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**CHINA SCIENCE AND TECHNOLOGY**

# **NEWSLETTER**

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**SPECIAL ISSUES**

## **More Infrastructures for Biopharmaceuticals**

China has made since 1994 noticeable accomplishments in the area of biopharmaceuticals, by establishing 15 national engineering and research centers for the purpose, with a population of some 1200 people. These centers have been assigned with 250 projects at the provincial/ministerial level or above, and produced more than 200 papers collected by SCI, and 84 domestic or international invention patents. They have won 41 prizes at the provincial/ministerial level or above. For example, China Biomedical Material Research Center was granted in 2007 with a second-place award of the National Natural Science Prize for its bone inducing base materials and products. The National Digital Medical

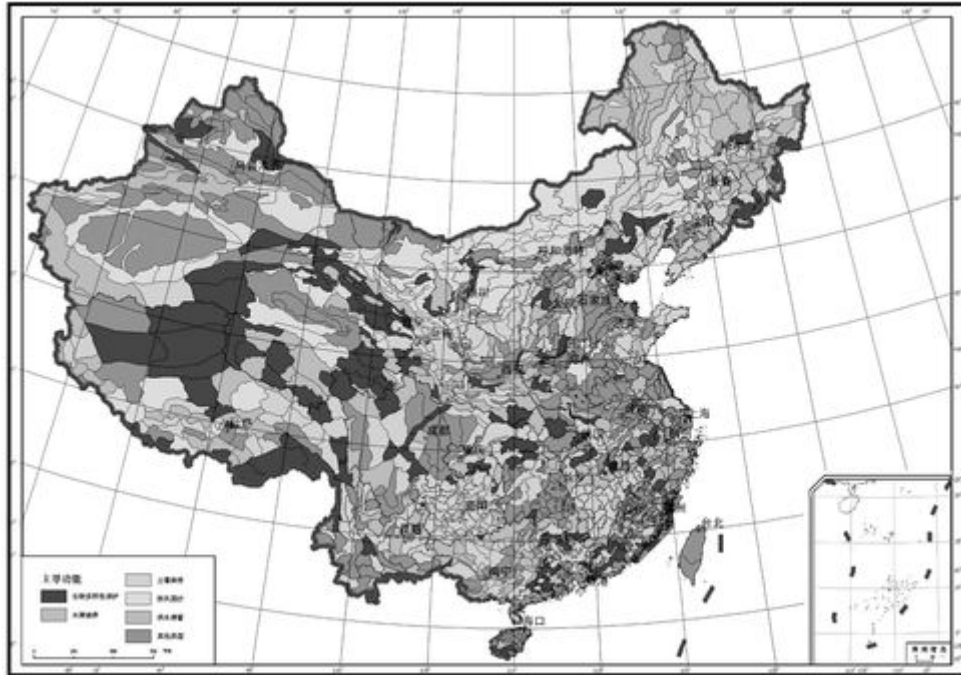
Imaging Equipment Center was honored with a second-place award of National S&T Advancement Prize for mastering the key technologies to make CT equipment. These R&D efforts have generated some 150 novel products, with direct or indirect economic benefits worth RMB 4 billion.

The National Infectious Diseases Diagnosing Agents and Vaccine Center has completed the both Phase I and Phase II clinical trials for recombinant hepatitis E vaccine with fine results. It also developed a quick test kit for highly pathogenic strain of bird flu, the first of its kind in the world.

The National Medical Diagnostic Instruments Research Center has developed seven core technologies for life sign monitoring, and associated commercial applications. These technologies have entered international markets, with both the CE certification and FDA approval. It also developed six core technologies for clinical examination. High precision sampling technique and high precision temperature regulating technology have been applied in full automatic biochemical products. It also produced six key technologies for digital supersonic imaging. These technologies have entered the international market. The supersonic products derived from the effort have generated an output worth RMB 700 million, with a leading position in the domestic markets.

The National Digital Medical Imaging Equipment Center developed China's proprietary CT machine, which filled up a blank in the area, allowing China to be the fourth country capable of manufacturing such equipment in the world. The digital medical imaging equipment produced by the center has found their applications in more than 30 provinces, municipalities, and autonomous regions in the country, with a combined sale revenue reaching more than RMB 3 billion.

