

Asia Nano Forum NEWSLETTER

(Issue No. 18)

ANF Secretariat, Singapore

November 2012

Editor:

Hongfang JIN

Lerwen LIU

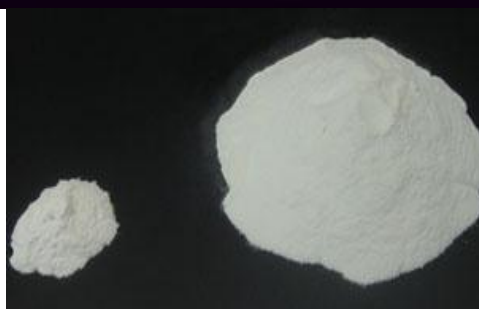
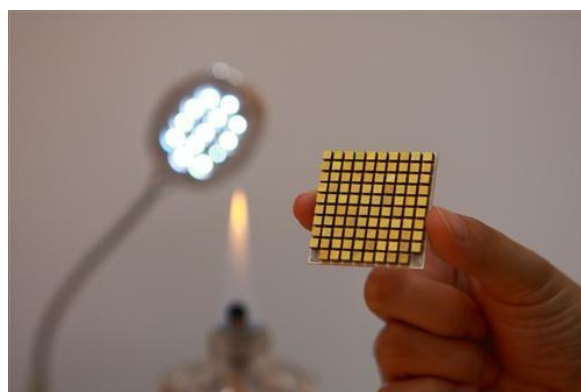
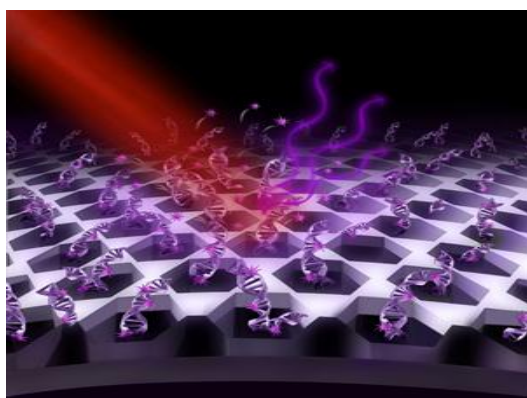


Table of Contents

NEWS	3
✧ Partnerships/Collaborations	3
✧ Commercialization and Business	8
✧ New Education/Research Programs	11
✧ General News.....	13
RESEARCH BREAKTHROUGHS.....	16
NEW PUBLICATIONS.....	20
EVENTS.....	22

NEWS

✧ Partnerships/Collaborations

Taiwan (Source: NPNT)

- ◆ *The 9th Cross-Strait Workshop on Nano Science and Technology, Taiwan*

The 9th Cross-Strait Workshop on “Nano Science and Technology” (CSWNST9) was held at the National Cheng Kung University, Tainan, Taiwan from April 22 to April 25, 2012. The event was covered with oral and poster sessions. (Photo source: National Program on Nanotechnology)

India (Source: ARCI)

- ◆ *Nanotechnology Application Centre (NAC) works in close collaboration with US army's research wing, Maryland*

KANPUR: The Nanotechnology Application Centre under Allahabad University has announced a tie-up in the field of nano-hybrid materials with research wing of the US Army, Aberdeen, Maryland. This tie-up will allow NAC scientist's team to work with experts of US Army Research Laboratory and the Michigan Tech University, Houghton and would help them to avail the various facilities like relevant software to strengthen the research work at NAC.

[\(Source\)](#)

- ◆ *Izon Science, New Zealand has donated 'qNano system' to IIT Bombay*

MUMBAI: New Zealand based nanotechnology company, Izon Science, has gifted highly advanced 'qNano system' to Department of Biosciences and Bioengineering at Indian Institute of Technology (IIT), Bombay. This instrument provides highly accurate results and will be beneficial in one of the advanced research areas of nanomedicines like drug delivery using specially engineered nanomaterials. qNano instrument is very precise in measuring physical properties like size, concentration, surface energy of particles even in micro/ nano quantities of samples. The company has shown its interest to collaborate with various different universities of India to strengthen their research activities.

[\(Source\)](#)

Taiwan (Source: NPNT)

- ◆ *Canada/Taiwan Joint Workshop on Nanotechnology, Canada*

The joint workshop was held at Waterloo, Canada, in order to facilitate cooperative relationship between Taiwan and Canada in this past July.



- ◆ *2012 Taiwan Nano Exhibition*

Taiwan Nano Exhibition and its serial demonstration of program achievements organized by NPNT was presented between October 3rd~5th, 2012 at Hall 1 of Taipei World Trade Center. The largest Nano exhibition in the country has been moving into its 10th year and the number of visitors is on the rise year by year.

The 2012 exhibition included government pavilions, domestic and foreign industry forum, and technology showcases, which display influential inventions and products. Not only the potential and advancement of Taiwanese nanotechnologies but also an international platform for further collaboration and business opportunities was revealed and provided to all of attendees. (Photo source: National Program on Nanotechnology)



◆ *2012 CNSI/NPNT/BETRC Joint Workshop on Nanotechnology, Taiwan*

This joint workshop was held at the National Chiao-Tung University (NCTU) on October 2nd. This workshop was to enhance the closed relationship between National Program on Nanotechnology (NPNT) and The California NanoSystems Institute (CNSI). The speakers from both sides have given speech in several topics including Nanoelectronics & Optoelectronics, Material Science & Energy Engineering and Nano Biomedical & Agriculture.



◆ *2012 UOW/NPNT/BETRC Nanobionic Symposium, Taiwan*

The symposium was also held at NCTU on October 2nd. The symposium provided a discussion platform with the topics of Fundamental Aspect of Medical Bionics and Selected Applications of Implantable and Wearable Bionics between Australia and Taiwan in order to initiate further collaborative subjects for both sides.



