Technology Scan

ASIA-PACIFIC

CHINA

Proprietary chip

Mr. M. A. Songde, Chinese Vice Minister of Science and Technology announced on 8 December 2003 that BeidaZhongzhi-863, a proprietary CPU chip developed by the Microprocessor R&D Centre of Peking University has entered the market promotion from the massive production phase.

Made of eight million transistors, the system chip has constituted the largest of its kind developed by China. It is reported that China has worked out on its own the chip's major components, including the system structure, commanding system, IP core of integrated circuits, front and end design, system software and supporting software. BeidaZhongzhi-863 based LINUX operating system has delivered numerous advantages such as the proven network computer technology, high reliability, security and cost/effectiveness, easy operation and simple management.

In addition to Peking University, China's other renowned higher learning institutions such as the Chinese Academy of Sciences, Tsinghua University, and S&T University for National Defense have also developed their own proprietary CPU chips.

http://www.most.gov.cn

Gene chip to detect pathogenic organisms

Backed by National 863 Programme, State Research Centre for Bio-Tech Engineering and Beijing Jin Di Ke BioTech Institute have, after five years of research, established a genome-specific probe database for viruses already known to human beings and some other pathogenic organisms, and developed the high-density gene chip able to detect several hundred kinds of pathogenic organisms. Experts noted that the system can swiftly detect pathogenic organisms that are causing trouble to humans, and identify quickly the unidentified viruses, thereby laying an important base for the pathogenic organism monitoring and control system to be established nationwide.

In the face of more and more pathogenic organisms and bacteria, human beings fall short of effective means of detecting and controlling them. At present common methods, such as the nucleic acid amplification test and the serum test, are unable to examine several kinds of viruses at one time, and are thus unable to meet the requirements of the new situation.

Five years ago, efforts were made by Chinese scientists to establish a system for the monitoring and control of pathogenic organisms. "The establishment of a complete database specific-virus test probe, including over 3,000 specific probes for over 300 kinds of viruses related to human diseases, can help detect over 300 kinds of pathogens at one time. The daily production of chips can reach 100 to 200," said Shu Yuelong, vice president of Beijing Jin Di Ke BioTech Institute.

Scientists have established a series of gene chips with different functions. They can be used to detect respiratory and intestinal viruses and pathogenic organisms in the air. They have also established a method for collecting clinical specimens of respiratory viruses of efficiency five to ten times that of the original.

http://fpeng.peopledaily.com.cn

INDIA

Nanotechnology for TB diagnosis kit

The Central Scientific Instruments Organization (CSIO) has finalized the theoretical simulation and design parameters of a micro-diagnostic kit based on nanotechnology, the future of humankind.

"We have been working on the project for a year now. The prototype should be ready by the end of this year. We are the only institution in India working on micro-diagnostic kits based on nanotechnology. Once the prototype is ready, we will be among the few international players in the field. There is a huge billion dollar global market for such kits," said Dr R. P. Bajpai, director, CSIO, while talking to *The Times of India.*

Explaining the concept, Dr Lalit Bharadwaj, head of the nanotechnology division at CSIO, said, "The kit will be around 1 cm by 1 cm cube and would cost around Rs 30 per piece. It would reduce the time taken and the cost of a tuberculosis test. Also, this type of kit will require a very small amount of blood sample, reducing the amount to only a few microlitres."

Nanotechnology involves developing instruments which are extremely small in size. One nanometre is equivalent to one billionth part of a metre. In practical terms one nanometre would be equal to 50,000 times less than the diametre of a human hair, he said.

According to scientists, test facilities for TB is available only in big hospitals, requires expert people, costs a few thousand rupees, and takes a few weeks time to get the results.

Scientists said that round the clock, each and every part of animals and plants, even the tiniest, is being diagnosed and treated for any kind of disturbance. Thus nature has created innumerable molecular sensors and actuators to perform such life processes. They say that techniques based on these highly selective and specific biosensors and receptors such as antibody, antigens and DNA will help in early and precise diagnosis of various diseases.

