitable to establish a globally unified standard for 6G in light of the history of mobile communication. According to Hong, to achieve ubiquitous connectivity in the 6G era, we should put equal stress on both integrations of different industries and continuous evolution. For terrestrial mobile communication networks, 6G should be based on the technological evolution of 5G. For space-based satellite networks, all the countries in the world should strengthen cooperation to develop advanced protocol standards as well as protocol standards for integration with terrestrial networks as soon as possible.

Bi noted that countries around the world have begun to promote 6G-related technology and research. The Alliance for Telecommunications Industry Solutions (ATIS) has brought together dozens of global technology giants such as Qualcomm, Samsung, Ericsson and Apple to form the Next G Alliance. Chinese companies have not yet been invited to join. "The success of the mobile industry relies on the existence of the global ecosystem. Establishing a unified set of global standards is a prerequisite for the success of 6G," he said.

## Hi! Tech

# Self-driving Trucks, a Bonanza for Logistics

Edited by QI Liming

Defying all odds, the self-driving truck industry has mushroomed at a time when supply chains are strained and labor shortages loom, all against the backdrop of the COVID-19 pandemic.

A self-driving or autonomous truck could be programmed and tracked to drive itself and deliver cargo

from point A to point B. It is ideally suited for long, uninterrupted and uncomplicated routes.

Stable and predictable conditions are important because self-driving vehicles are driven by sensors and software. During the software development process, developers try to imagine every possible situation that the software must be able to handle, and then program for that.

What we've learned is that despite the advances of technology and the Internet of Things (IoT), some human intervention is still needed in the operation of autonomous vehicles. There are always technology constraints and unpredictable situations that software can't anticipate.

Snowstorms, for instance, impede the abilities of today's IoT sensors to capture data, and require human inter-

vention. Complex intersections in cities with a variety of traffic situations are also difficult for sensors and control software to decipher and navigate, not to mention the unpredictable element of human drivers and the decisions they make.

Thus, self-driving trucks may be a logistics bonanza, but being complete driverless on the road may still need further research.

# Humanoid Robot Coming to Reality

By YU Haoyuan

Inside China's Dalian EX Future and Science Museum, several bionic robots built with silicone skin are being exhibited to the public. These robots are so lifelike, and it is hard to believe they are not real.

The designers are planning to make more realistic humanoid robots. A clip released by CGTN shows that after a man has his face scanned on a computer, his robotic version can be printed out. What is most impressive is that this robot can almost imitate all the man's movements, including rolling his eyes or sticking his tongue out.

The robot is made of medical-grade bionic silicone, and the designers have considered every detail to make it more

human-like. You can see details like the goosebumps and veins on the robot's arms, and the palm lines on its hands. So far, the robot's company is setting up plans to let people customize their own robots in the museum.

This is not the first time the EX robots have been demonstrated to the public. "Albert Einstein" and a "Steve Jobs" versions have already shown what they are capable of at the 2021 World Robot Conference.

And besides being seen in the museum, they have also been used in reality. In November 2021, a female EX robot, "Jin Xiaopu," was employed to guide COVID-19 nucleic acid testing. Its novelty appearance during the pandemic not only relieved public tension, but also reduced the medical staffs' workload.



Workers in northwest China try to contain the moving sand dunes. (PHOTO: XINHUA)

# From Desert Sand to Fertile Land, the Glue Solution

By Staff Reporters

Chinese scientists have developed a kind of "glue" to improve the quality of desert sand, which can directly transform large areas of desert into fertile farmland.

Chinese scientists extracted a fiber bonding material from plants that could melt into the sand like glue. After putting the material into the sand and mixing it with water, the sand can become as sticky as soil, instead of being loose grains. This not only allows plants to take root, but also enables the sand to firmly lock in the water and avoids evaporation under the hot sun.

With no doubt that there are many other methods in the world that can

transform sand into soil, most research faces the same major problem, which is the cost. The cost of transforming one hectare of land often runs into the hundreds of thousands of dollars, which even a rich country like Saudi Arabia can't afford.

However, the cost of using this glue to improve the sand quality, is minimal and the transformation could be permanent. Thus it is very suitable for a worldwide promotion. Moreover, this plant glue can both maintain the characteristics of soil permeability and will not pollute the environment, so the transformed desert can be used not only for planting trees, but also as agricultural land, for planting cash crops like watermelon.