Thailand (Source: NANOTEC)

◆ *Investment in XAS Beamline 5 for green nanotechnology*

NANOTEC, Suranaree University of Technology (SUT), and Synchrotron Light Research Institute (SLRI) have jointly invested in the construction of the X-ray Absorption Spectroscopy (XAS) Beamline 5 at SLRI in Nakornratchasima province which is 250 km north-east of Bangkok. HRH Princess Maha Chakri

Sirindhorn graciously presided at the Royal Commissioning of Beamline 5 in October 2012 at SLRI.

The use of Beamline 5 (XAS) will focus on research related to chemical and structural analysis. For example, one of NANOTEC research activity that will utilize XAS will be in the area of absorption analysis of nanoscale catalyst for Biorefinery. The XAS analysis is expected to play a major role in understanding



nanoscale structure and catalytic mechanism. In addition to energy production and storage research activity, NANOTEC will apply the XAS for R & D in food packaging and water treatment research activities.

◆ *NANOTEC strengthens collaboration with key research institutes and universities in Australia*



NANOTEC in cooperation with the Australian Education International, Australian Embassy in Bangkok hosted the Thailand-Australia Symposium: New Frontier on Advanced Functional Nanomaterials on October 18-19 at the InterContinental Hotel, Bangkok, Thailand. H.E. Mr. James Wise, Australian Ambassador to Thailand presided over the opening ceremony.

The aim of this symposium is to bring together leading Thai and Australian researchers and scientists to have an excellent opportunity to discuss, exchange ideas and network with potential collaborators on current and advanced development and application of nanotechnology in Nanomaterials, Nanocharacterization and Life Sciences.

The event brought together 10 Australian leading scientists from renowned institutions/ universities namely University of Technology Sydney, Mawson Institute, Ian Wark Research Institute, University of South Australia, The University of Queensland, Flinders University, Queensland University of Technology, RMIT University and CSIRO Clayton Laboratories and 13 Thai researchers and scientists from well-known institutions/universities from Chulalongkorn University, Mahidol University, Suranaree University of Technology, King Mongkut's Institute of Technology Ladkrabang, BIOTEC and NANOTEC.

2012 marks the 60th anniversary of diplomatic relations between Australia and Thailand. In this time, Australia and Thailand have developed an enduring bond of friendship, built on strong science, technology and innovation links. Therefore, this symposium is one of the mechanisms to move forward in order to strengthen the relationship across the full range of our bilateral and regional engagement.

◆ *Thailand hosted the 9th Asia Nano Forum Summit 2012 (ANFoS2012)*

Thailand hosted the 9th Asia Nano Forum Summit 2012 (ANFoS2012) on August 23, 2012 in Bangkok. His Excellency Dr. Plodprasop Suraswadi, Minister of Science and Technology was the guest of honor to present the Opening Remarks on the "Status of Nanotechnology Development in Thailand".

"The government gives importance to promoting the development of science and technology especially new and advanced technologies such as nanotechnology. This is vital for the well-being of the Thai people, and for national competitiveness in global market", said His Excellency Dr. Plodprasop Suraswadi, Minister of Science and Technology.

Asia Nano Forum Summit is an annual meeting of the representatives of 15 economic members of Asia Nano Forum (ANF). The meeting provides an opportunity for member countries to update on status of nanotechnology development in their respective countries. It also serves as a venue to hold the ANF Annual General Meeting (AGM).

Apart from the ANFoS2012, NANOTEC and ANF secretariat jointly organized the 1st Asia Nano Forum Summit Technical Seminar on August 22,2012 at Thailand Science Park on the topic of “Nano Labeling and Safety Issues” and “Green Nanotechnology”. Invited speakers from 15 of ANF member economics participated in the technical presentation and discussion.



◆ *First NanoQ labeling in Thailand*

The Nanotechnology Association of Thailand presented the first NanoQ label to Supreme Products Co.,Ltd on September 27, 2012. The NanoQ label certifies that the paint formulation produced by Supreme Product for use in coating the interior of the ambulance contains silver nano particles that have antibacterial property. The testing of the paint formulation samples was performed by Nano Characteristic Lab at NANOTEC. Mr. Kovit Tantranont, Director of Supreme Products was on hand to receive the NanoQ from Prof. Sirirung Songsivilai, President of Nanotechnology Association of Thailand.



Currently, the Nanotechnology Association of Thailand encouraged business counterpart in the paint, ceramics, textile, and household plastic industries to make inquiries on the possibilities of obtaining NanoQ label for their product. The NanoQ label will give their customers a sense of assurance that the product they are using does have nano particles with specific characteristics as stated by the company.

Indonesia (Nanotech Indonesia Inc.)

◆ *Indonesian natural resources based nanotechnology developed by Nanotech Indonesia Inc.*

Nanotech Indonesia Inc. is one of the pioneers in development of Indonesian natural resources based nanotechnology products. In the last 3 years, this company has been making significant progress in developing nanoparticles made from Indonesian unique herbs as follows:

1. *Spirulina Nanopowder*

Spirulina is widely known as a powerful herb for antioxidant, anticoagulant, and many exciting medical benefits. Nanotech Indonesia Inc. has successfully developed spirulina nanopowder with average particle size of 75.8 nm. In nano-size, supplements' absorption in body will be hypothetically enhanced. Currently Nanotech Indonesia Inc. is looking for potential collaborators for throwing this Nano spirulina into market.

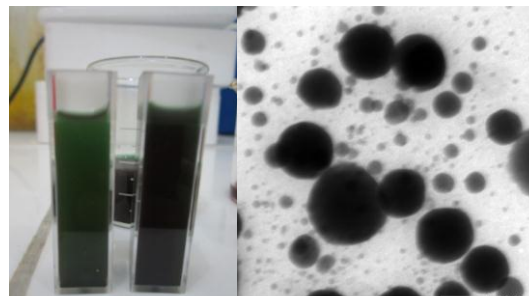


Figure 1. Spirulina nanopowder in dispersion (left); TEM image of Spirulina nanopowder (right).

