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# NEWSLETTER

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SPECIAL ISSUE

## Attracting 2,000 Overseas Talents in 5 Years

A talent recruitment panel under the Chinese central government has recently endorsed a working document to attract high caliber young talents from overseas. The so-called "thousand young talents program" plans to import 2,000 high caliber young talents from

overseas in a period of five years, or 400 people a year. The program will provide desirable living and working conditions for imported talents, including RMB 500,000 living allowance and RMB 1-3 million 3-year research funding per person. The qualified candidates are also entitled to the working and living conditions defined under a "thousand talents program".

The program is seeking the candidates who are under 40 years of age with a specialty in the area of natural sciences or engineering. They shall be the graduates with a doctoral degree from the renowned universities, enjoying an R&D experience for at least three years. The candidates shall also be a faculty member of renowned universities, research institutes, or enterprises when applying, with a capacity or potential to be a leader in the field. The program allows the new doctoral graduates who have made outstanding accomplishments during their campus study to be an exceptional candidate.

The candidates, once endorsed, shall work at a full time position in China, mainly at Chinese universities and research institutes.

Candidates will jointly be reviewed by a dedicated recruitment office made up of experts from the Ministry of Education, Ministry of Science and Technology, Ministry of Human Resources and Social Security, Chinese Academy of Sciences, Chinese Academy of Engineering, and National Natural Science Foundation. The recruitment will proceed in the following steps: step one, an intention of recruitment be reached between the employer institution and the candidate, and the candidate files an application to the recruitment office; step two, the candidate will be reviewed by experts by correspondence, before into an experts panel review. An interview will be staged to short list the candidates. The short listed candidates will be publicized for possible misbehaviors; step three, the recruitment office will scrutinize the candidates who have been questioned or complained by the public; and step four, the central government talent recruitment panel will endorse the talents short listed for importation.

## RESEARCH AND DEVELOPMENT

### Improved DNA Backbone S-modification

A study team, led by DENG Zixin of Shanghai Jiaotong University, heralded two breakthroughs in DNA backbone S-modification studies. The finding, published in the recent issues of both *Nucleic Acids Research* and *PLoS Genetics*, unveils a novel host-specific restriction system associated with DNA backbone S-modification. Unlike the well known methylation-specific restriction systems, the new system is taken care of by 7

genes having a direct bearing with DNA backbone S-modification. Researchers also found a completely new cellular defense system embedded in *Streptomyces coelicolor*. The enzyme is able to cut off the DNA that has been S-modified and the one that has undergone a methylation modification. Additionally, the restriction-modification systems were found sitting on the two genome islands that go against one another. As a result, their simultaneous expression will trigger up the instant death of cells.

## World's First GM Buffalo

Transgenic buffalo calves, the first of their kind in the world, were born on December 19, 2010 at a buffalo farm of Guangxi University research base. The two cloned male twins, weighing 20.5 kg, have shown noticeable green fluorescent protein markers in heads and limbs under UV irradiation.

The project, led by SHI Deshun, Dean of Guangxi University School of Animal Science and Technology, has established a transgenic cloning technology system for buffalo, through the transformation of transgenic carriers and the improvement of screening methods. Researchers have found solutions to addressing a range of technical difficulties, including the low activity of buffalo somatic cells and gene silencing after nuclear transplantation.

Researchers also developed microscopic fertilization based buffalo gene mediation and lentivirus-mediation based transgenic techniques. Two buffalo calves (one male and one female) derived from the single-sperm microscopic fertilization were born on December 2, 2010, the first instance of its kind in the world. On December 17, 2010, researchers harvested two male calves derived from the lentivirus-mediation based transgenic process, also the first instance of its kind in the world.

## Donkey Hide Gelatin Inhibits Melanin

Researchers at East China University of Science and Technology found through a new study that donkey-hide gelatin is able to inhibit the activity of tyrosinase and melanin synthesis in a significant manner, which in turn enhances the whitening effect of skin. Researchers made water-soluble vitamin E, a free radical scavenging supplement widely used, the positive control, in an attempt to understand the ABTS radicals removing capability of donkey-hide gelatin. They found that donkey-hide gelatin can significantly improve the anti-aging capacity of human skin cells. More importantly, the gelatin is not merely confined to the role of anti-aging, as it is also able to empower skin with an enhanced SOD

effect, making skin cells more antioxidant. The finding shows that donkey-hide gelatin can make skin cells more antioxidant both internally and externally, allowing skin cells to be more healthy and resistant to aging.

## Novel Sand Fixing Agent

A novel sand fixing agent preparation technology, developed by Chinese Academy of Sciences Lanzhou Institute of Chemical Physics to improve soils, has recently been granted with a national patent. The sand fixing agent is prepared mainly using the waste liquids discharged from paper making. Researchers extracted lignin or lignin derivatives from the waste liquids, before turning them into a sand fixing agent through chemical modification. Tests show that the new sand fixing agent is able to raise organic matters in the sandy soil, thanks to the lignin, a nice humus material, employed in the agent. The spray of the agent can improve the quality of the soil, and facilitate biodegradation. Meanwhile, the new sand fixing agent is good in both moisture absorption and water conservation. Wind tunnel and pressing tests show that the sand fixing agent is strong in resistance to both wind erosion and pressure.

According to a briefing, chemical fixation is a process to spray diluted bonding chemicals to the loose surface of quicksand, allowing the rapid infiltration of water into the underlying layer, while keeping the bounding chemicals between the sandy layers, forming up a protective shell made up of sands, and keeping air from direct contact to the loose sand surface, which in turn prevents wind erosions.