Scientists further said that the concept can be actually extended to diagnose a large number of other diseases and for monitoring toxins in the environment, including drinking water and food, both processed and fresh. Scientists added that there is no such product available in the world today and most of the research work in nanotechnology is being done in the USA.

http://timesofindia.indiatimes.com

JAPAN

Electron beam lithography

Nippon Telegraph and Telephone Corporation has created an electron beam (EB) lithography system that enables the fabrication of extremely small three-dimensional (3D) structures, with sizes measured in nanometres (a nanometre is a billionth of a metre). NTT demonstrated 3D nanopatterning and nano-

fabrication by exposing a small sphere to the EB to form the world's smallest globe. This highly advanced technique promises to become the technological foundation of nanotechnology, which is expected to give rise to many new industries and new markets.

Key features include:

- 3D nanofabrication and nanopatterning down to the 10-nanometre level.
- A drive that rotates a sample around two axes with a high precision.
- A height sensor that enables the EB to be focused on a 3D sample. The focus error is less than 1-2 micronmetres.
- A new beam-positioning system, which detects the outline of a sample using a transmitted-electron signal for accurate placement of patterns.

EB lithography is of creating two-dimensional (2D) patterns for semiconductor integrated circuits. The resolution at present is on the order of tens of nanometres (billionths of a metre). On the other hand, 3D fabrication methods should have a much wider range of application.

However, current 3D methods have found only limited applications because of some disadvantages. For example, deposition using a charged-particle beam is time-consuming, which makes it very difficult to build complicated structures. Many methods of 3D fabrication have been developed for microelectromechanical systems (MEMS). However, since those methods use an optical or X-ray beam, the minimum size is limited by the wavelength or lithographic resolution, which is on the order of one micron.

The new technique developed by NTT uses a special drive to rotate a sample EB nanolithography, which has a resolution 100 times that of methods using an optical or X-ray beam. This enables reasonaby fast 3D fabrication and patterning. As demonstrations of the technique, NTT used it to fabricate the world's smallest globe and a 3D nano-filter.

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http://www.japancorp.net

Carbon nano-fibre production

Mitsubishi Chemical, Mitsubishi Chemical Engineering Corporation and Shimadzu Corporation are jointly testing a pilot plant of new CO_2 fixation technology (annual capacity of five tonnes). This technology gets CO_2 chemically reacted with methane gas by using catalyst, and converts it to carbon and water. This technology enables us to effectively use organic wastes which used to be incinerated. Using biogas produced by microorganism (methane gas and CO_2), this technology produces hydrogen by means of catalytic reaction with low energy cost. Furthermore, this technology, by using the produced hydrogen, reduces CO_2 emission (a major cause of global warming) from biogas.

Carbon produced in this reaction is in a form of nano-fibre with a diametre of 100 nm (10^{-7} m) or less. The three companies are developing its various potential applications, as a conductive material, a functional pigment and an absorbent.

http://www.m-kagaku.co.jp

High output semiconductor

Japan Science and Technology Agency (JST) has recognized the development of "LD (laser diode) array power laser" for machining as a success. This technology was discovered by Assoc. Prof. Takahisa Jitsuno *et al* at Osaka University and developed on consignment by Hamamatsu Photonics K.K.

Machining using laser beams is widely used in cutting and welding of materials. Although carbon dioxide lasers and YAG lasers used as the light source can produce high optical output, they have defects such as requirement of large equipment and high cost due to low energy conversion efficiency at about 20 per cent.

In the new technology, a large number of GaAs semiconductor lasers (wavelength: c.a. 900 nanometres) with high output and high energy conversion efficiency are formed in an array on a semiconductor substrate. The laser beams emitted from individual lasers are converged together using a corresponding array of micro lenses.

This semiconductor array laser is small at about 20 cm, and has an output less than 100 w. However, due to the use of such lenses, it has realized an energy density at the same level as the conventional lasers for machining. It is expected to reduce costs of laser machining equipment and find applications in fine laser machining.