## China's Ecofunction Zoning



The Ministry of Environmental Protection and the Chinese Academy of Sciences jointly published on July 31, 2008 China's first ecofunction map in Beijing. The zoning is made in three categories: 1) category I ecofunction zones for ecological regulation, product provision, and human habitation, in line with the nature of ecosystems and the dominant service types; 2) category II ecofunction zones in line with the importance of ecological functions, for water origin conservation, soil moisture conservation, wind breaks and sand fixation, biodiversity protection, and flood water storage, for agrifoods, animal products, aquatic products, and timber products, and for urban belts and urban function areas; and 3) category III ecofunction zones enjoying the mixed ecological functions, based on the difference in space, terrains, and land use. The zoning efforts have carved the nation into 216 ecological function zones, of which 148 are for ecological regulation, covering 78% of the nation's territories, 46 for providing products, or 21% of the nation's territories, and 22 for human habitation, or 1% of the nation's territories.

## RESEARCH AND DEVELOPMENT

### Quantum Coding Against Qubit Loss Error

A study, led by Prof. PAN JianWe at University of Science and Technology of China, has for the first time in the world proved that quantum coding can be employed to effectively overcome qubit loss, a serious error occurred in computation. The development has removed a major obstacle for the practical application of quantum computation. Thanks to their two-year efforts, researchers have skillfully designed a coding network against qubit

loss error, and proved that the codes protect encoded quantum information from detected 1-qubit loss error, allowing the computing process being completed. The finding was published in the August 12, 2008 issue of the *Proceedings of the National Academy of Sciences*.

## Triallelic System of S5 Cloned

A research team, headed by Prof. ZHANG Qifa of Huazhong Agricultural University, has found and successfully separated/cloned a triallelic system of S5, a major regulator of the reproductive barrier and compatibility of indica–japonica hybrids in rice. Zhang explained in his findings published as a cover story in the August 12, 2008 issue of the *Proceedings of the National Academy of Sciences* that although reproductive isolation has been a key issue in evolutionary biology for many decades in a wide range of organisms, only very recently a few genes for reproductive isolation were identified. A special group of rice germplasm, referred to as wide-compatibility varieties, is able to produce highly fertile hybrids when crossed to both indica and japonica. ZHANG and his team have worked on the gene since 1990. It takes 18 years for them to work out S5 gene. The study has attracted the participation of some 20 researchers from 7 research institutes.

## Pig with Fish Oil Gene

CAS Institute of Animal Science, Institute of Genetic Engineering, part of the Chinese Academy of Military Medical Sciences, and Hebei Yutian Breed Pig Farm, have jointly produced a pig carrying  $\omega$ -3 fatty acid. With an initial weight of 1.15 kg, the piglet is healthy. According to a briefing, molecular biology has confirmed that the piglet has carried  $\omega$ -3 polyunsaturated fatty acids, which made China the second country in the world that is able to produce a pig carrying such fatty acid.

CAS Institute of Animal Science has long worked on the basic study of GM pigs. Researchers started in 2007 to develop the key technologies for producing a pig carrying  $\omega$ -3 polyunsaturated fatty acids. In May 2008, 9 sows were conceived with GM fetus. The GM piglet produced this time is the baby of the sow that was conceived first. Before this, researchers have harvested 10 pigs carrying pig  $\omega$ -3 polyunsaturated fatty acids using the injection approach at an experimental pig farm in Hubei.

## PET Chips Developed

Based on three-year painstaking efforts, Liaoyang Petrochemicals has recently developed PET chips using nanosolution as an additive. Derived from the project are 6 national invention patents, of which two have been granted. Researchers added a nanosolution with modified high molecules, allowing it dispersing among polyester high molecules, and

effectively blocking gas infiltration. They produced the PET chips with a barrier property twice higher compared with regular polyesters. The technology can be used to produce PET chips in a simple manner without precise and sophisticated molding technology. It can be applied to a regular beer bottle production line to produce high quality barrier beer bottles, with an effectively reduced cost of production. The technology has been used at a number of beer bottler makers, with a fine result for quality beer bottles.

## Cow with Therapeutic Genes

In collaboration with Beijing Jipulin Biotechnic and Beijing Kerunweihe Biotechnic, a study team, led by Li Ning, a CAS academician at China Agriculture University, has produced a cow with human CD20 genes at the Beijing GM animal experiment center. Having an initial weight of 38 kg, the GM cow carries human CD20 monoclonal antibodies, which can be eventually purified to produce special drugs for cancer treatment, with a cost that is only one tenth the current cost, creating a new approach for producing monoclonal antibodies, and bringing in new hope for B lymphocytes cancer patients.

