

Asia Nano Forum NEWSLETTER

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Editor:

Hongfang JIN

Lerwen LIU

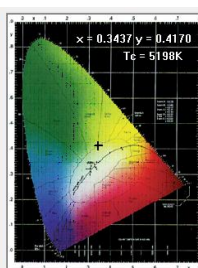
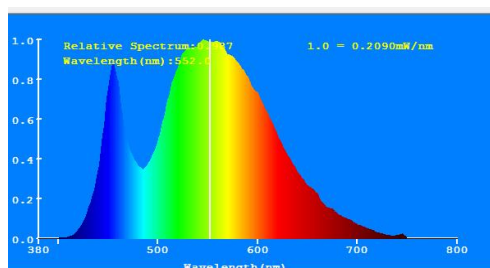
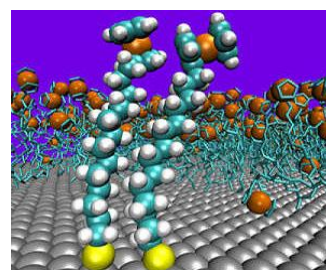
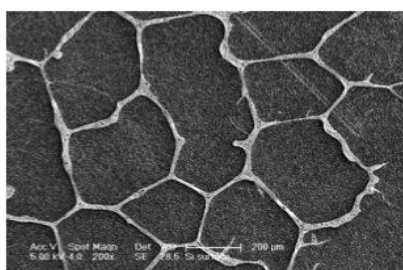


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NEWS

✧ Partnerships/Collaborations

India (Source: ARCI)

- ◆ *NIE-McMaster University has signed the MoU to develop biosensor paper strips*

MYSORE: National Institute of Engineering (NIE), Mysore has signed a Memorandum of Understanding (MoU) with McMaster University, Canada for developing biosensor paper strips to detect contamination in the environment. This nanotechnology based paper strips will be cost effective to detect pathogens in water. These strips will be validated and optimized to work under different environmental conditions and will be more useful for remote areas where frequent test is required to monitor and control various environmental related diseases. ([Source](#))

- ◆ *UCC and IIT-M collaborated to boost research*

CHENNAI: University College Cork (UCC), Ireland and Indian Institute of Technology-Madras have signed a MoU for the expansion and exchange of research activities and students between two institutions. The key area of research exchange will be nanotechnology, ocean engineering, electronic engineering, energy engineering and other future emerging technologies. ([Source](#))

- ◆ *Eris Lifesciences enters drug discovery contract with SCTIMST*

AHMEDABAD: Sri Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram and Eris Lifesciences Private Limited, an Ahmedabad-based bio-pharmaceutical company signed a contract for collaborative research to develop nanotechnology based drug delivery formulations. Both of the research organizations are pioneer in their respective fields of bio-medical technologies and are expecting to bring out new nano-based formulations in the market. ([Source](#))

Singapore

- ◆ *Joint workshop by NANOTEC and IMRE - Nano-scale inventions with giant applications*

Imagine food packaging that can respond to the changing level of freshness of its contents, or windows that can adjust how much light they let in when temperatures rise. Despite coming from completely unrelated industries, these are in fact innovations that researchers in green nanotechnology are looking into.

Green nanotechnology research is an area that is getting some attention this week: To advance research in the field, the Agency for Science, Technology and Research's (A*STAR) Institute of Materials Research and Engineering (IMRE) and Thailand's National Nanotechnology Center (NANOTEC) on Wednesday formalised a memorandum of understanding to collaborate more closely.

The two institutes held a joint workshop at IMRE on the same day where they discussed the research they conduct.

“IMRE and NANOTEC complement each other, but we each have our strengths: IMRE’s forte is materials and manufacturing, while NANOTEC’s is biology research,” said Professor Sirirung Songsivilai, Executive Director of NANOTEC. “Through this partnership, we hope to explore the intersection of these research areas.”

Green nanotechnology is the use of nanotechnology to improve environmental sustainability, whether by improving industrial processes or making things from buildings to packaging more environmentally friendly, said Professor Andy Hor, Executive Director of IMRE and one of the speakers at the workshop.