For further information, contact:
Public Relations Office, General Affairs Department, JST. Tel: (+81-48) 226 5606

S&T Today

THE PHILIPPINES

Diagnostic kits for *E.coli, salmonella*

A research team from the National Institute of Molecular Biology and Biotechnology (BIOTECH) of the University of the Philippines Los Baños, Laguna has developed detection kits for *E. Coli* and *Salmonella*. *Escherichia coli* and *Salmonella* are food-borne pathogens that cause diseases like typhoid fever and other infections of the intestines leading to diarrhoea. The team of Dr. Susana M. Mercado and Teresita J. Ramirez developed the diagnostic kits employing the polymerase chain reaction method. This technique increases the number of copies of certain regions of deoxyribonucleic acid unique to an organism in order to produce enough DNA detectable for testing. DNA is the molecule inside every individual's cells that carries genetic information, which is passed on from one generation to the other. Whereas an accurate identification on the DNA level is assured with the PCR-based method, the conventional method relies more on morphological, biochemical/physiological and serological characters to identify and distinguish microorganisms. "The PCR-based method is a quicker and more reliable way to determine the presence of *Salmonella*," according to Ms.

Ramirez. She said that it only takes 26-28 hours to complete the test compared with the traditional testing which usually takes five to seven days. Likewise, conventional methods currently used are labour intensive, time consuming and expensive. Local food and feed industries still make use of imported diagnostic kits. Ms. Ramirez also said that compared to conventional methods, the PCR method was proven to be more sensitive. While both methods were able to detect *Salmonella* in artificially infected animal samples in a conducted test, the PCR-based method was able to detect other strains of *Salmonella* which the traditional method failed to detect in six naturally contaminated samples. "With the globalization of food supply, there is a vital need to monitor the spread of hazardous organisms in food," said Dr. Mercado. These kits can address the growing global concern on food safety because of its importance in public health protection and to international trade. The Philippine Council for Advanced Science and Technology Research and Development presented a financial grant of P3.144M for the development of the PCR-based detection kit.

For more information on the detection kits, contact:
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http://www.stii.dost.gov.ph

THAILAND

Better rice and silk

Thai physicists are embarking on a new nanotechnology path – this one to develop a new rice strain and improve silk quality. The idea is to keep Thailand a step ahead of others in this nascent know-how.

It is part of a three-year project that would place new emphasis on uses of particles beams and plasma. "The technique is not GMO [genetically modified organism]. At least we can avoid it," said Thiraphat Vilaithong, director of the Fast Neutron Research Facility of Chiang Mai University, as he compared it with controversial genetic modification technology that adds alien genes to plant species to gain desired qualities.

In the nanotechnology-based study, physicists need to make a nanosize hole through a rice cell. A nitrogen atom will then be gunned through the hole to stimulate the rearranging of base substances in rice DNA, which controls its genetic characteristics. With this method, Thiraphat said, the researchers expect to have a new rice strain with desired qualities. What they want is a fragrant rice plant with short stems and not sensitive to sunlight.

A team of physicists will apply the technology to boost the silk quality, another popular Thai product, so that it could outshine the silk products of the world's other three major exporters – Italy, India, and China. Chiang Mai University plasma engineer Pradoong Suanpoot said he planned to develop a technique using a plasma to coat the surface of silk so that it would not get wet easily and attract less dust.

Plasma, or a gas in which the individual atoms are charged, would cause a change at the nano level on the silk surface. Humans cannot feel it, but its new feature can be perceived by putting a single drop of water on the surface and seeing it moving forward and backward like that on a lily leaf. "This is a clean technology because the one currently in use relies on chemicals," said Pradoong, who sees the new technique bringing an increasingly popular trend of environment-friendly products.

The nanotechnology-based research at the university is being financed by the National Research Council of Thailand. The agency has already set aside a 14 million baht (about $ 360,000) budget for their work in the first year as part of Prime Minister Thaksin Shinawatra's initiative to promote nanotechnology.

http://www.smalltimes.com

EUROPE

DENMARK

Nanotubes in hybrid semiconductors

Scientists from the University of Copenhagen, Denmark, claim to have made the first electronic hybrid nanotube-semiconductor devices. They encapsulated single-walled carbon nanotubes in epitaxially grown semiconductor heterostructures such as GaAs/AlAs and (Ga,Mn) As.