2. *Nano vitamin A for additive in cosmetics*

Nanotech Indonesia Inc. also has developed vitamin A encapsulated in chitosan nanoparticle. This project has advanced into a commercialized product of herbal super cream with commercial name



ORYZANO™ collaborating with Gizi Indonesia Ltd. and Qolbi Ltd.. This cream

Figure 2. ORYZANO™ super cream with extract vitamin A encapsulated in chitosan nanoparticle (left); TEM image of vitamin A encapsulated with chitosan nanoparticle (right).

is believed to have a anti aging and anti oxidant effect. Nanotech Indonesia is now looking for a chance to expand into South East Asia market.

3. *Other products*

Nanotech Indonesia Inc. has also developed several other products, for instance: rice nanoparticle for additive in cosmetic, purwaceng (*Pimpinella pruatjan*) nanoparticle and pasak bumi (*Eurycoma longifolia*) nanoparticle for additive in coffee, ginseng nanoparticle, gojiberry nanoparticle, and many more, shown in Figure 3. Some have already become commercialized products, while some still need to look for potential collaborators in near future.



Figure 3. Pancasona coffee with nano pasak bumi and nano purwaceng for stamina enhancement (collaborator: Zstar Berkah International Ltd)

✧ Commercialization and Business

India (Source: ARCI)

◆ *Nano- emulsion 'Trios' has been launched in India*

CHANDIGAARH: Venus Remedies Limited, a Chandigarh based R & D company has recently launched a new nano-based emulsion 'TROIS' for arthritic pains in India. This drug contains good blend of natural medicines formulated in nano- emulsion form for topical application. TRIOS is getting good response across Indian market and showing dramatic improvements in arthritic pain condition. The company has filed patents for TRIOS in many other countries and they are soon launching this product in international market. TRIOS can be used in various inflammatory pain conditions like osteoarthritis, rheumatoid arthritis, juvenile idiopathic arthritis, gouty arthritis, ankylosing spondylitis, psoriatic arthritis, backache, sprain and fibromyalgia. ([Source](#))

◆ *Single Vial of 'Taxedol' is launched in India*

BENGALURU: Once again, the leading pharmaceutical company, Venus Remedies Limited has launched a nano based drug for treatment of cancer. The drug is meant for immediate use without any reconstitution. It is the revised version of marketed drug 'Docetaxel' under new brand name 'Taxedol' which is available in three different doses of 20mg/ 0.5ml, 80mg/ 2ml and 120mg/ 3ml. Taxedol has a potential against several type of cancers like; prostate cancer, gastric adenoma cancer, head cancer, neck cancer, breast cancer and ovarian cancer as parent drug. This nano- based new form of drug has the advantage that it can be dispensed as single vial, which does not require multiple dilutions before use and therefore, there is a less chance of contamination. Again, this single dose administration (via. parental route) has improved patient compliance in comparison to multiple administrations. Other listed advantages are reduced particle size in nano range are enhanced efficacy, better penetration and lesser side effects. ([Source](#))

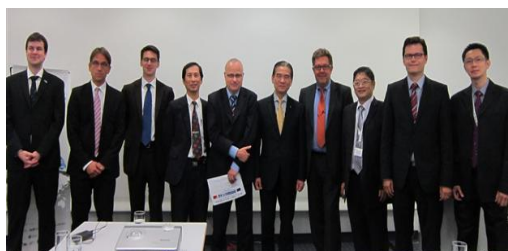
◆ *New TSEZ proposal for public-private partnership*

KOCHI: Pushpagiri Medical Society (PMS), which is managed by Syro Malankara Catholic Church is planning to launch a Rs. 875 crore project in its 140-acre campus for the development of Tiruvalla Special Economic Zone (TSEZ). Under this project, they are planning to set up industries related to medical instruments and alternative energy, nanotechnology and biotechnology. TSEZ will focus on indigenous technologies to offer innovative platform to the students for the development of beneficial products and services. ([Source](#))

Taiwan (Source: NPNT)

◆ *ITRI Creates a Taiwan-European Automotive Industry Connection Platform to Give Taiwan's Telematics Industry Access Global Automotive Markets*

In order to establish an exchange platform between Taiwan's information and communications technology (ICT) industry and Europe's automotive industry to access the global auto markets in terms of high quality ICT products, the Industrial Technology Research Institute (ITRI) held a Europe meets Taiwan forum on September 13 (September 12 European time)



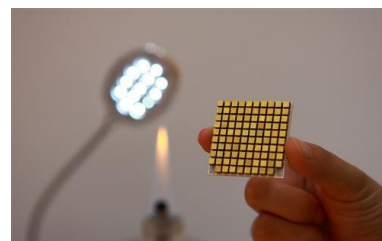
in Frankfurt, Germany to promote the cooperation between Taiwan's outstanding ICT industry, the automotive part industry and world famous European automotive industry. The forum was organized around two hot topics in today's automotive industry --- electric cars and telematics. Experts from Taiwan and Germany were brought together to share their insights on the latest car electronic development trends in the two countries.

At this forum, the German experts introduced the latest electric car developments in Germany and how Internet applications in the future will spur further vehicle integration. The experts from Taiwan introduced topics such as innovative vehicle applications and service development strategies as well as mobile security for inter-vehicle communications. Discussion of these next generation advanced vehicle development trends have drawn the close attention of many industry members attending the forum.