Nanotechnology has been around for some years, said Prof Hor. But with the increasing importance of environmental sustainability due to soaring energy use and waste generation in modern societies, applying the idea of sustainability to nanotechnology was a natural development.

And green nanotechnology is not just blue-sky research, researchers say. It aims to generate intelligent solutions to real, common problems we face today: Reducing food wastage through packaging reactive to falling levels of food freshness, for example, or making high-strength composite materials to protect electronic products from damage.

In fact, people seldom realise how widely applied it is, because products made with green nanotechnology are often not noticeably different from those made with conventional methods, said Prof Hor.

The ongoing research in green nanotechnology might be mistaken for science fiction: Window panes coated with nanomaterials can reduce the amount of light they transmit when the temperature rises, and solar panels that incorporate nanomaterials are more efficient while being cheaper to make at the same time, for example.

Scientists from Thailand’s NANOTEC also shared their research during the workshop. In response to the devastating 2011 flood in Thailand, the agency developed SOS Water, a solar-powered mobile water purification machine.

Silver nanoparticles added to a traditional ceramic water filter killed bacteria and produced 200 litres of clean drinking water in an hour.

NANOTEC’s research on green biorefineries works to solve the problem of water hyacinths choking waterways in Thailand, by harvesting them as biomass for conversion to other organic products by nanoparticle catalysts.

Green nanotechnology, however, is still in its infancy: Most of the research has not yet reached the state where it can be practically applied, said Prof Hor. However, the potential for wide application in the future is enormous, he said.

Dr Mark Lim, Director (Industry and Enterprise) of IMRE, agreed. “The prospects for green nanotechnology are rich, though it will take time to realise them,” he said.

As a new area of research, green nanotechnology needs standards to be put in place as guidelines for industries and researchers. It also needs strong demand to thrive.

“In time, you will see more regulators push for green standards and requirements, which translates into business for the green nanotechnology industry,” said Dr Lim.

Prof Hor is confident of the future of green nanotechnology. “If we believe in nanotechnology, if we are concerned about the state of the world, we will realise that the way forward must be through green nanotechnology,” he said.

[\(Source\)](#)

Taiwan (Source: NPNT)

- ◆ *The NPNT, Taiwan joins the M-ERA.NET network as the first partner from Asia*

EU Framework Programm:

M-ERA.NET Kick-Off Meeting, United Kingdom (Feb. 27-28, 2012).

M-ERA.NET Working Group Meeting, Romania (Sep. 13-14, 2012).

M-ERA.NET Working Group Meeting, Vienna (Feb. 21-22, 2013).

Taiwan focuses on joining M-ERA.NET --- the European joint strategic programmes, developed by a network of national and regional funding organizations, systematically advised by external high-level experts selected from the European RTD community.

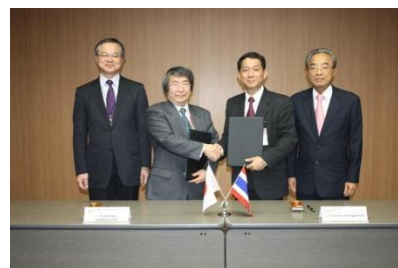
The M-ERA.NET partners set up the cooperation at international level, with the goal to strengthen the status of the European RTD base and industry by providing access to additional expertise. (Photo source: M-ERA.NET and NPNT)



Thailand (Source: NANOTEC)

- ◆ *The 3rd Thailand – Korea Nanobiotechnology Joint Research Meeting*

The 3rd Thailand – Korea Nanobiotechnology Joint Research Meeting opened this morning with Prof. Sirirung Songsivilai, NANOTEC Executive Director presenting the Opening Remarks. According to Prof. Sirirung the meeting provides a venue for interaction and mixing between nanobiotechnology researchers that will create the research sparks that the local research community needs. Prof. Sirirung gestured a symbolic comparison of the gathering to that of the late Steve Jobs push for human interaction and creativity at his Pixar Animation Studio in the USA.