"Contacting single-walled carbon nanotubes by epitaxially grown semiconductor material is a totally new approach," researcher Ane Jensen told *nanotechweb.org*. "It may be a way around the difficulties of attaining good electrical contacts to the tubes."

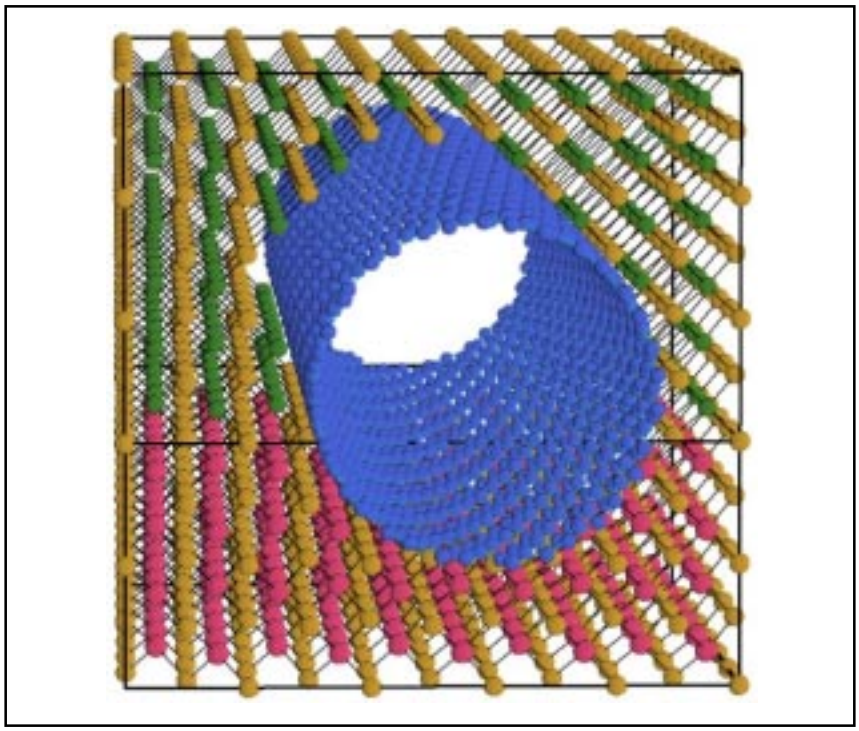
Jensen and colleagues grew the devices on n-doped GaAs substrates prepared by molecular-beam epitaxy (MBE). They deposited a 100-period superlattice of 2 nm GaAs plus 2 nm AlAs ended by 20 nm GaAs as an insulating layer, before coating the wafer with a layer of amorphous As. This layer of As was key to the epitaxial growth process. Carbon nanotubes were then deposited on the surface from a dichloroethane suspension, and the As layer was removed in a MBE chamber to leave a clean, smooth GaAs surface before epitaxial growth of the ferromagnetic semiconductor $Ga_{0.95}Mn_{0.05}As$. The team grew semiconductor layers between 20 and 50 nm thick and capped them with 3 nm of GaAs to prevent oxidation.

Finally, the researchers used lithography to make three-terminal devices from the structures. Islands of (Ga,Mn) As acted as the source and drain to the nanotube, while the n-doped GaAs base served as a back gate.

"Presumably the technique will work with other types of semiconductors since the tubes are mechanically robust and can withstand elevated temperatures," said Jensen. "We believe that the incorporation of single-walled carbon nanotubes in the traditional Si and GaAs semiconductor electronic and optic circuits […] opens up possibilities for designing hybrid nanotube/semiconductor devices, where nanotubes act as interconnects in traditional semiconductor integrated circuits or as active devices."

Examples of such devices could include: a tube field-effect transistor (FET) made from a semiconducting single-walled carbon nanotube, with the source, drain and gate electrodes

A single-walled nanotube incorporated in a GaAs-based heterostructure



constructed from semiconductor material grown epitaxially on top of the tube; a two-dimensional electron gas FET, where the source and drain are traditional diffused contacts but the gate is a nanotube; and a nanotube laser, where a semiconductor cavity contains a semiconducting carbon nanotube doped to form a p-n junction.