Taiwan's dynamic ICT industry can serve as a forceful weapon in the development of advanced vehicle communication testing and vehicle electronics. Mutual enhancement of individual strengths could be achieved if the advantages of Taiwan's ICT industry could be combined with Germany's powerful electric vehicle system technology. It is hoped that this Europe meets Taiwan forum can accelerate Taiwan-European automotive industry cooperation towards its next milestone. (*Information Source: nanoMark, MOEA; ITRI*)

◆ *ITRI Wins R&D 100 Awards for Fifth Year in a Row*

Generally known as the Oscars of the technology industry, the R&D 100 Awards were announced in the United States on June 20. ITRI was selected as a winner for the fifth consecutive year. This year, ITRI won six awards for the following advanced technologies: Lignoxy, lignin-based polymer technology; TEMM, thermoelectric material and module technology; SideLighter, optical microstructure-based concentrator photovoltaic technology; aePLASMA, atmospheric environment plasma coating technology; Light&Light, A19 LED light bulb technology; and AVA-Clamp, clamp-on voltage and current meter technology. The six awards ranked ITRI second among all participating organizations, which included Intel, Dell, 3M, Hitachi and other internationally renowned manufacturers. ITRI's consistently strong performance in the R&D 100 Awards over the years confirms that Taiwan's scientific and technological strength has reached a world-class standard, and displays its vitality and capability in technological R&D and innovation for all the world. (*Information/Photo Source: ITRI*)



TEM - Photo source: ITRI

◆ *ITRI wins Two Technology Innovation Awards from Wall Street Journal*

ITRI received honors in two categories of the Wall Street Journal's Technology Innovation Award October 16. ITRI has won the awards for the past four consecutive years. This year, the institute is the only winner with dual awards, which are SideLighter in the energy category and aePLASMA in manufacturing technology.

SideLighter is a “solar-energy technology that concentrates sunlight by directing it sideways to small solar cells at the edge of a panel,” while aePLASMA is a “plasma-jet coating process for applying transparent conductive materials to touch-screen displays and photovoltaic products,” according to the Journal.

Wu Tung-chuang, ITRI executive vice president, said both innovations were developed with green energy concepts and the support of the Ministry of Economic Affairs under its science and



Side Lighter

aePLASMA

technology program. According to

Wu, aePLASMA could help to solve environmental problems result from

power consumption and the production of toxic materials, while SideLighter allows the installation of solar panels for a greater range of locations, thereby boosting utilization of this renewable energy source. (Information Source: Taiwan Today, ITRI)

◆ MOEA, nanoMark Progress

Passed 41 certification standards

34 Companies with 1150 products



Recent approval of nanoMark product certificate regulations:

Product Category	Product Type	Product No.	Date of Approval
Certification Specifications of Nano Silver Antibacterial Water-based Paint	Paint	TN-39	08/17/2012
Certification Specifications of Nano Photocatalyst Antibacterial Paint	Paint	TN-40	08/17/2012
Certification Specifications of Nano Ceramic Tile with Stain-resistant Treated Surface	Building Materials	TN-41	08/17/2012

The nanoMark websites have accepted with Accessible Web Development Guidelines and currently upload the English version information of “Nano Surface Coating Standards High Weather Durable Aluminium” and “Nano Metal Oxide Antibacterial Wood Board” on the site. See more detail information on: <http://proj3.moeaidb.gov.tw/nanomark/Eng/License/>. (Information/Photo source: MOEA, nanoMark website)

✧ New Education/Research Programs

India (Source:ARCI)

- ◆ *School of Nano- engineering will be shortly opened by BV University*

PUNE: The Bharati Vidyapeeth University (BVU), Pune has announced its new plan to open the 'School of Nano-engineering' in joint collaboration with the US and Japan universities. This school will offer M. Tech, PG diploma and PhD courses in Nanoscience and technology. The curriculum for different courses will be designed in such a way so that maximum number of students will get exposure to the research environment and facilities of foreign universities for their dissertation works. The university has already made tie-ups with North Carolina A & T (NCAT) State University, USA and it is now chasing similar tie- ups with prestigious universities from Japan. ([Source](#))

- ◆ *Nanotechnology centre at Tamil Nadu Veterinary and Animal Sciences University*

CHENNAI: The Tamil Nadu Veterinary and Animal Sciences University has recently announced to open a new nanotechnology research centre in their university campus. The university has submitted its proposal to the management for the grant of equipments for their centre. The basic area of research will focus on nanotechnology with more emphasis on targeted drug delivery systems. The university is also looking for Industry- Institute collaboration for research and development. ([Source](#))

- ◆ *AK University is opening new Postgraduate and Doctorate courses in nanotechnology*

BIHAR: Aryabhatta Knowledge University (AKU) has initiated a step for opening of Post- graduation and PhD courses in nanotechnology from this year. Currently, this university is functioning from Chanakya National Law University campus at Mithapur farm. Early this year, this university has set-up one research centre on nanotechnology at Patna, Bihar. ([Source](#))

Singapore (Source: NUS)

- ◆ *NUS environmental projects at energy forum*

NUS showcased its latest research of different environmentally sustainable projects on campus at the recent Singapore International Energy Week (SIEW) 2012. As part of the inaugural Asia Future Energy Forum & Exhibition held in conjunction with SIEW, the University hosted a mini conference for participants to learn more about its work on 24 October.

Marking its strong ties with the industry, NUS inked agreements with Medad Technologies and Singapore Technologies Kinetics Ltd at the event. The desalination technology developed by a team led by Professor Ng Kim Choon of the NUS Department of Mechanical Engineering taps on waste heat as the main energy source. This approach, more energy-efficient than reverse osmosis employed in most desalination systems, will be commercialised by Medad Technologies. NUS Energy Office Director Professor Michael Quah, who moderated an insightful session on bringing research from the laboratory to the market, said that "energy needs to be viewed from a holistic viewpoint".