Prof. Sirirung told the story of the 2 bathrooms at Steve Jobs' Pixar Animation studio.

According to Prof. Sirirung, Steve Jobs insisted there be only two bathrooms in the entire Pixar studios, and that these would be in the central space. And of course this is very inconvenient. No one wants to have to walk 15 minutes to go to the bathroom. And yet he insisted that this is the one place everyone has to go every day. If you do happen to visit Pixar, ask them about their 'bathroom story.' They all talk about the great conversation they had while washing their hands.

He went on to say that Steve Jobs wanted there to be mixing. He knew that the human friction makes the sparks, and that when you're talking about a creative endeavor that requires people from different cultures to come together, you have to force them to mix; that our natural tendency is to stay isolated, to talk to people who are just like us, who speak our private languages, who understand our problems. But that's a big mistake. And so his design was to force people to come together even if it was just going to be in the bathroom.

Leading the Korean team was Dr. Bong Hyun Chung, Director of BioNanotechnology Research Center, Korea Research Institute of Bioscience and Biotechnology (KRIBB). “The field of convergence is one of the key engines for economic growth and creation of jobs under the new government” said Prof. Chung. “When there is successful commercialization of new technology, this helps to contribute to the economy of any nation”.

Prof. Chung went on to inform that the new Korean government has assigned science and technology portfolio to be under the Ministry of Future, Creation and Science (MFCS). The new ministry will be involved in promoting investment in research and development.

The 3 days meeting from March 29-31 in Bangkok is organized by NANOTEC and KRIBB to promote research collaboration opportunities between Thailand and Korea. A total of 25 experts took turn to present technical papers and exchange dialogue on selected research projects. In addition, the program also included the Networking and Discussion session on 4 themes: Nanomedicine, NanoSafety, and NanoBiosensor. The 4th meeting in 2014 will take place in Korea hosted by KRIBB.

◆ *NANOTEC Thailand sign collaborative LOI with Nanosystem Research Institute (NRI) of AIST*

NANOTEC of Thailand signed collaborative Letter of Intent (LOI) with the Nanosystem Research Institute (NRI) of National Institute of Advanced Industrial Science and Technology (AIST) on January 28, 2013. Signing on behalf of NANOTEC was Prof. Sirirung Songsivilai, Executive Director and on behalf of NRI by Dr. Tomohiko Yamaguchi, Director of NRI. This event was witnessed by Dr. Shingo Ichimura, Senior Vice President of AIST and Prof. Pairash Thajchayapong, Chairman of NANOTEC Executive Board.

The initial research collaboration discussion focused on the topic of functional nanomaterials for various applications between NRI and NANOTEC. In addition, the two institutes also discussed the possibility of organizing regular joint technical seminars to be held in both Thailand and Japan.

“The signing marks a steadily growing friendship between our two institutes” said Prof. Sirirung. “It is important for researchers of our two leading centers to work together not only for the development of their own organizations, but also to contribute to the development of the societies. It is our hope that collaboration would be further strengthened in the future”.

Both NANOTEC and NRI have informally collaborated in various programs in the past. The LOI signing marks the first formal initiative between the two agencies under the umbrella MOU between NSTDA and AIST which was signed in 2009 in Bangkok.

✧ Commercialization and Business

New Zealand (Source: Univ. of Canterbury)

♦ *Mary Quin appointed as CEO of Callaghan Innovation*

Readers of previous newsletters will recall that the NZ Government has recently restructured the main Government research laboratory in the physical sciences. It was previously called Industrial Research and has been re-christened Callaghan Innovation, in honour of Sir Paul Callaghan, the founding Director of the MacDiarmid Institute. The new organisation is expected to focus on growing NZ companies through science and innovation.

Callaghan Innovation has now announced the appointment of Dr Mary Quin, an exceptional New Zealander with an impressive track record of working in the US engineering and technology sector, as the inaugural CEO of Callaghan Innovation. With a background in R&D in materials engineering and over 20 years' experience working in senior executive roles in NASDAQ-listed companies such as Xerox and Eastman Kodak Company, Dr Quin comes with an impressive profile and experience in technology and engineering industries.