Several humanoid robots are exhibited in Dalian EX Future and Science Museum. (PHOTO: EXROBOTS OFFICIAL WEBSITE)



## Science as a Bridge to Benefit Global Well-being

By LONG Yun & BI Weizi

Martin Banwell, a world-renowned Australian scientist, amassed a lengthy list of honors during his academic career in the field of organic chemistry. He became a fellow of the Australian Academy of Science in 2004 and joined Jinan University (JNU) as a full-time professor at the end of 2019, before being appointed the first dean of the Institute of Advanced and Applied Chemistry Synthesis (IAACS).

Professor Banwell was presented with the 2021 Chinese Government's Friendship Award in recognition of his significant contributions to China's modernization and cooperation with other countries.

**Competitive academic environment**  
Banwell described China's academic environment as being dynamic, competitive and stimulating. China's support of a broad range of scientific research, coupled with a sizable chemical industry, went a long way to convince him to further his academic research in the country.

"I feel as though China is a major focal point of research in chemistry in the world these days," he said. He is appreciative of the opportunities JNU has provided him and said, "The combination of all these possibilities makes life attractive here." He also praised his colleagues at JNU for laying the groundwork for his research work.

In addition, Banwell noted that China is becoming more concerned with using the powerful tools of organic chemistry to tackle with global warming and other major environmental issues.

He emphasized the critical role of green chemistry in fostering an economically and environmentally sustainable future. In terms of commercializing scientific discoveries in the chemistry field, Banwell noted that Guangdong province benefits from its strong chemical industry and the strong emphasis placed on translating interesting research results in the laboratory into commercial products.

He also noted that failure is actually part of the landscape progress. "We should always prepare to encounter failures and interpret or exploit them properly so that we eventually achieve our goals," he said, adding that the most crucial ingredients for translating university achievements into commercial products and processes are funding (for research) and perseverance.

"China has numerous successful examples and astounding accomplishments in research and innovation," he said, sounding distinctly optimistic about China's innovation ecosystem.

Banwell believes that the IAACS has a long-term role to play by continuing to develop its ongoing research program and so addressing all sorts of interesting new problems (and opportunities) emerging in an increasingly complex world. According to him, research is an ongoing and never-ending mission.

**Cooperation to make a difference**  
Despite the current geopolitical complexities and the challenges presented by COVID-19, Banwell says there will always be fundamental value in international scientific exchanges because this can promote global well-being, emphasizing that, "Scientific knowledge is like water, it flows everywhere." Based on his experience, concerted efforts are essential for increasing the body of knowledge and identifying important discoveries going forward.



Professor Martin Banwell. (COURTESY PHOTO)

According to Banwell, the IAACS maintains active contact with research groups in Australia, Brazil, France, the U.S. and U.K. "We hope that outstanding experts in chemistry from other countries will visit China in the not-too-distant future and so enhancing already fruitful academic exchanges. Their work on drug development and green chemistry complements ours extremely well," he said, clearly pushing the need for cooperation.

Banwell anticipated that joint actions and "chemistry" with international peers would result in exciting new discoveries and developments, noting that international exchanges are critical while also expressing hope they continue to thrive.

He applauded China's readiness to welcome increasing numbers of foreign experts to conduct research as well as advance technological development and so resulting in the generation of greater global research resources. Creating win-win arrangements between China and the rest of the world must be the approach that is adopted.

As to the sci-tech collaboration between China and Australia, he said, "I think science is an excellent way of building bridges between China and Australia. I think there are numerous possibilities in that respect, and I am hoping to play a role as a bridge between the two countries with the advantage of knowing both well".

Banwell is also looking forward to resuming international travel in order to conduct more in-depth and face-to-face communications among sci-tech professionals.

## Letter to the Editor

### Education That Inspires Generations

By Hasmik Hakobyan

As a goodwill ambassador, I practice cultural diplomacy, revealing to the world "the souls of the nations" I closely relate to.

When trying to show China's might as an emerging superpower not only in economic processes but also in modern educational practices, it is impossible to look at the history of China without admiration.

There are so many examples of bravery and determination throughout its long history to offer to the world. Many powerful civilizations of the past are extinct, but China continues to thrive and blossom in the new world. What often goes unnoticed is that a major part of China's powerful history is its education.

The great educator Confucius left the major legacy of education in China and the teachers who came after him tried to hold high the torch of learning. Few civilizations of the ancient world had any scholastic or historical figure comparable to Confucius, and his teachings are in the hearts and minds of not only Chinese people, but also a lot of educators who have emerged to teach across East and West cultural paradigms.

China's formal education system is the oldest in the world, established nearly two millennia ago. From being reserved for the aristocracy, to the table of an individual learner, education in China went through enormous transformation. This transformation played an important role in the economic efficiency and social consistency of the country. It was with this determination that the Chinese government kept gearing China to maintain its academic and educational excellence during the darkest hours and wars. Thanks to the efforts of the CPC, the country's literacy rate increased in the mid-50s of the last century and educational reforms became the target focus of the government's trend and priorities.