To do this, his office offers a "one-stop shop" for the University's energy information and serves as a platform for researchers from various faculties to look at issues together in an integrated manner.

One such project is the year-long study of [Toyota Tsusho's micro electric vehicles](#) which are powered by sealed lead-acid batteries and have zero carbon dioxide emissions. NUS researchers are currently collecting data for its usability on Singapore roads and the possibility of producing remotely controlled electric vehicles. An annual event, SIEW is a venue where energy professionals, policymakers and commentators congregate to discuss and share best practices and solutions within the global energy space.



◆ *Lee Kuan Yew Distinguished Visitor speaks on nanotechnology*

Far from being a mere buzzword, nanotechnology is already here and being applied in many sectors, ranging from electronics, medicine and energy to security and defence. Professor Chad Mirkin, who is Rathmann Professor of Chemistry at Northwestern University in the United States, stressed this fact at an NUS lecture in his capacity as a Lee Kuan Yew Distinguished Visitor.



"Nanotechnology focuses on developing tools for making, characterising and manipulating materials on the nanometre length scale. It also determines the chemical and physical consequences of miniaturisation. What really makes this field interesting is that everything when miniaturised has new properties," said Prof Mirkin, one of the world's most cited chemists and an adviser to US President Barack Obama.

The nanoscience expert illustrated the observation with his invention of the Dip-Pen Nanolithography which can be used to deposit molecules and materials on surfaces with sub-50-nanometre resolution. National Geographic named the technology as one of the 100 scientific discoveries that changed the world. The novel technology has allowed circuit boards to shrink, leading to the development of progressively smaller computers.

Following the engrossing lecture, Prof Mirkin fielded questions from the packed auditorium which included the infrastructure needed to commercialise research work as well as technical details related to nanotechnology.

Established in 1995, the Distinguished Visitors Programme invites internationally eminent academics and scholars to Singapore to create high-level contributions to NUS, Nanyang Technological University and Singapore. The programme is funded by an endowment fund set up by friends and well-wishers of Singapore's former Prime Minister Mr Lee Kuan Yew on the occasion of his 60th birthday.

✧ General News

Thailand

◆ *NANOTEC researcher won Research Awards*

Dr. Chaisak Chansriniyom, NANOTEC researcher from Nano-cosmeceutical Laboratory, is one of the recipients of the 2012 Cerebos Awards for his research proposal entitled “Evaluation of Antihyperlipidemic and Antioxidative effects of Phyllanthus emblica and Alpinia galanga Extract for using in Dietary Supplement Product”. The Royal Award Presentation was presided by HRH Princess Somsawalee at the Cerebos Award Conference 2012 on October 11, 2012 in Bangkok. This is the 12th year that Cerebos have presented research grants to upcoming researchers who have presented promising research projects that are considered beneficial to society in areas related to health.



◆ *NANOTEC researcher won business pitch award*

Dr. Phikunthong Kopermsub, NANOTEC researcher from Nano-Delivery Laboratory and her team found that consumer trends showed an increase interest in products that are considered non-chemical and made from natural compound extracts. The team implemented a research project to invent QAcnes, an electrospun anti-acne pad, by applying the mangosteen extract in easing the discomfort associated with acne. Applying QAcnes leaves no scare marks to the end-user. It is effective pad which can be used with any facial makeup application.



QAcnes made from nano encapsulation of mangosteen extract won both Best Presentation Award and Outstanding Investor's Choice Award at NSTDA Investor's Day 2012 on September 20, 2012. Dr. Phikunthong presented the business pitch to over 300 investors and interested participants. The research is on process to commercialize to business sector.

◆ *NANOTEC received Senate Acknowledgement Award (S&T for Excellence)*

NANOTEC received the Senate Acknowledgement Award (S&T for Excellence) from Mr. Nikom Wairatpanij, President of the Senate at Parliament House on November 5, 2012 under the category of using science and technology to build societal impacts to health and medical sector. Dr. Sirasak Teparkum, Deputy Executive Director represented NANOTEC at the award ceremony.

This is the first year that the Thai Senate decided to present the award to various agencies who have demonstrated the use of S&T to promote excellence in various categories.



Singapore

◆ *NUS researchers recognised for R&D contribution*

A team comprising an NUS clinician-scientist and a Nanyang Technological University engineer received the President's Technology Award, which acknowledges research scientists and engineers in Singapore who have made outstanding contributions to research and development resulting in significant new technology or innovative use of established technology.

Assistant Professor Chen Wei, conducts research focusing on surface and interface science. The recipient of numerous research awards, his achievements include the development of rational design approaches to self-assemble molecular nanostructure arrays over macroscopic areas, the invention of a simple non-destructive surface transfer method to effectively dope graphene for nanodevices, and the identification of interface properties for organic solar cells. (Photos: A*STAR)



◆ *Environmental and sustainability research for world future*

Ten outstanding PhD students received this year's World Future Foundation (WFF) PhD Prize in Environmental and Sustainability Research, the only such award in Singapore that recognises excellence in doctoral-level environmental and sustainability research. The winners from NUS and NTU won US\$10,000 each for doctoral theses related to the topics on environment, sustainability and metropolis of the future.



This year's winning projects were from the NUS Faculty of Engineering and Faculty of Science, including Dr Saravanan Kuppan's work on finding novel materials for lithium-ion batteries and Dr Wei Yuting's use of environmentally friendly engineered materials to remove arsenic and boron from water.

At the awards ceremony on 11 July, NUS Vice Provost (Education) Professor Tan Thiam Soon pointed out the impressive quality of the 110 submissions received. He congratulated the proud recipients, saying: "Our winners had once again distinguished themselves with their high-quality projects where they have demonstrated passion, creativity and innovativeness in developing multidisciplinary solutions towards solving environmental problems."

