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IN THIS ISSUE

* S&T Insurance Pilot Project
*China-Russia Joint Mars Probe
* China-US Sustainable Development Center Established
* High Tech Instruments for Moon Probe
*Progresses for Contraceptive Vaccine
*Super Plastic Bulk Metallic Glasses

## SPECIAL ISSUE

### S&T Insurance Pilot Project

As a supporting policy for implementing the Outline for the National Long- and Medium-Term S&T Development Planning (2006-2020), the Chinese Ministry of Science and Technology (MOST) and China Insurance Regulatory Committee (CIRC) will jointly stage S&T insurance pilot projects at national high tech parks, and in selected cities, in an attempt to promote the diffusion of S&T insurance.

The pilot projects will work on the following missions: 1) raise the insurance awareness of high-tech businesses, through government guidance and promotion, in an effort to set up S&T insurance examples; 2) provide insurance for technological innovation activities at high-tech businesses, using insurance means, and gather up experience, models, and cases for supporting industrial technological innovation using S&T insurance; 3) further develop insurance products tailored to the needs of high-tech businesses; and 4) collect S&T insurance data for verifying the scientific nature and rationality of S&T insurance policies.

Application for an S&T insurance shall go through the following procedures: 1) the government or administrative committee initiating an S&T insurance pilot project shall submit an application to S&T authorities at the provincial level; 2) S&T authorities at the provincial level shall review the application together with the local insurance regulatory bureau, before sending the application to MOST and CIRC. The areas proposed by the provinces or municipalities for S&T insurance shall not exceed two in number; 3) MOST and CIRC will evaluate application materials in a balanced manner, and choose the right candidate for S&T insurance; and 4) MOST and CIRC will sign a memorandum with the chosen candidates, to formally start the pilot project. Please see details in MOST website (www.most.gov.cn).

## INTERNATIONAL COOPERATION

### China-Russia Joint Mars Probe

Sun Laiyan, China National Space Administrator and Anatoly Perminov, Head of Russian Federal Space Agency, undersigned on March 26, 2007 a cooperation accord in Moscow for a joint probe of Mars and one of its moons in 2009.

According to the agreement, Russia will launch the spacecraft (Phobos-Grunt), and it will carry China-made survey equipment. The Chinese made survey equipment will independently work on its probe missions. It will also work with Phobos-Grunt to probe Mars' environment. Phobos-Grunt will take landing on the surface of Phobos, and collect samples from it, before returning to the Earth. A Phobos surface soil preparation system, developed by Hong Kong Polytechnic University, will be aboard the spacecraft for analyzing the surface thermal fields of Phobos.

### China-US Sustainable Development Center Established

Not long ago, an opening ceremony was held at Rice University to herald the establishment of China-US Center for Environmental Recovery and Sustainable Development. Some hundred representatives, from Nankai University, Tianjin University, University of Science and Technology of China, Tianjin Municipal S&T Committee, Tianjin

Binhai New Area, Chinese Consulate General in Houston, Rice University, Houston Municipal government, and local industry, were present at the event.

Co-sponsored by Rice University, Nankai University, and Tianjin University, the Center will work on a range of issues involving the development of Tianjin Binhai New Area, and common concerns relating to sustainable development between the two nations. The seven research areas defined for future cooperation are: nanotechnology and its application in environmental protection and cleaning; preservation, purification, and protection of drinking water; protection, restoration, and modeling of groundwater; prevention, control, and modeling of atmospheric pollution, environment related legislations and policies; energy issues in cyclic economy and sustainable development; and seed projects of basic research. Rice University and Nankai University have jointly prepared 13 white papers on collaborations in the above-mentioned areas. Some of them have been or will be financed by NSF. The Center will take care of technology transfer and attracting investors for the findings derived from the project.

