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INTERNATIONAL COOPERATION

New SERS Technique

A study, led by TIAN Zhongqun at Xiamen University, and a team, headed by WANG Zhonglin with Georgia Institute of Technology, reported their latest findings in the March 18, 2010 issue of journal *Nature*. Under the title of Shell-isolated nanoparticle-enhanced Raman spectroscopy, researchers reported a new technique developed for surface-enhanced Raman spectroscopy. It is believed that the new technique significantly expands the flexibility of SERS for useful applications in the materials and life sciences, as well as for the inspection of food safety, drugs, explosives and environment pollutants. The

SHINERS derived from the study makes obtaining surface Raman spectroscopy of the molecules and ions attached to platinum and gold monocrystal electrodes under a controlled condition possible.

The new SHINERS technique is able to spread a monolayer of 'smart dust', or shell-isolated nanoparticle, on metal or other material surfaces, such as silicon or even orange skin. The nanoparticles treated with the technique enhances Raman spectroscopy on the surface of materials. Meanwhile, the ultrathin coating keeps the nanoparticles from agglomerating, and separates them from direct contact with the probed material. In other words, scientists enhanced the Raman spectroscopy of the molecules to be probed using the shell-isolated nanoparticles.

In addition, researchers picked out pesticide residues in yeast cells and citrus fruits using the technique, and confirmed that the new technique can be applied to probe the surface chemical components of materials, and probe the different contours of substrates, allowing surface Raman spectroscopy to be a more useful tool.

Antinucleus Found

Dr. CHEN Jinhui at Shanghai Institute of Applied Physics under the Chinese Academy of Sciences, in collaboration with XU Changbu, a research fellow working for the U.S Department of Energy's Brookhaven National Laboratory in Upton, N.Y. and scientists at STAR, have found the most massive antinucleus to date on RHIC's STAR detector at BNL. The findings, published in the recent issue of the journal *Science*, were also published in the March 4, 2010 online issue of *Science Express*.

A year ago, Dr. CHEN started to search for the evidences of antinucleus working with XU and other scientists through more than one hundred million high-energy collisions. They screened out 70 examples of new particles from massive data, which led to the discovery of antinucleus.

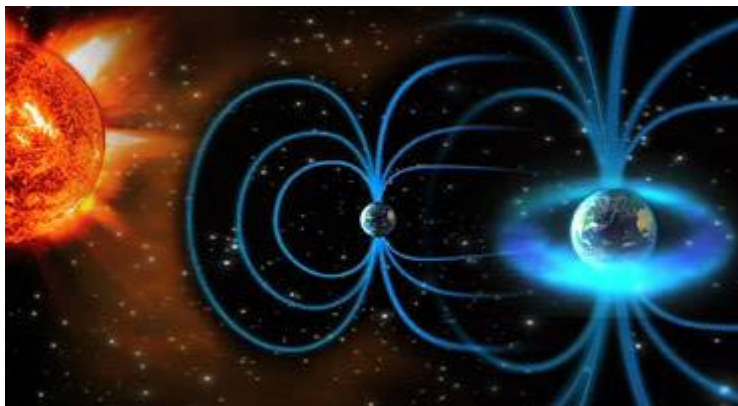
RESEARCH AND DEVELOPMENT

World's First Therapeutic Hepatitis Vaccine

Prof. WEN Yumei, a Chinese Academy of Engineering academician at Fudan University School of Medicine, disclosed on March 16, 2010 that a research team, led by her, has worked out the first therapeutic hepatitis B vaccine in the world, and will terminate its

clinical trials at the end of the year. After that, the therapeutic vaccine will apply for an approval for entering the market. WEN explained that a therapeutic vaccine is a therapy sitting between drugs and immune vaccines. Compared with the interferon therapy that has been widely applied at the present stage, the therapeutic hepatitis B vaccine enjoys numerous merits, including the shortened treatment process, reduced side effects, and lower costs.