This observation was echoed by Dr Feng Lun, Chairman of the board of WFF. He expressed delight at the calibre of the NUS and NTU scholars who have displayed dynamic capabilities to explore sustainable development for the environment constantly.

A renowned social entrepreneur and real estate tycoon, Dr Feng established WFF in 2010, a philanthropic foundation incorporated in Singapore and dedicated to promoting research on environmental sustainability.

The 2012 NUS WFF Prize recipients and their research are as follows:

- Dr Chen Jie, Faculty of Science "Theoretical investigation on thermal properties of silicon based nanostructures"
- Dr Panu Sukitpaneemit, Faculty of Engineering "Fundamentals of PVDF hollow fiber membrane formation and pervaporation for ethanol-water separation"
- Dr Saravanan Kuppan, Faculty of Science "Synthesis of nano-structured materials and their application in lithium-ion batteries"
- Dr Wei Yuting, Faculty of Engineering "Removal of anionic contaminants by environmental-friendly engineered materials"
- Dr Zhang Wei, Faculty of Engineering "Fabrication of dye sensitised solar cells with enhanced conversion efficiency"

RESEARCH BREAKTHROUGHS

India (Source: ARCI)

- ◆ *Effectual linking of siRNA with nanoparticles for targeting cancers*

HYDERABAD: Scientists from CSIR- IICT (Indian Institute of Chemical Technology) laboratory have developed some biodegradable organic acid nanoparticles as an effective delivery vehicle for anti- cancerous drugs. These nanoparticles can also combine with DNA/ RNA material for effective gene therapy. In this experiment, siRNA (short interfering RNA) were attached with nanoparticles to target specific genes. *In vivo* studies have further confirmed that these vehicles can be administered by oral route to target the cancer inducing specific genes by controlling its expression. Another advantage lies in the fact that these nanoparticles will not accumulate inside body. ([Source](#))

- ◆ *Carbon-dots (C-dots) as medical diagnostics to improve bio-imaging*

KHARAGPUR: Researchers from the Indian Institute of Technology, Kharagpur, have prepared new water soluble C-dots that can produce luminescence in entire visible range without any additional coating material. These C-dots when exposed to specific wavelength, emits different colors of light and this unique property makes them more useful for improving the vision in bio- imaging. They are capable of tracking biological reactions inside cells without any signs of toxicity. These C-dots nanoparticles have been prepared by breaking down of carbohydrate dextrin with microwaves. ([Source](#))

- ◆ *Economically valuable water purifier based on AgNPs*

NOIDA: Scientists from Amity university, Noida have developed a new water purifier that is very economical, easy to carry and is reusable. This product is based on silver nanoparticles embedded porous concrete pebbles, which is available in the form of portable tea bags at extremely low price (Rs. 100). This can be reused to cleanse up to 1000 liters of water in a shelf-life of 6 months. This water purifier inhibits the bacterial growth in drinking water without consuming any current or energy. This product was tested and certified by Shriram Institute of Industrial Research, New Delhi and now designed, packed and manufactured by Kunstocom (India) Ltd. (An AKC Group Company). The technology is patented by Department of AIARS, Amity University, India. ([Source](#))

- ◆ *Extraction of Hydrogen as a future fuel by using nano- photo electrodes*

VARANASI: Professor O.N. Srivastava and his team from Centre for Hydrogen Energy, Department of Physics, Banaras Hindu University, Varanasi is doing the research on extraction of hydrogen from water as a cheaper fuel to run automobiles and batteries. This team is busy in exploring various ways to maximize efficiency of extraction of hydrogen from water source. Recently, they have developed and used nano-structured TiO₂ as photo electrodes instead of anodes. The recent research has shown that this nano-based photo electrode is expected to increase the hydrogen production by ~50% over conventional method. This team has successfully developed two and three wheelers running on hydrogen in the past. ([Source](#))

- ◆ *Quercetin nanocapsules for gastric ulcerations*

KOLKATA: In a new research outcome, a team of scientists from Drug Development Diagnostic and Biotechnology Division, Indian Institute of Chemical Biology (IICB), Kolkata have developed the quercetin based nanocapsules to

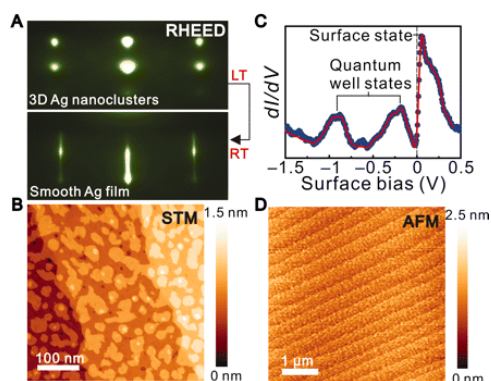
treat gastric ulcers. Quercetin is the natural compound present in various fruits and vegetables. It is a poorly soluble drug with slow onset of action, and thus, researchers have formulated nanocapsules of quercetin. Results showed that these quercetin nanocapsules are also active at 20 times lower dose for treating gastric ulcerations. ([Source](#))

Taiwan (Source: NPNT)

◆ Plasmonic Nanolaser Using Epitaxially Grown Silver Film

A nanolaser is a key component for on-chip optical communications and computing systems. Here, we report on the low-threshold, continuous-wave operation of a subdiffraction nanolaser based on surface plasmon amplification by stimulated emission of radiation. The plasmonic nanocavity is formed between an atomically smooth epitaxial silver film and a single optically pumped nanorod consisting of an epitaxial gallium nitride shell and an indium gallium nitride core acting as gain medium. The atomic smoothness of the metallic film is crucial for reducing the modal volume and plasmonic losses. Bimodal lasing with similar pumping thresholds was experimentally observed, and polarization properties of the two modes were used to unambiguously identify them with theoretically predicted modes. The all-epitaxial approach opens a scalable platform for low-loss, active nanoplasmonics. (*Diagram provided by Prof. Shangjr Gwo*)

