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IN THIS ISSUE

- * Top Ten S&T Progresses in 2009
 - * Top Ten TCM Events in 2009
 - * WAN Met with UTC Senior Vice President
 - * First Inbred Line Pig Cloned
 - * Superconductivity Found in One-Atomic-Layer
 - * Magnesium Enhances Learning and Memory
 - * SSRF Won State Approval
-

SPECIAL ISSUES

Top Ten S&T Progresses in 2009

A news conference, sponsored by China Association for Science and Technology, was held on January 27, 2009 to publicize the top ten progresses Chinese scientists have achieved in the areas of science, technology, and engineering.

The top ten scientific events are: an extreme intensity and associated super hardening effects were found in nanometer twine crystalline copper; β -arrestin2 loss was proved associated with insulin resistance; sodium was turned into a transparent insulator under a

high pressure; quantum coding based safe communication network was put into practical application; avian influenza polymerase PAN revealed an endonuclease active site; the terrestrial ecosystem carbon balance across China was investigated; super hybrid rice LYP9 was analyzed using transcriptomic techniques; more evidences were collected for origins of birds studies; strength of composite materials was enhanced with the help of reticulate nanotube architectures and coupled glassy polymer chains; and the superconductivity of copper compound oxide and associated mechanism were better understood.

Ten major technological progresses are: the first home made medium-low speed levitated train into test run; the world's first solid-state deep ultraviolet laser prototype system was developed for practical application; a wide field astronomic telescope with the largest caliber was built; a state-of-the-art deep sea oil drilling and storage platform in cylinder shape was successfully developed; ARJ21-700, a new passenger jet successfully completed its maiden regional flights; a novel 10-million-ton mining equipment was rolled off the assembly line; Chinese scientists rolled out a 3-D lunar terrain map, the clearest one ever made in the world; large volume sodium-sulfur energy storage cells developed; Tianhe I, a petaflop supercomputer was successfully developed; and a proprietary 2.0MW direct-driven permanent magnet wind turbine was developed.

Top 10 major engineering events are: a million-ton direct coal liquefaction project was put into operation at Shenhua; the first home made UHV AC power transmission and distribution system was put into operation; Chang'e I satellite made a successful impact on the moon at the end of the Phase I project; the longest land tunnel was put into operation in Liaoning; Shanghai Synchrotron Radiation Facility (SSRF) was put into operation; Beijing Spectrometer and Beijing Synchrotron Radiation Facility was successfully upgraded; China's first proprietary sea tunnel was put into operation; a southwest wildlife germplasm resources bank passed the state approval check; a high speed train was put into operation between Wuhan and Guangzhou; and Shanghai Minpu Bridge, a double deck cable stayed bridge with the large span in the world, was put into operation.

Top Ten TCM Events in 2009

State Administration of Chinese Traditional Medicine published top ten Chinese medical events for 2009 on January 30, 2010 as follows:

- 1) Chinese State Council published a guidance document to support and promote the development of traditional Chinese medicine (TCM). State treasury has invested RMB 4.7 billion to support the development in the area. TCM management system has been streamlined and strengthened.
- 2) TCM has become a part of medical reform, with a string of policies and measures favoring the development of TCM industry.