Chinese Scientists Unveiled Killer Electron Recipe

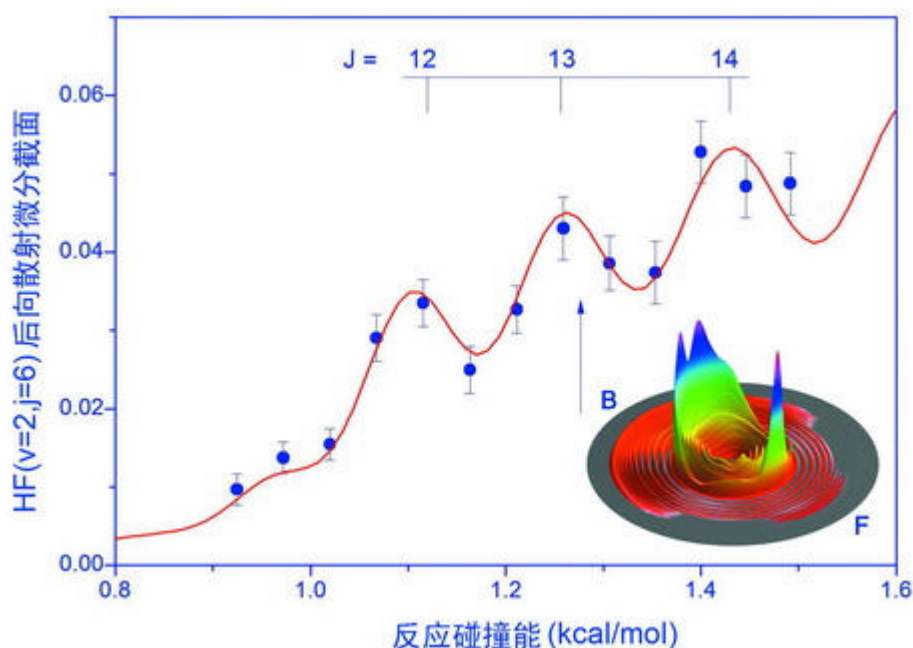


Earth's magnetosphere and radiation belts.

A research team, led by Prof. ZONG Qiugang at Peking University School of Earth and Space Sciences, reported their findings on shocking recipe for making killer electrons in the recent issue of *Journal of Geophysical Research, A: SpacePhysics*. It was also made by the European Space Agency the headline news at its website on March 11, 2010.

The data show that a two-step process causes the substantial rise of killer electrons. The initial acceleration is due to the strong shock-related magnetic field compression. Immediately after the impact of the interplanetary shock, Earth's magnetic field lines began wobbling at ultra low frequencies (ULF). In turn, these ULF waves were found to effectively accelerate the seed electrons provided by the first step, to become killer electrons. Thanks to this analysis of Cluster data, if the killer electrons happen to be ejected towards Earth, researchers now know that they can strike the atmosphere within just 15 minutes.

Partial Wave Resonances Observed



A research team, led by YANG Xueming at Chinese Academy of Sciences Dalian Institute of Chemical Physics, observed partial wave resonances in a chemical reaction. The work, reported in the March 19, 2010 issue of journal *Science*, marks a new breakthrough landed in the area of reaction resonance by YANG and his coworkers at the Institute. The effort was financed by the National Natural Science Foundation, Ministry of Science and Technology, and Chinese Academy of Sciences.

YANG and coworkers designed a cross molecule scattering experiment enjoying the highest resolution in the world. They frozen the two molecule sources to a temperature of 196 below zero at the same time, allowing an unprecedented high energy resolution. Doctoral students in the team eventually realized theoretically predicted three peaks of partial wave resonances at 12, 13, and 14 (the figure), and found an only 0.03kcal/mol deviation from the theoretical prediction, implying a fully reached spectrum.

New Dinosaur Genus Found

An international team, led by Chinese scientists, unearthed an intact fossilized small theropod dinosaur in Inner Mongolia. Named *Lineraptor exquisitus*, the newly found dinosaur is a new genus in the family of dromaeosaurid dinosaur. It is also a best preserved

specimen of meat eating dinosaur in the late Cretaceous Period in the world, enjoying a kinship with the bird's family.

The fossilized dinosaur, reported in the March 19, 2010 online issue of journal *Taxonomic Zoology*, was found by an international team, led by Prof. TAN Lin with Inner Mongolia Longhao Institute of Geological Paleontology, and XU Xing, a research fellow working for Institute of Vertebrate Paleontology and Paleoanthropology under the Chinese Academy of Sciences, over a Cretaceous site in Bayinmanduhu, Linhe, Inner Mongolia during the 2008-2009 expedition. According to scientists, the dinosaur, 2.5m long and 25 kg heavy, used to live in the area some 80 million years ago, and was a smart meat hunter with strong running capability. It sat in the transition between the lean legged primitive dromaeosaurid dinosaur and the relatively advanced dromaeosaurid dinosaur, in the context of evolution.

Clean Metal Magnesium Production

Qinghai Institute of Salt Lakes, part of the Chinese Academy of Sciences, has developed a proprietary new technique for preparing metal magnesium. The new technique removes both the carbon dioxide and sulphur oxides heavily emitted from producing the metal magnesium with a high purity up to 99.99% using the magnesium chloride stemmed from the salt lakes in the locality and the lime left out from industrial processes, realized a clean metal magnesium production process.