(Yu-Jung Lu, Jisun Kim, Hung-Ying Chen, Chihhui Wu, Nima Dabidian, Charlotte E. Sanders, Chun-Yuan Wang, Ming-Yen Lu, Bo-Hong Li, Xianggang Qiu, Wen-Hao Chang, Lih-Juann Chen, Gennady Shvets, Shangjr Gwo, and Chih-Kang Shih, *Science* 27 July 2012, Vol. 337 no. 6093 pp. 450-453, IF = 31.201)



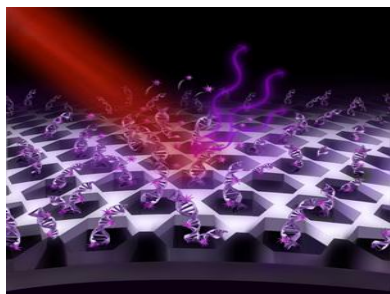
(A) RHEED patterns taken during the two-step growth process. At low temperature (LT, 90 K), 3D Ag nanoclusters are observed after Ag deposition on Si(111). After room-temperature (RT) annealing, atomically smooth epitaxial Ag film forms. (B) In situ STM image of an atomically smooth epitaxial Ag film (4-nm thickness). (C) STS spectrum showing multiple quantum-well states and a surface state on epitaxial Ag film. Raw data (blue line) are shown with a superimposed smoothed spectrum (red line). (D) AFM image showing that Ge-capped Ag film remains atomically smooth in air (at RT).

Singapore (Source: NUS)

◆ New nanoparticles target deep-lying cancer

Headed by Associate Professor Zhang Yong from the Department of Bioengineering, the six-member team - from NUS Faculties of Engineering and Science as well as Yong Loo Lin School of Medicine - has developed a new technology that holds promise for a safe and non-invasive method of treating cancer, and has demonstrated that their discovery could stop cancer cells from growing and control gene expression in mice.

The discovery, published online recently in *Nature Medicine* and the journal *Proceedings of the National Academy of Sciences, USA*, is the first in the world using nanoparticles for photodynamic therapy of deep-seated cancer. The group used nanoparticles which are able to change near-infrared (NIR) light to visible or ultraviolet (UV) light. When introduced into target sites of the patient, they can be manipulated to control gene expression.



Genes release certain proteins in our body to regulate the body's internal workings and health. When the process goes wrong, the body malfunctions, leading to various diseases. UV light can be exploited to control the process of gene expression but the procedure carries safety risks. The scientists have applied the nanoparticles to other light-based therapies to produce visible light. Conventional light therapy for treating tumours takes visible light to activate light-sensitive drugs which destroy cancer cells but such visible light is not strong enough to penetrate to tumours in deep-lying sites.

Assoc Prof Zhang said: "NIR, besides being non-toxic, is also able to penetrate deeper into our tissues. When NIR reaches the desired places in the body of the patient, the nanoparticles which we have invented are able to convert the NIR back to UV light (up-conversion) to effectively activate the genes in the way desired - by controlling the amount of proteins expressed each time, when this should take place, as well as how long it should take place.

This innovative application of nanoparticles for up-conversion of light reported in various journals before has generated considerable scientific interest.

PhD student Mr Muthu Kumara Gnananasammandhan who is a co-author elaborated that the platform technology can be customised for a wide range of applications such as in bioimaging where the nanoparticles can be "labeled" with biomarkers, which will then attach to cancer cells to enable clearer imaging of tumours.

The new method has worked in mice to inhibit cancer growth and the group is currently working with researchers at the National Cancer Centre Singapore to assess the safety and effectiveness. This will pave the way for pilot clinical trials of specific cancers such as skin and nasal cancers. Other projects include using the nanoparticles to develop diagnostic kits for rapid detection of bacteria and biomarkers.

♦ *Low-cost designer material extends Li-ion battery life*

An NUS researcher, Dr Kuppan Saravanan from the Departments of Chemistry and Mechanical Engineering, has come up with an innovative way to cleverly harness the power of lithium-ion (Li-ion) batteries. Thanks to their compactness, design flexibility, lightweight, longer lifespan and high operating voltages, Li-ion batteries hold the most promise as a sustainable energy provider.

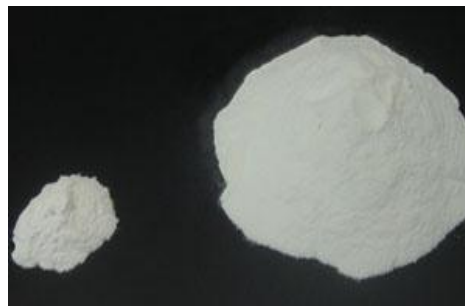


For his PhD project, Dr Saravanan searched for new environmentally friendly electrode materials with superior energy and power density for potential application in future Li-ion batteries. Through systematic investigation, he managed to create a mesoporous titanium oxide (meso TiO_2) material with excellent energy storage with low-cost production. Mesoporous materials are micron-sized particles containing nanopores which, when employed as electrode materials in Li-ion batteries, enable easy access of electric energy stored. Meso TiO_2 shows storage capacity 50 per cent higher than current Li-ion batteries, but costing 5 to 10 times lower. Furthermore, the novel material is environmentally friendly as it has already been used in skincare products and paints.

Comparison between lab-scale production (4 g) and mass production (80 g) of mesoporous titanium oxide

With funding from the National Research Foundation in Singapore, Dr Saravanan and his team members have scaled up the production of meso TiO_2 . They collaborated with Taiwanese battery manufacturer E-One Moli to develop a new Li-ion battery for electric vehicle application.

For this achievement, Dr Saravanan won the 2012 World Future Foundation PhD Prize in Environmental and Sustainability Research that recognises excellence in doctoral-level environmental and sustainability research.