Dr Quin was most recently President of support services company NANA Management Services LLC, in Anchorage Alaska. With revenues of US\$200M, Quin has expanded the company's operations to 16 states in the US and has more than doubled revenues. She was also the founder and CEO of retail trade company Tuliqi LLC in Alaska. During her five years at Xerox Corporation (1995-2000), Dr Quin held Vice-President and GM roles in various business units. At Xerox, she drove collaboration across both divisional and national boundaries to develop technology strategies that became a key platform for Xerox's long-term growth. While at Eastman Kodak (1988-93), she worked in both marketing and sales and managed the US\$600M Mid-Volume Copier and Printer business for the company's Office Imaging Division.

Singapore (Source: IMRE)

♦ *New Singapore plastic film is the future of 3D on-the-go*

Ditch the 3D glasses. Thanks to a simple plastic filter, mobile device users can now view unprecedented, distortion-free, brilliant 3D content with the naked eye. This latest innovation from TP and IMRE is the first ever glasses-free 3D accessory that can display content in both portrait and landscape mode, and measures less than 0.1 mm in thickness.

"The filter is essentially a piece of plastic film with about half a million perfectly shaped lenses engineered onto its surface using IMRE's proprietary nanoimprinting technology," said Dr Jaslyn Law, the



Apple iPod Touch handsets installed with Nanoveu's EyeFly3D show content in 2-D (left) and in 3-D during the product launch on April 2, 2013. A new invention in Singapore has made 3-D glasses irrelevant. The product - a plastic film dubbed EyeFly3D to be stuck on the screens of handheld devices - instantly turns ordinary Apple iOS and Android smartphones into 3-D displays for 3-D content. -- PHOTO: REUTERS

IMRE scientist who worked with TP on the nanoimprinting R&D since 2010 to enhance the film's smoothness, clarity and transparency compared to other films in the market.

To complement the filter, the team developed applications for two software platforms, Apple iOS and Android, which allow users to play 3D content through its filter, in both landscape and portrait formats. The applications also allow 2D pictures taken using mobile devices to be converted into 3D. The team will be releasing a software development kit that enables game developers to convert their existing games into 3D versions.

The team is also exploring using the same technology for security access tokens to decode PIN numbers sent online as an inexpensive and portable alternative to rival bulkier and more expensive battery-operated security tokens, similar to those used by Singapore banks today.

"The team's expertise in both hardware and software development in 3D technology has enabled high quality 3D to be readily available to consumers," said Mr Frank Chan, the TP scientist who led the overall NRF-funded project. "We have taken age old lenticular lens technology that has been around for the last hundred years, modernised it and patented it using nanotechnology." Lenticular lens technology creates a transparent film that retains the brilliance of 3D visuals and effects, which does away with the need for stronger back lighting and saves on battery consumption in mobile devices.

"The successful development of this product is indeed testimony that we have been able to bridge the gap between R&D and commercialisation in the area of 3D interactive digital media (IDM), aided by the NRF Translational R&D Grant and gap funding from A*STAR," said Mrs Lay-Tan Siok Lie, Deputy Principal of TP.

The two-year project was initially funded under a National Research Foundation (NRF) Translational R&D Grant in Dec 2010 to look at optimising the control of the nanostructures and integrating its effects with the complementary software applications. The team has since shifted its focus towards commercialisation with support from Exploit Technologies Pte Ltd (ETPL), A*STAR's technology transfer arm and a one-stop resource that brings together home-grown technology, funding, collaboration and networks to assist A*STAR spin-offs and start-ups.

"Our breakthrough is a game-changing piece of plastic that simply fits onto current smartphones or tablets to give users breathtaking 3D graphics on their smart devices. This removable plastic also opens up a multitude of opportunities for anyone wanting to create affordable premium 3D content and games for quick adoption to existing portable devices easily," said Nanoveu Pte Ltd Founder and CEO, Mr Alfred Chong. The start-up is licensing the technology exclusively from ETPL and TP, and is currently securing the interest of local and overseas customers and investors.