### NEWS BRIEFS

## Semiconductor Illumination Fair in Shenzhen

Not long ago, the 5th international semiconductor illumination fair was held in Shenzhen. 197 semiconductor illumination makers from both home and abroad, including China, the United States, Japan, Germany displayed their products at the Fair. CAO Jianlin, Chinese Vice-Minister of Science and Technology was present at the opening ceremony. The Fair has made the following developments:

- 1) The largest scale of its kind. The Fair had a displaying area as spacious as 11,000 square meters, or 40% more compared with the previous session. 197 semiconductor illumination makers from Beijing, Shanghai, Zhejiang, Jiangsu, Chongqing, Xi'an, Jilin, Jiangxi, Fujian, Hebei, and Guangdong, and from overseas showed up at the Fair, with a growth of 60% in number against the previous session.
- 2) Utility grade products. An array of semiconductor illumination products from materials to devices were displayed at the Fair. Major semiconductor illumination makers have made their presence at the Fair, demonstrating the strength of the industry. The Fair has attracted the participation of all seven national semiconductor illumination centers in Shanghai, Dalian, Nanchang, Xiamen, Shenzhen, Yangzhou, and Shijiazhuang, showing the national strength in the area.
- 3) Closer ties between The Mainland and Taiwan and Hong Kong. A Taiwan show and Hong Kong show were separately staged during the event. Mainland semiconductor

illumination makers visited the shows.

## China's Arctic Marine Expedition

With the help of ice breaker, small boat, and helicopter, China's 3<sup>rd</sup> Arctic expedition team conducted a joint operation for some six hours over the water and ice surface of the Arctic Ocean at 82 degrees north latitude. In the morning of August 18, the ice breaker Xuelong (snow dragon) reached the Arctic Ocean area at 82 degrees north latitude along the line 147 degrees west longitude, with some 100 people on board. Half an hour later, 7 team members surveyed the ice some 50 km from the ice breaker from the helicopter. They shot the pictures of ice, and dropped temperature and salinity sounders into the deep sea, collecting temperature and salinity parameters at different depths. Two hours later, 24 team members embarked on a small boat named "Yellow River", collecting ice and snow samples over an area of 4-5 square kilometers that is two nautical miles from the ice breaker, and made multidisciplinary observations.

## Space Rice for Record Yield

Two space born rice varieties, grown by a study team led by XIE Hua'an with Rice Institute of Fujian Academy of Agricultural Sciences, have approached the desired Phase III target: 900 kg per mu (1 mu = 0.0667 hectare). Of them, II Youhang-2 has registered a yield of 864.6 kg, and II Youhang-623 887.07 kg. An expert team, organized by Fujian Provincial Dept. of Science and Technology, visited the Mayang Village, Xicheng Township in the Youxi County, where II Youhang-2 has been grown over a plot of 103.4 mu, for a validation check. Results show that the rice in the category I field has produced a per-mu yield of 960.2 kg, rice in the category II 871.5 kg, and the category III 789.4 kg, at a proportion of 2:5:3. The averaged yield is 864.6 kg.

## 1000MW Ultrasupercritical Air-Cooling Generator

A project to produce 1000MW ultrasupercritical air-cooling generators was kicked off on August 14. As a pilot project for localization, the cooling system and equipment manufacturing part will be fully localized, according to the head of China Huadian. Comparing with the traditional wet cooling generator, the two 1000MW ultrasupercritical air-cooling generators, once into production, may save water as much as 70%, or 24 million tons of water each year, which is equivalent to the water consumed by some 800,000 people.

## Qinghai Lake High Density Mapping

In collaboration with the Administration Bureau of Qinghai Lake National Nature Conservation Zone, CAS Nanjing Institute of Geography and Lakes has recently launched a survey to investigate the water depth and quality across the Qinghai Lake. Researchers have produced a lake wide depth contour map through high density and high precision mapping. They also analyzed the water quality of different parts of the lake at different depth. They will try to understand the distribution of floor sediments and associated physical and chemical properties through drilling holes in the lake, in an attempt to make background information available for studying the evolution of the lake, and provide scientific evidences for protecting the lake environment and for responding to climate change. At the same time, the data collected will become part of China Lake Database, along with other lake data across the Qinghai-Tibet Plateau.