No nation in the world has emphasized education the way China does. The policy of providing modern education upon a national basis was adopted a few years ago. Many language schools, along with technical and professional schools, have been established across various provinces. The Chinese International Education Foundation, which officially oversees Confucius Institutes, has also started an educational and cultural promotion program. Since 2004 the Confucius Institutes have been promoting and teaching Chinese culture and language in dozens of countries throughout six continents. From holding

Chinese proficiency tests (HSK Examination) to teachers' training, hosting cultural and artistic presentations, the institute provides information about contemporary China.

In a globalized world, China opened its arms, offering various degree and exchange programs to encourage studies in China. In recent years, close to half a million foreign students study in China at almost 1,000 universities annually. Across China 274 universities are offering scholarships for international students on an annual basis. What a great way to support local Chinese teaching internationally, introduce Chinese language and culture and facilitate cultural exchanges.

China is not only moving into a period of significant transition, but is also setting an example for the countries to examine, learn, and adopt. It went ahead by nationalizing this strategy and forming a national-level response to recruiting and sustaining foreign talent. In January 2020, during the educational symposium in Beijing, Premier Li Keqiang urged developing mechanisms to attract foreign talent with families to move to China. This strategy is extremely beneficial for offering sustainability and educational opportunities to foreign families with children, planning their work and life in China.

In the recent past, China's importance has been increasing in the world's economic and technological landscapes. In this interconnected world, Chinese modern education is becoming more internationalized in promoting cultural awareness on multilateral levels and becoming the cornerstone of World Intercultural Dialogue.

*Dr. Hasmik Hakobyan is founder of the Teachers' Professional Developments Center (TPDC) and teacher at the international department of Chongqing No. 8 Educational School Group.*



Dr. Hasmik Hakobyan. (COURTESY PHOTO)

## FAQs about Antigen Self-testing for COVID-19

### Service Info

By Staff Reporters

As of March 18th, 2022, China's National Medical Products Administration has approved 17 COVID-19 antigen self-testing products as a supplement to the standard nucleic acid testing to help fight the spread of the virus. Here is some important information about the newly approved COVID-19 antigen self-testing.

**Q: Can antigen self-testing replace nucleic acid testing?**

A: The nucleic acid test result is still

essential to confirm novel coronavirus infection. Antigen testing uses the principle of immunology and can complete virus detection in a non-laboratory environment quickly. It is an effective supplement to nucleic acid testing but can not be a replacement. (See the article on page 1)

**Q: Who can use COVID-19 antigen self-testing kits?**

A: There are three groups of people who can use the antigen test kits:

Individuals visiting local clinics within five days of having respiratory symptoms or fever.

Those who are under quarantine. And residents who want to take the

test.  
**Q: Where do you get the self-test kits?**

A: Community residents can buy self-test kits from retail drugstores and online sales channels.

For people under quarantine, administrative authorities organizing the quarantine, such as communities, villages and quarantine sites, are responsible for purchasing, distributing and managing the self-test kits.

**Q: What are the procedures for self-testing?**

A: The COVID-19 antigen self-testing generally uses nasal swab samples. Read and follow the instructions for use. Here is a quick guide.

**Before taking the test:**  
You should wash your hands with water or sanitizer thoroughly.

Read the instructions. Check the expiration date of the kit and the contents included in your kit.

Ensure the environment is suitable for performing the test. Please be aware that exposure to extreme hot or cold temperatures and humid environments may affect self-testing accuracy.

**Sample taking:**  
Blow your nose with the tissue before collecting the samples. Take the nasal swab out from its container and avoid touching the tip of the swab with your hands.

Insert the swab about 1-1.5 centimeters into one nostril while keeping your head slightly tilted. Rotate the swab in-

side the nostril wall at least four times and for no less than 15 seconds. Repeat the same process in the other nostril.

People aged 14 or older can take their own nasal samples. For children aged 2-14, the sample should be done by adults.

**After sample-taking:**  
Place the nasal swab in the sampling tube immediately after taking the sample. The swab head should be rotated and mixed evenly in the preservation solution for at least 30 seconds. Squeeze the swab head through the outer wall of the sampling tube at least five times.

Press the cap tightly onto the tube to avoid any leaks.