"The success of this project is typical of what IMRE aims to do - innovate and turn science into an exciting business opportunity. I'm glad this has given us products that make life just a little bit more fun," said Prof Andy Hor, Executive Director of IMRE.

◆ *A*STAR's IMRE and Cima NanoTech to develop materials for next generation transparent conductors*

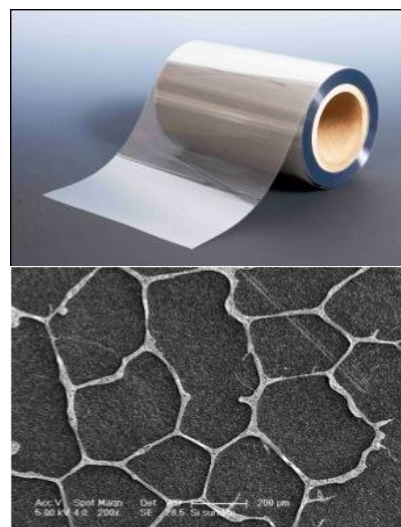
A*STAR's Institute of Materials Research and Engineering (IMRE) and Cima NanoTech, a US multinational company, have signed an agreement to jointly work on new sustainable nanomaterials, processes and devices for transparent conductors used to make cheaper and more efficient electronics and organic solar cells.

IMRE and Cima NanoTech are collaborating to develop new transparent conductive materials and components, based on Cima's ANTETM Technology¹ and IMRE's know-how in printed electronics

These innovations will enable efficient conductive interfaces with high transparency, which can be developed into low cost and high performance products for displays, organic solar cells, and flexible electronics. Conventional Indium Tin Oxide (ITO) and Transparent Conductive Oxides (TCO) used in today's solar cells, OLEDs, flat panel TVs, and touchscreen displays have limitations in conductivity, flexibility, and cost. These new materials and processes that IMRE and Cima are developing will potentially enable faster response touch screens for large flexible displays and reduce production cost.

"Cima is particularly interested in IMRE's extensive electronics materials systems and device fabrication capabilities," said Mr Jon Brodd, Cima NanoTech's Chief Executive Officer (Singapore). IMRE and CIMA are working together to develop enabling nanotechnology materials, components, and processing methods to support new market applications in transparent conductors and printed electronics with SANTE^(TM), Cima NanoTech's self-aligning nanoparticle network.⁴ "We are collaborating with Cima to develop new transparent conductor applications that will lead to cheaper, flexible, more eco-friendly and sustainable products," said Dr Zhang Jie, the key scientist leading IMRE's printed electronics initiative. The research team will develop applications using novel, sustainable transparent conductor materials as an alternative to conventional ITO-based materials.⁵ "Innovations in materials R&D are crucial in evolving today's devices into new products with tomorrow's technology. IMRE's research portfolio covers the entire printed electronics value chain that includes materials, processes, optimisation and reliability testing for integrated printed electronics prototypes. I am glad that we can present a diverse suite of capabilities in partnering Cima in the area of transparent conductors and printed electronics," said Prof Andy Hor, IMRE's Executive Director.

[\(Source\)](#)



◆ *Biofactory introduces kits for assessment of protein-DNA interactions, targeting researchers and industry*

The Biofactory, a leading innovator in incubating biomedical and life sciences related technologies, introduced today its ColoQuikTM line of label-free kits for the rapid colorimetric detection of protein-DNA interactions in biomedical research labs and the pharmaceutical industry. These kits are based on technology licensed from the Institute of Materials Research and Engineering (IMRE), a research institute of the Agency for Science, Technology and Research (A*STAR), Singapore's lead government agency for fostering world-class scientific research. The Biofactory has

three kits in its pipeline, each customized for the assessment of a well-known transcription factor in cancer: ER α , ER β , and p53.

