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SPECIAL ISSUE

Innovative Health S&T System

CHEN Zhu, the newly appointed Chinese Minister of Health aired out his new thinking lines on establishing an innovative S&T system for health, at an annual meeting recently sponsored by China Association for Science and Technology in 2007.

1) The capacity building of China' s innovative S&T system for health shall be aligned with the nation' s key strategic needs.
2) China' s innovative S&T system for health shall an integration of the existing education and research resources in the area, establishing a knowledge based innovation system combining the strength of medical research institutes and higher education institutions. China will establish a technology innovation system combining the strength of medical institutions and research institutes, and establish a technology diffusion and application system consisting of large medical research institutes and grassroots health organizations. It will also strive to build up regional innovation systems to meet local needs.
3) China will strengthen the capacity building of health workforce, strengthening the support to young S&T personnel and role model research institutes, accelerating open recruitment of overseas high caliber personnel to fill up key research positions, supporting research institutes and medical institutes to absorb and train S&T personnel, and speeding up the process to establish a policy system for the orderly mobility of S&T personnel.
4) China' s health innovation system shall focus on transformational research, learning from the proven experience of US National Institute of Health among others, and establishing a transformational research system from lab to clinical and from basic to applied research.
5) China' s health innovation system will support the development of national health industry. The data published by the World Bank show that the United States registered 20%, as a proportion of health service in entire service industry, with Germany at 15.1%, and China 11.5%. In this context, China' s health innovation system shall be built on a strong national health industry, allowing the development of health business to be a powerful support and guarantee for China' s economic restructuring and sustainable development.
6) China' s health sector shall pay more attention to absorbing international resources, vigorously promoting international cooperation in the area of health, establishing an open, collaborative, and win-win health cooperation mechanism, being part of international cooperation projects, strengthening international cooperation, and strengthening the absorption and utilization of international resources in developing China' s health activities.

INTERNATIONAL COOPERATION

Catching CO^2 from Coal Burning Power Plant

Huaneng Energy inked on September 6, 2007 an accord with Australia' s Commonwealth Scientific and Industrial Research Organization (CSIRO) to jointly work on CO^2 catchment and associated treatment for coal burning power plants. According to the accord, both parties will stage a joint development of technologies for CO^2 catchment and associated treatment for coal burning power plants. Huaneng' s Beijing Thermal Power Plant will be the nation' s first pilot project for CO^2 catchment to be benefited by the cooperation.

Both parities will study a range of related technologies, including CO^2 catchment and associated treatment, coal gasification, and coal gas purification. Both parties will support other similar efforts, including CO^2 catchment and associated treatment by Xi'

support other similar efforts, including CO2 catchment and associated treatment by Xi an Institute of Thermal Power Generation, and CSIRO Energy Center.

Hungarian Corn into Green Product

János Kóka, Hungarian Minister of Economy and Transport recently announced in Shanghai that Hungary will make itself a major EU maker of biodegradable food box and other environment friendly packaging materials, taking advantage of China's capital and technology, and Hungary's corn resources.

According to a briefing, Harbin Green Biodegradable and Beijing Zhongke S&T have made a joint investment worth 18 million EUR to establish a factory in Hungary, with an annual capacity of 50,000 tons of corn starch and a hundred million of biodegradable food boxes. The project has not only found a new value added approach for Hungarian corn resources, but will also create some 800 jobs for the country. What is more important is it will replace plastic and paper packaging materials.

János Kóka told reporters that the new project consumes less corn, compared with the corn ethanol projects. That means the new project will not produce an adverse effect on corn supply and corn feed production in the country. Believing it will bring up remarkable economic benefits, the Hungarian government has determined to favor it with financial support and taxation holidays.

The project will be partially put into operation in 2008, and form up an annual capacity of 100,000 tons of corn starch and 800 million environment friendly food boxes around 2010.

RESEARCH AND DEVELOPMENT

Enhanced 2nd Generation Plants Phytase

The Chinese Academy of Agricultural Sciences announced on September 10, 2007 that, thank to its 7-year painstaking efforts, a research team led by FAN Yunliu, an academician of the Chinese Academy of Engineering, has successfully rolled out a GM corn with high transmission activity, or the 2nd generation phytase product, based on the first generation products, also developed by the team.

According to a briefing, phytase is a highly effective feed additive, which helps to turn phytate in corn and soybeans into inorganic phosphor, which addresses the difficulty of utilizing rich phytate in feeds, as the monogastric animal produces little phytase. It also raises the utilization of phytate by monogastric animals, which in turn reduces wastes emission.

Unlike the production of phytase through fermentation, the new technology calls no production site or fermentation tanks, with a low production cost. The entire production process is the field growth process of corn seeds, without consuming other energy, or extraction and purification, which means lots of energy can be saved. In addition, phytase can be preserved in seeds for a long time, needing no special preserving equipment, and easy for long distance shipping and diffusion.

New Gene Mutations in Chromaffin Cell Tumor

YAO Bin and others at No.1 hospital affiliated to Guangzhou Sun Yat-sen University reported first in the world that they have found a new rare gene mutation point in chromaffin cell tumors, or delD631. The patient who has such mutation usually has a later occurrence of the tumor, with light symptoms.

YAO and his colleagues have examined a large family consisting of 22 members, having a history of multiple endocrine neoplasia type 2A. Four of the members have been diagnosed for the disease. Researchers obtained peripheral blood samples from 22 members, and worked on their DNA compositions, from which they found a rare site (D631) on RET cancerous gene, and another new mutation named delD631. Unlike regular patients with multiple endocrine neoplasia type 2A, the patient with the mutation usually has a later occurrence of the disease, mainly between 31-36 years of age. Furthermore, liver chromaffin cell tumor can occur earlier than medullary thyroid cancer, with a weak aggression.