"Within the scope of the rapidly growing field of spintronics, we have applied the ferromagnetic semiconductor contacts to nanotubes with the aim of studying spin-polarized electron transport in the tubes," said Jensen. "We hope to present the results from this in the near future. We also wish to explore new semiconductor hybrid devices such as single-walled carbon nanotubes contacted by a two-dimensional electron gas."

http://www.nanotechweb.org

GERMANY

New palladium-based nanotubes

Scientists in Germany say they have developed a new type of nanotube that uses palladium and other precious metals to exhibit a new range of properties.

Nanotechnologists at Weizmann Institute say they have combined palladium, gold, silver and other nanoparticles to formulate a new type of nanotube.

The nanotubes are tiny cylindrical structures measured in millionths of a millimetre, first discovered in 1991, which can boast unusually exaggerated properties. The particular palladium-based tubes in question are said to demonstrate unique electrical, optical and other properties. Indeed, the researchers say their findings may form the basis for future nanosensors, catalysts and chemistry-on-a-chip systems.

Professor Israel Rubinstein, Dr Alexander Vaskevich, postdoctoral associate Dr Michal Lahav and doctoral student Tali Sehayek, all worked on the paper, which was published in Angewandte Chemie. "We were amazed when we discovered the beautifully formed tubes," commented Professor Rubinstein. "The construction of nanotubes out of nanoparticles is unprecedented."

The team is now working on a number of combinations to deliver a selection of different types of nanotube, including gold/palladium and copper-coated gold tubes.

http://www.platinum.matthey.com

UK

Breakthrough in fuel cells

UK researchers claim to have made a breakthrough in the design of fuel cells that could transform the commercial prospects of the fledgling clean-energy technology.

Compact mixed-reactant (CMR) fuel cells are designed to be smaller, lighter and need fewer components - including costly platinum - than conventional alternatives.

Their developer, Cambridge-based CMR Fuel Cells, claimed that when formed into a array of cells - a 'stack' - they can increase performance by up to tenfold and cut costs by 80 per cent.

CMR was this week spun out of technology incubator Generics as a standalone firm to commercialize the new fuel cell architecture.

It claimed the base technology could eventually be applied to almost any type of fuel cell across a range of industries, including power generation and the automotive sector.

But the company's initial focus will be on direct methanol fuel cells for portable electronic devices said chief executive Michael Priestnall.

'We are looking at developments in areas such as battery chargers, laptops and power tools. There are also specific applications for portable military equipment." CMR cells are less prone to failure or accidental damage when dropped because of their simpler design and reduced number of components, he claimed.

The size, cost and complexity of fuel cells has been a persistent barrier to their widespread commercial roll-out.

CMR's system has been under development for several years within Generics, where Priestnall was head of fuel cell consulting.

CMR was born as an independent business after raising capital from investment house Conduit Ventures and the Carbon Trust, which claimed its technology could make a significant contribution to the development of clean energy sources. Generics has retained a stake in the new company.

The fuel cell industry is ferociously competitive, with researchers around the world racing to solve the type of technical issues that CMR is addressing.

Priestnall admitted that it was still early days for the company. "I would characterize us as moderate-to-high risk, but with the potential for an enormously high pay-off." However, he claimed CMR's core technology could become a global design standard for all fuel cells. "We've had cells in the lab running for weeks," he said. "At the fundamental electrochemical level it works. What we are concentrating on now is engineering it into a stack that can outperform the alternatives. We are confident we can achieve that."

Compact mixed-reactant technology literally breaks down the barriers between the elements that make a fuel cell work. Fuel cells rely on the energy produced by the electrochemical reactions of a fuel - for example methanol or hydrogen - and an oxidant at two electrodes coated with a catalyst.

In conventional cells, the fuel is delivered separately from the oxygen by using a sophisticated engineered structure comprising a membrane and barrier plates designed to keep the two apart. This is because, for the cell to work, the fuel needs to react at the anode, and the oxygen at the cathode. If both reacted on the same electrode, the result would be heat rather than electricity.

The plates alone account for about 90 per cent of the size and weight and up to one third of the cost of conventional fuel cell stacks, according to CMR.