## RESEARCH AND DEVELOPMENT

### High Tech Instruments for Moon Probe

OUYANG Ziyuan, the lead scientist of China's moon probe project and an academician of the Chinese Academy of Sciences (CAS), and ZHENG Yongchun, an assistant research fellow at the CAS National Observatory recently told reporters that the Chang'e I moon probe satellite that will be launched in the second half of the year is equipped with 24 scientific instruments in 6 categories, including CCD 3-D camera, laser altimeter, imaging spectroradiometer, gamma /X ray spectrometer, solar high-energy particle sounder, and low energy ion sounder. All these instruments are employed for the first time in China, with some of them for the first time in the world. Chang'e I moon probe satellite is designed with four scientific missions:

1)Take 3-D moon topographic pictures using the onboard CCD 3-D camera. The satellite will carry one CCD 3-D camera and one laser altimeter. The two instruments will work together to produce complete and detailed 3-D pictures of the Moon. The CCD camera will shoot the scenes from front, bottom, and rear, so as to produce a 3-D image. The laser altimeter is made up of three components, including laser unit, telescope, and receiving module. After entering the moon circling orbit, the onboard laser altimeter will send laser beams to the moon surface, and the telescope will turn the beam echo into electric signals. Meanwhile, the receiving module will make a quick calculation to produce the altitude of the spot. When the satellite completes its moon circling journey, there will be out a clear map showing different altitudes of the sounding spots, including dark and deep pits in both poles. These data, combined with high precision pictures produced by CCD camera, will constitute a complete and accurate 3-D moon map.

2)The onboard gamma /X ray spectrometer will detect the distribution of 14 elements over the Moon, in an attempt to work out the resources rich areas for further exploration. With it, Chinese scientists will have an improved knowledge of resources distributions across the Moon. In the following events, people can select the right site for a permanent base, and exploit moon resources for human needs.

3) An onboard microwave telemetry sounder will be used to estimate the depth of moon soil, and the reserves of helium-3. The instrument, the first of its kind aboard a moon probe satellite, is able to see underground objects at a great depth, and under all meteorological conditions, using its strong microwave radiation. Scientists will calculate the depth of moon soil, and the total reserves of helium-3, based on microwave radiation intensity. Helium-3 is a rare energy on the Earth that can be used to replace petroleum. The microwave sounder is also able to produce information concerning the luminance of the other side of the moon, temperature, and two poles.

4) Chinese made solar high-energy particle sounder will probe a vast space environment ranging from 40,000 km to 400,000 km, recording original solar wind data, and studying the impacts of solar activities on earth-moon space environment. Before this, domestic scientists had made an observation of space environment up to 70,000 km. The scientific data derived will become an important evidence for designing environment protection components for deep space probers.

### Progresses for Contraceptive Vaccine

Researchers at the Daping Hospital, part of No. 3 Military Medical School in Chongqing, have come up with a brand new special sperm protein and gene discovered in both human and rat. The protein sits at a major section of the sperm tail. It gets its energy from the sperm, and works on a range of activities, including activation, combining with calcium ions, and signal transmission. It is named by researchers as FSCB. As the whipping movement of sperms to be fertilized needs the involvement of calcium ions, researchers have worked hard to screen out the protein that works on calcium. Researchers found that the protein is of a noticeable function of calcium bonding and phosphatization. In addition, it has a noticeably specific expression and location. Researchers told reporters that the protein is of an important value for developing novel contraceptive drugs.

It is believed that the finding has provided new evidences for improving the understanding of developmental biology of human sperms, and for studying the molecular basis and regulation mechanism of FSCB in activating sperm tail movement. It is both theoretically and practically important for contraceptive vaccine studies at home and abroad.

### Super Plastic Bulk Metallic Glasses

A research team, led by WANG Weihua at the Institute of Physics, part of the Chinese Academy of Sciences, has successfully worked out super plastic bulk metallic glassesat room temperature, through binding the seemingly unbinding properties. The finding was published in a recent issue of journal *Science*.