Peroxidase-like Activity of Ferromagnetic Nanoparticle

A study team, led by YAN Xiyun of Institute of Biophysics, Chinese Academy of Sciences, published its finding "Intrinsic peroxidase-like activity of ferromagnetic nanoparticle" in the recent issue of *Nature Nanotechnology*.

Researchers were originally looking for a new cancer cell target. To find the target, they connected their patented "antibody" with the magnetic nanoparticles, hoping to find a new immune nanoparticles able to tell different antigens, for cancer diagnosis and treatment. While judging if antibodies can be connected to ferromagnetic nanoparticles, they accidentally encountered the bench noises that could not be overcome. They failed to reach the expected results, after exhausting all possible means. Researchers concluded that the magnetic nanoparticles may have another unfound property, possibly a peroxidase-like activity.

To prove the scenario, researchers obtained samples from different research institutes studying nanomaterials, and investigated the properties of ferromagnetic nanoparticles of different sizes. Experiments have confirmed that the assumptions made by researchers are correct. Researchers then designed a range of immune testing techniques, taking advantage of the novel property of peroxidase-like activity of ferromagnetic nanoparticles. They successfully tested hepatitis B viruses and troponin using the new technique. They also found that it is easy to produce peroxidase-like activity from ferromagnetic nanoparticles, which enjoys numerous merits, including simple operation, economic, and high temperature and acid resistance. Based on the finding, they have developed a novel immunoassay for new applications of ferromagnetic nanoparticles that can be used in the treatment of wastewater, and acid rain detection.

Natural Dance in Space

An international observation team, headed by XIAO Chijie, an assistant research fellow of CAS National Observatory, and Profs. WANG Xiaogang and PU Zuyin with Peking University, has for the first time observed a basic physical process made up of solar flare, polar light, and magnetic storm. The 3-D geometric structure depicts a natural dance in space. The phenomenon provides evidences for space weather modeling, which is important for human space flight activities. The finding was published in the recent issue of *Nature Physics*.

WANG wrote that magnetic null is an important factor affecting space environment and weather. Study of magnetic null helps people understand other physical phenomenon of

plasma matters in space, which in turn helps to work out better and more accurate weather forecast models.
The website of ESA commented that this is a pioneering discovery made by an international team led by Chinese scientists, and the finding demonstrates an unprecedented natural dance of 3-D magnetic field.

Single Molecule Spin Based Quantum Manipulation

A study team, headed by GAO Hongjun, Institute of Physics & Center for Condensed Matter Physics, Chinese Academy of Sciences, in collaboration with XIE Xincheng, a research fellow, and Prof. Werner A. Hofer at University of Liverpool, has made new progresses in studying single molecule spin based quantum manipulation. Researchers found that the signal of the resonance depends stronglyon the adsorption site of the molecule on a goldsurface. The finding, published in the September 7 issue of *Physics Review Letters*, reported for the first time the regulation imposed on single molecule' s Kondo effect by the adsorption site, which creates a new technical line for studying single molecule spin based quantum manipulation, and its application in quantum information process.
Kondoresonances are a very precise measure of spin-polarized transport throughmagnetic impurities. However, the Kondo temperature, indicating the thermal rangeof stability of the magnetic properties, is very low. Bycontrast, researchers find for iron phthalocyanine a Kondo temperature inspectroscopic measurements which is well above room temperature. It isalso shown that the signal of the resonance depends stronglyon the adsorption site of the molecule on a goldsurface. Experimental data are verified by extensive numerical simulations, whichestablish that the coupling between iron states and states ofthe substrate depends strongly on the adsorption configuration.

Spermatogonial Stem Cells Mediation

Based on 4-years efforts, Prof. LI Bichun with Yangzhou University and her team, has successfully developed the spermatogonial stem cell mediation technique. The new technique can be extensively applied in producing genetically modified domestic poultry, with an enhanced success rate 10 times that of conventional techniques.

Starting from 2003, Prof. LI and her team proposed to inject exogenous genes into rooster ' testicles, allowing spermatogonial stem cells being turned into genetically modified genes in the division process. Test results show that the genetic modification can produce a success as high as 50%—60%, or 10 times that of conventional techniques, with quite stable genetic properties. One can still detect GM traces in the second and even third generations.

Honglian Hybrid Rice

A Honglian rice male infertility study, completed by Wuhan University, recently passed an approval check. The hybrid rice is one of three major hybrid rice species in the world. In the 1970s, Wuahn University had produced the Honglian hybrid rice species, using the wild paddy rice grown in Hainan as the female, and the rice species grown in Liantang as the male. It also introduced an array of hybrid rice varieties from Guangdong, and Hainan, and made them into a string of new infertility systems. After 1997, it successfully produced Honglianyou-6, Luoyou-8, and Yueyou-9.

In recent years, Honglianyou-6 has become very popular in eight southern provinces of China, as well as in Indonesia and Vietnam for trial growing. The species enjoys numerous merits, including strong growth, fine and large grains, strong resistance, and wide adaptability. It usually produces a yield of 847 kg per mu(1 mu= 0.0667 hectare). At present, Honglianyou-6 has attracted seeds buyers from Hubei, Hunan, Anhui, Shaanxi, and Henan. Luoyou-8 has been grown over an area of 700,000 mu across Hubei Province, with an average yield of 700 kg for extensive growing. Some demonstration sites have registered a yield over 800 kg per mu, reached the national standard for a super hybrid rice. The species has also grown over an area approaching 300,000 mu across Hunan, Henan, Jiangxi, Anhui, Zhejiang, Fujian, and Guangxi.

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