The Institute started to work on the clean metal magnesium process in 2008. Thanks to the two-odd year efforts, researchers developed new techniques to extract metal magnesium with a high purity up to 99.99% from the magnesium chloride mined from local salt lakes, and from the lime left out from industrial processes. The techniques effectively reduced the temperature needed for extracting metal magnesium, and shortened the reduction time, desirable for a cyclic and low-carbon economy. The effort has resulted in two national invention patents, and one national grant. The development is of a practical importance to the development of magnesium resources in the locality.

NEWS BRIEFS

Improved Silicon Optical Connection

In collaboration with the researchers at Shanghai Hongli Semiconductor Manufacture, an

SOI team with Shanghai Institute of Microsystem and Information Technology, part of the Chinese Academy of Sciences, has rolled out a silicon-based electro-optic modulator chip at 10Gbps, based on a CMOS platform, taking advantage of its own strength in SOI research and integrated circuit applications. The modulator chip can sit together with an integrated circuit on the same SOI board, meeting the speed needs of high definition TV signal transmission and internet based optical connections. The new modulator chip will find broad applications in the area of new generation high performance computers, optical communication, and consumer electronic appliances.

China's First Large Civic Helicopter

AC313 model, a large helicopter developed by Aviation Industry Corporation of China, made a successful test flight on March 18, 2010 in Jingdezhen, Jiangxi. With a maximum take-off weight at 13.8 tons and an extended range up to 900km, the new helicopter is designed to carry 27 passengers or 15 patients. The new helicopter enjoys enhanced safety, reliability, and comfortableness, desirable for delivering people and cargo, search, rescue, urban and forest fire fighting, anti-terrorism, offshore oil and natural gas drilling, regular passengers shipping, medical emergency, and business flight.

Advanced Wind Turbine Converter

In 2007, DAQO Group started to develop a converter applied to the direct-driven permanent magnet wind turbine at the two megawatt level, in collaboration with Navy Engineering University and Xiangtan Electric Manufacturing Corporation. Thanks to more than 2-year painstaking efforts, DAQO Group worked out a high performance converter that can be applied to a direct-driven permanent magnet wind turbine, enjoying enhanced output density and fine adaptability to the rough environment. Designed to provide high quality power source up to the national standards, the new converter expects to find applications in extended areas, including ship and aircraft, in addition to its application in wind turbines.

Advanced Generic Technologies for Food Industry

An initiative to study advanced generic technologies for food industry, under an agricultural component of National S&T Infrastructure Program during the 11th Five-year Plan period (2006-2010), has developed the non-thermal processing techniques and associated quality control and standards, for meat products, a substantive progress made in the

industrial demonstration of the cold chain control process from production, to delivery, and to sale.

The effort also resulted in an advanced technique for preparing lipid soluble vitamin carrier, along with the proprietary scale systems for preparing biocapsules and emulsificated gel capsules. In addition, researchers worked out the advanced technologies to utilize the non-starch components of corn skin, protein, germ, and silk, and to produce high value added corn products. Researchers also developed an improved technical system for balanced supply of raw organ juice on a long term basis, along with a test kit picking out the bacteria that may cause the deterioration of orange, ensuring the quality of orange juice.

Apart from the above-mentioned accomplishments, researchers established a storage and fresh keeping platform for agricultural products, and rolled out 13 fresh keeping materials and agents, 8 new techniques and technologies for distributing agricultural products, and 6 fresh keeping units, effectively raised China's capability of processing and fresh keeping agricultural products. A pilot project was also staged to produce sea buckthorn fruit oil in a consecutive manner for an enhanced value of agricultural products.

Traditional Therapy for Resistant Tuberculosis

A research center was inaugurated on March 20, 2010 at the Changsha Central Hospital, to treat resistant tuberculosis using traditional medical means, a major national project initiated for the 11th Five-year Plan period. The new center will treat resistant tuberculosis using traditional Chinese medical means, in collaboration with other medical institutions across the country, making itself a center for research, training, diagnosing, lab test, therapy formulating, and therapeutic effects assessment, exploring effective traditional therapies for treating resistant tuberculosis, and providing the needed technical support and evidences for the treatment in the country.

International Collaborations in Optics

Not long ago, Changchun Polytechnic University and the State University of New York at Buffalo established a joint research center at the premises of Changchun Polytechnic to study nano and bio photonics. The new center is made up of five labs, combining the photoelectric strength of Changchun Polytechnic and the laser, biophotonics, and nanophotonics strength of the State University of New York at Buffalo, and focusing on the areas of laser, energy, photon, nanophoton, and biophoton. The center plans to turn itself into a national key lab with an international influence in 5 or 10 years.

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