Seepage between the two electrodes has long been recognised as a problem, and researchers around the world have successfully identified 'selective catalysts' that will react with the fuel or oxidant while ignoring the other.

This work has been designed to improve the performance of conventional fuel cell designs. But CMR decided that if the catalysts can act selectively there is no need to separate the fuel and oxidant at all and the barriers can come down. CMR fuel cells deliver a continuous mixture of fuel and oxygen through a stack of porous cells, eliminating the need for the flow plates. The anode and cathode are coated with a selective catalyst which reacts appropriately with the fuel/oxygen blend as it passes through the assembly.

A conventional fuel cell would use platinum for both the anode and the cathode because of the precious metal's efficiency at reacting with the fuel and the oxygen. Platinum is removed from the cathode entirely, resulting in significant cost savings. The core element of the fuel cell - the cell repeat unit - is reduced from a thickness of 2 mm to 0.2 mm.

According to CMR, the continuous through-flow also boosts the performance of the reactants across the catalyst surfaces.

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NORTH AMERICA

USA

Hybrid materials for super LEDs

Engineers at Ohio State University have overcome a major barrier in the manufacture of high-quality light emitting devices and solar cell materials. Steven Ringel, professor of electrical engineering, and his colleagues have created special hybrid materials that are virtually defect-free - an important first step for making ultra-efficient electronics in the future. The same technology could also lead to faster, less expensive computer chips.

Ringel directs Ohio State's Electronic Materials and Devices Laboratory, where he and his staff grow thin films of III-V semiconductors. Because III-V materials absorb and emit light much more efficiently than silicon, these materials could bridge the gap between traditional silicon computer chips and light-related technologies, such as lasers, displays, and fibre optics.

Researchers have tried for years to combine III-V materials with silicon, but only with limited success. Now that Ringel has succeeded in producing the combination with record quality, he has set his sights on a larger goal. "Ultimately, we'd like to develop materials that will let us integrate many different technologies on a single platform," Ringel said.

Key to Ringel's strategy is the idea of a "virtual substrate" — a generic chip-like surface that would be compatible with many different kinds of technologies, and could easily be tailored to suit different applications.

Ohio State graduate student Ojin Kwon reported the project's latest results at the Materials Research Society meeting in Boston. Other coauthors include graduate student John Boeckl, also of Ohio State; and postdoctoral researcher Minjoo Lee, graduate student Arthur Pitera, and professor Eugene Fitzgerald, all of the Massachusetts Institute of Technology.

Ringel's current materials design consists of a substrate of silicon topped with III-V materials such as gallium arsenide, with hybrid silicon-germanium layers sandwiched in-between. The substrate is 0.7 mm thick, while the gallium arsenide layer is only 3 microns thick. Other labs have experimented with III-V materials grown on silicon, but none have been able to reduce defect levels below a critical level that would enable devices like light emitting diodes and solar cells to be achieved, Ringel said.

Ringel and his colleagues grew films of III-V semiconductors with molecular beam epitaxy, in which evaporated molecules of a substance settle in thin layers on the surface of the silicon-germanium alloy. They then used tech-

niques such as transmission electron microscopy to search for defects. Other experimental III-V materials grown on silicon have achieved carrier lifetimes of about 2 ns. Ringel's materials have achieved carrier lifetimes in excess of 10 ns.

The engineers have crafted the III-V material into 1-square-in. versions of solar cells in the laboratory, and achieved 17 per cent efficiency at converting light to electricity. They have also built bright light-emitting diodes (LEDs) on silicon substrates that have a display quality comparable to that of traditional LEDs.

The next phase in this research will carry Ringel's materials into space, as part of NASA's Materials International Space Station Experiment (MISSE). An international partner spacecraft will deliver samples of the materials to the space station so they can be tested and possibly developed for use in future spacecraft.

http://oemagazine.com

Safer gene therapy

A product claimed to be the world's first biodegradable gene carrier has hit the market, promising wider and safer treatment of genetic diseases.

Developed by Oceanside, California-based Nitto Denko Group, a maker of biopolymer-based biomaterials, the carrier could be used for gene therapy.