- 3) TCM has played a unique role in H1N1 prevention and treatment, with noticeable results. Some H1N1 patients with light symptoms have been treated using TCM drugs only, with the seriously affected one being treated under a combined western and TCM therapy. Some 2/3 H1N1 patients in the country were benefited from the combined therapy.
- 4) 30 TCM masters were selected by the government agencies concerned, the first selection ever made in the country.
- 5) TCM has for the first time become part of the military Medicare system, indicating that TCM has found applications in more areas.
- 6) Professional skill certification system was established for five TCM professionals, including scraper (a TCM doctor good at treating patients by scraping the patient's neck, chest or back), TCM pharmacist, TCM herb planter, TCM drug preparer, and TCM tester.
- 7) An outline for certified TCM doctor examination published in 2009 has an enhanced focus on TCM doctrines. It is also stipulated that the TCM doctors who are taught by TCM masters or good at certain therapeutic skills are exempt for western medicine tests.
- 8) TCM injection accidents, including Shuanghuanglian injection accident, have drawn public concerns. A re-evaluation project was initiated to assess the safety of TCM injections.
- 9) A TCM innovation system has been established, with 16 TCM hospitals being certified as national TCM clinical research centers. Ten TCM R&D findings, the most in the last decade, were honored with National S&T Awards in 2009.
- 10) A resolution on traditional medicines, initiated by China, was adopted at a WHO meeting. China and 10 ASEAN countries inked a Nanning Declaration on traditional medicines. The first international organization standard on TCM education, with Chinese TCM standard as the core, was published, hallmarking China's leading position in the world health system.

INTERNATIONAL COOPERATION

WAN Met with UTC Senior Vice President



WAN Gang, Chinese Minister of Science and Technology, met with Dr. J. Michael McQuade, UTC senior vice president and CTO, on January 18, 2010. Both sides exchanged views on strengthening the cooperation in the area of clean energy. At the request of Dr. McQuade, WAN made a briefing on the development of China-US Clean Energy Research Center, new energy auto pilot projects in ten major cities, and a fuel battery auto demonstration to be held in the Shanghai Expo. He encourages clean energy collaborations between industry, universities, and research institutes in the two countries. Dr. McQuade briefed the other side of the collaborations initiated by UTC with Tsinghua University and Tongji University in the areas of homebuilding energy efficiency and fuel battery autos, and expressed the wish to be an active collaborator in the area.

RESEARCH AND DEVELOPMENT

First Inbred Line Pig Cloned

Researchers at Yunnan Agriculture University cut off a tiny piece of skin (0.5 cm^2) from a newly born boar's ear for further cell culture and division. They injected the 3rd generation of the cells into the denucleated egg cells collected from sows, and transplanted the divided cells (2nd-8th) into the sows' Fallopian tubes for further development. The cloned piglet was born 116 days later.

The donor is a pure breed black boar derived from a Banna inbred line which has passed for 20 generations, enjoying a DNA similarity as high as 99%. The cloned piglet, the first of its kind in the world, is healthy for all indicators, suggesting the success of the cloning. The development will eventually result in more animal models and xenotransplantation.

Superconductivity Found in One-Atomic-Layer

Not long ago, a study, led by XUE Qikun, CHEN Xi, and JIA Jinfeng at Tsinghua University Dept. of Physics, in collaboration with a team headed by MA Xucun with the Chinese Academy of Sciences Institute of Physics, Prof. WANG Yayu, Tsinghua University Dept. of Physics, Prof. LIN Haiqing at the Chinese University of Hong Kong, and Prof. LIU Ying of the Pennsylvania State University Department of Physics and Material Research Institute, has found superconductivity in one-atomic-layer metal films grown on Si substrates. One-atomic-layer is the ultimate thickness a practical material can reach. The finding, published in the recent online issue of *Nature Physics*, renders a solution to the question concerning how thin a superconductor can be.

Strong Crystal Size Effects on Deformation Twinning

Under the guidance of her tutor, YU Qian, a post-graduate at Xi'an Jiaotong University State Key Laboratory for Mechanical Behavior of Materials, in collaboration with Prof. LI JU with University of Pennsylvania Department of Materials Science and Engineering, and Dr. HUANG Xiaoxu of Technical University of Denmark Laboratory for Sustainable Energy, made an in-depth study of the deformation twinning behavior of nano-sized metal crystals and its impact on the dynamic performance of the materials. YU and coworkers found that the size of monocrystals is of a strong effect on the dynamic performance. The finding, published in the recent issue of journal *Nature*, provides a meaningful insight of materials performance evaluation and design, especially on material processing at the nano-scale utilizing the strong crystal size effect.