NEW PUBLICATIONS

India

1. C. Nethravathi, B. Viswanath, J. Michael et al, "Hydrothermal synthesis of a monoclinic VO₂ nanotube-graphene hybrid for use as cathode material in lithium ion batteries", CARBON, 50(13): 4839-4846 NOV 2012.
2. S. Jain, D. Kumar, N.K. Swarnakar et al, "Polyelectrolyte stabilized multilayered liposomes for oral delivery of paclitaxel", BIOMATERIALS, 33(28): 6758-6768 OCT 2012.
3. V. Jain, N. K. Swarnakar, P. R. Mishra et al, "Paclitaxel loaded PEGylated glycerylmonooleate based nanoparticulate carriers in chemotherapy", BIOMATERIALS, 33(29): 7206-7220 OCT 2012.
4. S. Harish, S. Baranton, C. Coutanceau et al, "Microwave assisted polyol method for the preparation of Pt/C, Ru/C and PtRu/C nanoparticles and its application in electrooxidation of methanol", JOURNAL OF POWER SOURCES, 214: 33- 39 SEP 2012.
5. B. S. Prakash, V. K. W. Grips, S. T. Aruna, "A single step solution combustion approach for preparing gadolinia doped ceria solid oxide fuel cell electrolyte material suitable for wet powder and plasma spraying processes", JOURNAL OF POWER SOURCES, 214: 358-364 SEP 2012.
6. P. Kesharwani, R. Ghanghoria, N. K. Jain, "Carbon nanotube exploration in cancer cell lines", DRUG DISCOVERY TODAY, 17(17-18): 1023-1030 SEP 2012.
7. P. Parhi, C. Mohanty, S. K. Sahoo, "Nanotechnology-based combinational drug delivery: an emerging approach for cancer therapy", DRUG DISCOVERY TODAY, 17(17-18): 1044-1052 SEP 2012.
8. A. Acharya, K. Samanta, C. P. Rao, "Conjugates of calixarenes emerging as molecular entities of nanoscience", COORDINATION CHEMISTRY REVIEWS, 256(17-18): 2096-2125 SEP 2012.
9. S. Ghorai, A. Sinhamahapatra, A. Sarkar et al, "Novel biodegradable nanocomposite based on XG-g-PAM/SiO₂: Application of an efficient adsorbent for Pb²⁺ ions from aqueous solution", BIORESOURCE TECHNOLOGY, 119(181-190) SEP 2012.
10. A. Ashokan, P. Chandran, A. R. Sadanandan et al, "Development and haematotoxicological evaluation of doped hydroxyapatite based multimodal nanocontrast agent for near-infrared, magnetic resonance and X-ray contrast imaging", NANOTOXICOLOGY, 6(6): 652-666 SEP 2012.

Taiwan

1. Tsung-Wu Lin, Ching-Yuan Su, Xin-Quan Zhang, Wenjing Zhang, Yi-Hsien Lee, Chih-Wei Chu, Hsin-Yu Lin, Mu-Tung Chang, Fu-Rong Chen, and Lain-Jong Li, "Converting graphene oxide monolayers into boron carbonitride nanosheets by substitutional doping.", Small, 8(9):1384-91, May 7 2012

2. Yueh-Chun Lai, Hsin-Cheng Lee, Shu-Wen Kuo, Cheng-Kuang Chen, Hsieh-Ting Wu, Oscar K. Lee, Ta-Jen Yen, "Label-free, coupler-free, scalable and intracellular bio-imaging by multimode plasmonic resonances in split-ring resonators.", *Advanced Materials*, 24(23):OP148-52, Jun 19 2012
3. Akon Higuchi, Qing-Dong Ling, Shih-Tien Hsu , and Akihiro Umezawa, "Biomimetic Cell Culture Proteins as Extracellular Matrices for Stem Cell Differentiation", *Chemical Reviews*, 112(8):4507-40, Aug 8 2012

ASIA NANO FORUM SOCIETY NEWSLETTER

ISSUE No.18 Nov.2012

EVENTS

Date	Avenue	Events
Jan. 21-22, 2013	Tamilnadu, India	International Conference on Nano Electronics & Nano Devices (ICNEND'13) http://www.icnend13.com/
Jan. 30-Feb. 1, 2013	Tokyo, Japan	Nano tech 2013 Website: http://www.nanotechexpo.jp/en/
Feb. 11-15, 2013	Auckland, New Zealand	The 6th International Conference on Advanced Materials and Nanotechnology (AMN6) http://www.amn-6.com/
Feb. 13-15, 2013	Porto, Portugal	nanoPT 2013 - Nanoscience and Nanotechnology International Conference http://www.nanopt.org
Feb. 23-24, 2013	Goa, India	International Conference on Emerging Technologies: Micro to Nano 2013 (ETMN 2013) http://emtm2n.bits-pilani.ac.in
Apr.7-10, 2013	Suzhou, China	The 8th Annual IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2013) http://www.IEEE-NEMS2013.org/ Flyer
Apr. 23-26, 2013	Bilbao, Spain	ImagineNano 2013 http://www.imagenenano.com Flyer
Jun.30-Jul.5, 2013	Singapore	International Conference on Materials for Advanced Technologies (ICMAT 2013) For more information: eileenso@mrs.org.sg
Jul.14-19, 2013	Chiba, Japan	12th Asia Pacific Physics Conference (APPS12) http://www.jps.or.jp/APPC12/index.html
Aug.13-16, 2013	Nanjing, China	The 4th International Conference of Bionic Engineering(ICBE 2013) http://www.icbe2013.cn
Sep.15-21, 2013	Vladivostok, Russia	V Euro-Asian Symposium "Trends in MAGnetism", EASTMAG-2013 http://eastmag.wl.dvfu.ru/