Gene therapy involves the correction of defective genes responsible for disease. By replacing absent or faulty genes with working ones, it can allow the body to make normal rather than disease-causing proteins.

Typically, therapeutic genes are delivered by a carrier molecule called a vector. Vectors are usually either viruses or polymer materials.

Viruses, however, are known to have problems such as injecting their genetic payload incorrectly. It is believed that this led to the recent development of leukemia in children receiving gene therapy for severe combined immunodeficiency syndrome.

Polymer particles have been of interest as an alternative, but until now they have been less effective at transferring genes and more toxic to cells. Toxicity appears to be caused by polymer particles accumulating in cells.

Nitto Denko's polymer particles, however, biodegrade into small, nontoxic molecules that actually promote cell survival and health. The polymer delivery system has proven safe and highly efficient, transferring genes at up to 95 per cent efficiency with less than 5 per cent toxicity. It is currently being sold for research purposes through Carlsbad, California-based Qbiogene under the product name CytoPure.

Nitto Denko hopes to develop applications for the animal experiment and human gene therapy market.

http://www.betterhumans.com

Molecular attack on cancer

Pharmaceutical company scientists are reporting a promising approach to a problem that has baffled cancer researchers for almost a decade: How to fix a molecular waste-disposal system that goes wrong.

The molecule that has their attention is named p53, a protein designed to detect cells that are becoming cancerous and kick off the process of controlled cell death called apoptosis. To make sure that p53 does not kill good cells, it is controlled by another protein, MDM2.

Since the mid-1990s, researchers have known that MDM2 can interfere with attempts by p53 to kill cancerous cells, but no one has yet come up with a workable way to stop that interference.

Now researchers at Hoffmann-LaRoche Inc. report in the January 2 issue of *Science* that they might have such a method: Tiny molecules designed to block the site that MDM2 uses to bind to p53. They call the molecules "nutlins," a name that might confuse those who do not know that the Hoffman-La Roche laboratory is in Nutley, N.J.

"There is a well-defined region on the surface of the molecule where the interaction takes place, a region of three amino acids," says Lyubomir T. Vassilev, a molecular oncologist who heads the research effort. "If we are ever going to target the protein-protein interaction, this one offers the best opportunity."

Vassilev and his colleagues came up with the nutlins by first getting detailed X-ray images of the binding site. Then they screened a huge library of synthetic chemicals to find some that can nestle in the site to stop the protein-protein interaction.

"For the first time, we are showing that a small molecule can actually bind to the MDM2 surface," Vassilev says.

The p53-MDM2 interaction plays a role in perhaps half of all solid tumors, he says. But there's a long way to go before nutlins can be shown to have any value as a cancer treatment. Other approaches have been tried without success, he notes, and "many companies are terminating projects because it turns out to be not so easy."

"The next step to see if the molecules are appropriate for clinical use is to use mice as models," Vassilev says. "A significant number of experiments need to be done to elucidate the value of this approach."

And success with animal tests would not necessarily guarantee positive results with human cancers, he adds, because "many things can occur in clinical trials that are not predicted." "We don't know yet to what extent side effects will be tolerated," he says. A careful balance must be achieved Vassilev says, so that p53 mounts the appropriate attack against cancer cells with a minimum of harm to normal cells.

"One cannot predict all that will happen," he says. "With the right molecules and lots of work ... we believe we have molecules that can do the job."

http://news.yahoo.com

Conference Announcement and Call for Abstracts

22-26 November 2004
Chiang Mai, Thailand
The 1st Asian Space conference
Organized back to back with the Asian Association on Remote Sensing (AARS) 25th Annual Conference entitled the Asian Conference on Remote Sensing (ACRS).
Organizers: The International Institute for Geo-Information Science and Earth Observation (ITC, the Netherlands) and the IIAS, in close cooperation with the ACRS organizers the Asian Remote Sensing Conference and the Geo-Informatics and Space Technology Development Agency (GISTDA , Thailand).

Deadline for Abstract Submission: 30 June 2004
Abstracts (in English) are limited to 300 words on an A4 sided page and must include:

- *Suggested topics*
- *Paper title*
- *Author Name(s)*
- *Proposed presenter(s)*
- *Affiliation(s)*
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