In contrast to the poor plasticity that is usually observed in bulk metallic glasses, super plasticity is achieved at room temperature in ZrCuNiAl synthesized through the appropriate choice of its composition by controlling elastic moduli. Microstructures analysis indicates that the super plastic bulk metallic glasses are composed of hard regions surrounded by soft regions, which enable the glasses to undergo true strains. This finding is suggestive of a solution to the problem of brittleness in, and has implications for understanding the deformation mechanism of metallic glasses.

As the elements used in the new metallic glasses are popular metals that can be procured at a reasonable price, the new finding has created an important scientific and application perspective for the material.

## Mini Ultraviolet Sensor

The Shanghai Institute of Technical Physics (SITP), under the Chinese Academy of Sciences, has recently rolled out a very tiny GaN ultraviolet sensor, with a size smaller than a grain of rice, allowing a comfortable stay in a mobile phone. The new technology means placing your mobile phone under sunshine will tell you the intensity of ultraviolet rays in the day, with a suggestion for sun burning.

There is a tiny eye in the front of the sensor, with positive and negative electrodes on the back. The mini sensor, 'palm weather forecaster' for its nickname, can fit into fashion electronic products, such as mobile phone, wrist watch, MP3, and digital camera.

The eye of the sensor is made of GaN, an artificial synthesized material for new generation wide bandgap semiconductor, responding only to the ultraviolet rays with a wavelength less than 370 nanometers, covering UVA, UVB, and UBC bands. Thanks to its unique no-response to visible light, it is highly sensitive to ultraviolet rays, and no filter is needed to fence off fake signals, when making measurement.

With an application in mobile phones and other products, it can directly show ultraviolet intensity on the screen or warn people using a voice message. It indicates ultraviolet intensity using a range from 0 to 15. When larger than 10, it means a strong ultraviolet radiation. When it comes down to 5 or below, you will be warned to have more sunshine.

According to a briefing, the mini sensor can also be used to alarm ultraviolet flames, tell fake money, and modulate ultraviolet sterilizing unit.

## Efficient Water Based Auto Paint

High performance water based auto paint, a project undertaken by the Institute of Chemistry under Jilin University, recently passed an approval check. Researchers of the Institute have long worked on the key technologies to synthesize a water based auto paint having fine epoxy resin match. They have made major innovations in bonding hydrophilic non-ionic surfactant to resin and hardener, for the purpose of increasing the stability. The epoxy water based auto pain they produced is featured with environment friendliness, high performance, lower cost, safety, and easy operation.

Experts believe that the new product is technically sophisticated, with innovated hardener making and resin synthesizing. For example, it enjoys a salt and fog resistance for 300 hours. Research results show that the new paint is desirable for auto parts that have a higher demand for salt, fog, acid, and alkaline resistance. It is also an environment friendly product with little organic emissions.

## High Performance Computer and Grid Service

A project to create China's own high performance computer and associated grid service environment was initiated at a meeting held March 13-14, 2007. As a key initiative under the National 863 Program, the project is designed to develop a proprietary high performance computer with a capacity of 1000 trillion floating-point operations per second during the 11th Five-Year Plan period (2006-2010). The effort will raise China's level of making high performance computer to 3rd place in the world. The project will also build a national grid service and application environment based on home made high performance computer, supporting major information applications and allowing China's grid technology and applications to reach an internationally advanced level. Phase I project will produce two high performance computers with a capacity of 100 trillion floating-point operations per second, and master the key technologies for developing the computers with a calculating capacity of 1000 trillion floating-point operations per second. As a result, there will come a national grid service and application environment possessing a calculating capacity of 300 trillion floating-point operations per second, and a storage capacity of 1PB, built on home made high performance computers.

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Comments or inquiries on editorial matters or Newsletter content should be directed to:
Mr. Mao Zhongying, Department of International Cooperation, MOST 15B, Fuxing Road Beijing 100862, PR China Tel: (8610)58881360 Fax: (8610)

58881364
http://www.most.gov.cn