## Carbon Dioxide Lidar

A Raman lidar system able to show the spatial and temporal distribution of carbon dioxide, developed by Chinese Academy of Sciences Anhui Institute of Optics and Fine Mechanics, has recently passed experts' acceptance check. The system is China's first proprietary laser radar able to detect the spatial and temporal distribution of carbon dioxide for an area of 2km in horizontal, and 3km in vertical, with a 1% error rate for an area of 1 kilometer, and 3% for 3 kilometers. The system claims an international leading position among its peers.

Experts made a field test to the new lidar system. Test results show that the system has reached the desired performance, with some performance being better than expected. At present, the Raman carbon dioxide lidar system has been put into operation for the conventional atmospheric carbon dioxide measurement across the Hefei area.

## Solid Oxide Fuel Cells

A project assigned to Harbin Engineering University researchers to develop intermediate temperature solid oxide fuel cells has recently passed an acceptance check. Researchers developed high-performance composite cathodes based on composite and gradient electrodes, prolonged the length of three-phase interface, and drastically reduced the performance loss caused by interface mutation. They also developed new anode materials for manufacturing anti-coking solid oxide fuel cells, and a shared sintering process featured with simple operation, low cost, low power consumption, and easy mass production. Researchers assembled single unit cells (100mm × 100mm) using the shared sintering technique, and reduced the ambient temperature of power generation from 1000 °C to 750 °C, effectively addressed a range of common problems, including fast attenuation caused by electrode sintering, electrode/electrolyte interface reactions, thermal expansion of cell components, and metal connecting material corruptions. The effort has led to the publication of papers in a range of journals, including *Electrochemistry Newsletter*, *Electrochemistry*, and *Power Source Technology*, along with five national invention grants.

## New Generation "Artificial Sun"

CAS Hefei Institute of Physical Sciences announced on December 23, 2010 that China's new generation "artificial sun" system, or the world's first superconducting Tokamak (EAST) has completed its annual experiments on December 24, 2010. So far researchers have obtained a plasma current worth 1 million amperes, 100-second 15million-degree divertor long pulse plasma, a 30-time energy confinement time plasma, and 3-MW ion cyclotron heating among many other accomplishments.

The stable 100-second discharge conducted in the 2010 experiment makes the longest high-temperature divertor fusion plasma discharge recorded up to date. Researchers also made a range of successful experiments to address the safe operation of future fusion reactors, including microwave and RF based high confinement modeling, advanced high-parameter divertor precision control, and long pulse steady-state plasma acquisition.

The annual round of experiments lasted for 8 months. Some hundred domestic and foreign scientists, including a dozen of world-renowned nuclear fusion scientists, participated in the 8-month long annual experiments, and achieved fine results in modeling future ITER physics.

## China's First Cloud Computing Server

China officially rolled out on December 23, 2010 its first cloud computing server at a Yizhuang center in Beijing. The server enjoys the so-called "four highs and three lows" green features: high-performance, high-density, high-reliability, high-scalability, and low-carbon, low-cost, and low power consumption. The new server is designed with an operating cost that is 40% lower than a traditional server, and a carbon emission no higher than 0.2 gram per 100 million floating point operations for 0.2 watts of energy consumption per 100 million floating point operations. It sets up a green standard for cloud computing servers.

## Seaweed Polysaccharide Capsule

Not long ago, an expert panel nodded their acceptance to a seaweed polysaccharide capsule development and industrialization project assigned to Chinese Academy of Sciences Institute of Oceanology under the National 863 Program.

Researchers developed a range of key technologies to optimize the formulation of seaweed polysaccharides capsule that is built on seaweed polysaccharides and dietary fiber, and to address film-forming condition control. They worked out the needed techniques and facilities for producing seaweed polysaccharides capsules, and tested the clinical performance of the capsule in the context of pharmacokinetics, making the products up to the national standards. The capsule has been granted with a production permit issued by the State Food and Drug Administration, along with two industrial standards. The project team, in collaboration with an enterprise, established a production line with an annual capacity of 2 billion capsules. The product has been sold at both domestic and overseas markets, with an expected output value worth RMB 40 million in 2010.

## Novel Hemp Species

It takes 10 years for ZHOU Guotai, a Chinese Academy of Engineering academician, and Prof. JI Yingchao of Dalian University of Technology to land a breakthrough in breeding the

long woolly fiber hemp species. The new technique is able to breed out a new woolly hemp species as tall as 81.5mm.

The hemp fibers produced with the new technique have been applied in industrial production on an experimental basis, blended with wool, linen, silk, and cashmere, enjoying a fine market perspective for a range of merits, including soft, smooth, antibacterial, airy, moisture absorbing, and ultraviolet resistant. China is a desirable place for growing hemp that are innately resistant to pests and diseases. Hemp roots are good for nitrogen fixation. The rotational plantation of hemp and soybean can raise the yield of soybean by 30%. Growing hemp also facilitates industrial restructuring in the rural areas, raising farmers' income, and creating more jobs.

## Large Enclosed Tube Photobioreactor

Chinese Academy of Sciences Marine Biotechnology Center has recently rolled out two large enclosed tube photobioreactor desirable for algae breeding, an effective solution to addressing the bottleneck of commercial development and utilization of microalgae resources. Researchers have completed the development of two 5-ton parallel tube photobioreactors that can be used for pilot experiments and production activities. The photobioreactors are designed with a specific surface area at 0.74, basically solved the technical difficulty that the specific surface area will drop drastically over an increased volume. Additionally, the photobioreactors are designed with a range of practical functions, including self inner pipe cleaning, internal liquid flow control, liquid vortex enhancement, sensors/modules based automated data acquisition and process control, key parameters (temperature, pH, dissolved oxygen) tuning, and oxygen/carbon dioxide compensation analysis. Researchers staged a trial scale breeding of *Haematococcus pluvialis* using the equipment. Test results show a substantially increased cell density, and a shortened cultivation cycle by 1/4.

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