NEWS BRIEFS

SSRF Won State Approval



Shanghai Synchrotron Radiation Facility (SSRF) passed a state approval check on January 19, 2010. SSRF is made up of a 150MeV LINAC, a booster that can increase the electron energy from 150MeV to 3.5GeV in 0.5 second (180m), and a 3.5GeV electron storage ring, in addition to 7 initial beamlines and experimental stations. With an investment worth RMB 1.4344 billion, the project was completed in April 2009, after 52 months construction started from December 2004.

SSRF is equipped with massive (70%) proprietary home made equipment. For example, the proprietary ultra-high precision digital power supply and septum magnet cutting system has found an innovative solution to address grid disturbance and stray fields. Others, including long trace profiler, plane grating monochromator, a dual-chamber super vacuum system, digitized HF low level control and orbit feedback system, high precision bending mechanism, and in-vacuum undulator, are applied with internationally or domestically advanced technologies.

China's First Large Dredger



“Tianjing”, China’s first large dredger, was delivered to its operator on January 19, 2010 in Shenzhen. 127.5m long and 23m wide, the new boat is equipped with an array of the state-of-the-art mud digging equipment, with a total installed capacity reaching 20,020 kilowatts. The onboard reamer is designed with a power worth 4200kw. Enjoying the most powerful digging system in Asia, the dredger is able to dredge up large rocks up to 40Mpa, in addition to mud, sand, and little rocks. Application of a large dredger may reduce the number of sea floor explosion activities, and boost up the safety of projects, in addition to its environmental protection functions.

The boat is also equipped with three efficient mud pumps that can be used to reclaim land from the sea for a distance up to 6,000 m. Its unloading capacity allows the boat to ship the mud and sands it has dug out to other desired destinations, expanding the scope of operation. It works efficiently thank to its mobility, easy dispatching, and fine adaptability.

New Psoriasis Susceptibility Loci Found

With the support of National 973 Program and National 863 Program, Prof. ZHANG Xuejun at Anhui Medical University, in collaboration with Chinese National Genome Center at Shanghai, has identified new psoriasis susceptibility loci (LCE) in Chinese Han population, in a genome-wide association study (GWAS) of 15,000 Chinese psoriasis patients, started from 2007. The newly found LCE, published in the recent issue of *Nature Genetics*, has been collected by NIH GWAS database.

Magnesium Enhances Learning and Memory

A study team, led by Prof. LIU Guosong at School of Medicine Center for Learning and Memory, part of Tsinghua University, has recently rolled out a novel magnesium compound that was proved effective in enhancing both young and elder rats' learning and memory capability, by elevating the magnesium level in the brain. The finding, published in the recent issue of journal *Neuron*, has for the first time unveiled a major regulating function possessed by magnesium ions in maintaining brain's learning and memory capability, suggesting that magnesium ions supplement can be an effective approach to prevent brain decay.

More Digital Cities

It was recently reported at a national meeting on mapping services that the State Bureau of Surveying and Mapping will accelerate the construction of 100 digital cities. In 2009, a digital geographic information platform, the first of its kind in the country, was put into operation in Taiyuan.

As a role model of digital city, Digital Taiyuan is made up of a basic geographic information database and a public search platform, with five application systems, including baseline land prices search, environmental protection information, air defense information, food and drug safety, and public geographic information service. It provides geographic information service to the public.

Light Field Based Quantum State Study

Light field based quantum state study, a major project under the National Major Research Program, was officially launched on January 15, 2009 in Taiyuan. Researchers will work on a range of missions, including the entangled state light sources that can be applied in daily life, consecutive entanglement purification, new approaches for quantum information storage and generic quantum information processing, and quantum information network. The new findings derived from the said fields will make China's quantum information related basic research and technological development hit an internationally advanced level, providing a major technical support for future quantum manipulation studies.

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