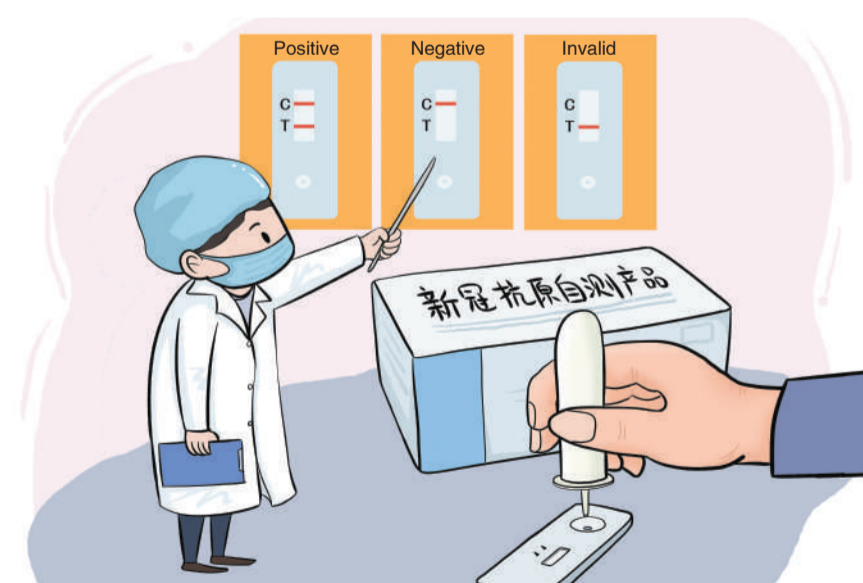
Test the swab samples and wait for the results according to the instructions.

**Q: How to read the results?**  
A: **Positive result:**  
Two lines appear. One colored line should be in the control line region (called C-line), and another colored line should be in the test line region (called T-line).

**Negative result:**  
Only C-line appears in red or purple.

**Invalid result:**  
C-line does not appear in any color.

**Q: What to do after testing positive from an antigen test?**  
A: People who have positive antigen test results should contact local authorities immediately, regardless of whether they have respiratory symptoms or a fever. They will be taken to specific medical facilities for nucleic acid testing. (Source: CCTV)



China's National Medical Products Administration has approved 17 COVID-19 antigen self-testing products. (PHOTO: VCG)

## Optimum Astro-observation Base Built on Qinghai-Tibet Plateau

From page 1

Among them, the 50BiN telescope project developed by China West Normal University was officially put into use in December 2020.

Four projects, including the Stellar Observations Network Group (SONG) de-

veloped by the NAOC and the multi-application survey telescope array (MASTA) by the Purple Mountain Observatory, have completed their main body construction.

The University of Science and Technology of China is building a 2.5-meter-diameter telescope in the area, and it is

set to complete installation and begin operation in 2023, said project leader Zhu Qingfeng.

This year, the construction of Nanjing University's Time Domain Observatory (TiDO) and Tsinghua University's Multiplexed Survey Telescope kicked

off. The latter, with a diameter of 6.5 m, is the largest in the base.

The construction of the Lenghu astronomical observation base provides very good opportunities for the development of optical astronomy, planetary science and deep space explorations, as well as bridge the longitudinal gap between the known best sites (all in the Western Hemisphere), according to Deng Licai, researcher from the NAOC.

## Traditional Eastern Wisdom

### First Chinese Doctor Discovering Scarlet Fever

By Staff Reporters

Ye Tianshi (1666-1745) was a well-known medical practitioner in the Qing Dynasty, and the first person who discovered scarlet fever in China.

During his lifetime, Ye was so busy treating patients that he had no time for writing. As a consequence, most medical works attributed to him were actually compiled by his disciples and descendants, including *Wen Re Lun (Treatise on Warm and Heat Pathogens)*, and *Lin Zheng Zhi Nan Yi An (Guide to Clinical Practice Based on Medical Case Records)*.

Ye posited that warm diseases develop and transmit through four stages, namely wei (defensive phase), qi (qi-phase), ying (nutrient-phase), and xue (blood-phase). The characteristics of wei

are fever, sensitivity to cold, headache, and rapid pulse. Next qi is the phase of most active disease, characterized by high fever, sweating, dry mouth, and rapid pulse. Ying is characterized by rising fever at night, confusion, and weak pulse. Finally, xue consists of agitation, rash, and in some cases vomiting of blood or blood in the stool or urine.

Ye Tianshi's influence on the development of Chinese medicine extended to almost all areas of practice, from theory to treatment, from diagnosis to formula formation. He proposed new methods in tongue and pulse diagnosis, and many of the key formulas for treating warm diseases were derived from his case records. Yin Qiao San (gold silver flower and forsythia powder) and San Ren Tang (San Ren Decoction) are just a few widely known examples.