The ColoQuik™ kits will be particularly suited for pharmaceutical companies or academic researchers who require tools for the analysis of protein-DNA interactions at a higher level of throughput. ColoQuik™ kits will find strong utility in primary screens for drugs that can modulate protein-DNA interactions, or in QC analyses of purified DNA-binding proteins based on their DNA-binding capacities.

Conventional techniques for the analysis of protein-DNA interactions tend to pose numerous restrictions and drawbacks upon their users in terms of assay time, expense and throughput. Some methods can involve extensive protocol optimization and materials preparation, with tedious procedures lasting as long as 2 days. Others necessitate tagging of the DNA with radioactive isotopes prior to running the test, which can result in safety and environmental issues. Label-free assays for academia or industry have typically involved hardware and software costs, which limit their utility for primary drug screening.

In comparison, users will find ColoQuik™ assays much easier to use. These tests require only a half-hour to complete on average, and allow for instant visual detection of reagent colour changes based on the quality and affinity of binding between a protein and a specified DNA sequence. The test does not require radioactive or fluorescent labeling of DNA which leads to significant time and cost savings on preparatory work. ColoQuik™ tests require only standard equipment such as microplate absorbance readers for semi-quantitative readouts. As such, these kits are amenable to high-throughput drug discovery applications and batch functional analysis of transcription factor production.

The key technology in the kits is the custom-made, nanometer-sized metal particles created at A*STAR's IMRE. The particles act as probes which give off different colours depending on the specific protein-DNA combinations that are formed in the nanoparticle solution. "These kits offer the easiest and fastest ways to date for scientists to analyse a particular DNA binding protein for its impact on the gene transcription mechanism of specific diseases," said Dr Su Xiaodi, the IMRE Senior Scientist who led the nanoparticle work.

The Biofactory has received beneficial technology assessments from leading scientists who have utilized the technology for their specific experiments. The Biofactory is in the process of manufacturing and marketing the kits to research institutions and pharmaceutical laboratories both in Singapore and around the world.

"The licensing of our materials technology for use in protein-DNA analysis is testament to the value of our research to industry. This development is also a prime example of cross-disciplinary research in action," said Prof Andy Hor, IMRE's Executive Director. "We look forward to seeing this revolutionary new technique being developed further to aid in advancing global healthcare."

"The Biofactory is honoured to be part of the commercialization process. With our expertise in product and business development, we will continue to guide other Singapore-based biomedical innovations towards market success," said Theodore Tan, Managing Director of The Biofactory.

The ColoQuik™ kits will be introduced at this year's MEDICA exhibition in Dusseldorf, Germany. For more product information or licensing enquiries, interested parties may visit <http://thebiofactory.com/coloquik>. (Source)

Taiwan (Source: NPNT)

◆ Taiwan LED Lighting Industry Alliance launched

The Taiwan LED Lighting Industry Alliance was officially established Dec. 24, with 31 corporate and two sponsoring members, according to the Industrial Technology Research Institute (ITRI).

Tong Chiang-hsiung, general director of ITRI's Green Energy and Environment Research Laboratories, said the purpose of the organization, which evolved from its predecessor Taiwan LED Street Light Industry Alliance, is to promote exchanges and cooperation within the light-emitting diode industry, to create business opportunities, and to achieve the goal of sustainable development for the sector.



Information/Photo Source: ITRI and Taiwan Today (12/25/2012) ([Website](#))

◆ MOEA, nanoMark Progress



- Passed 45 certification standards
- 34 Companies with 1215 products

Information/Photo source: MOEA, nanoMark website

Thailand (Source: NANOTEC)

◆ QAcnes attracts local business

QAcnes anti acne pad made from nano encapsulation of mangosten extract gave a business pitch to over 50 companies' representatives this morning at Thailand Science Park. The aim of the pitch is to attract interested companies to consider entering into a business discussion either as research collaborators and/or technology licensing agreement. Dr. Phikunthong Kopermsub and Dr. Suvimol Surassmo researchers from Nano-Delivery System Lab at NANOTEC presented technical information on nano encapsulation and electrospinning process.

"The nano encapsulation of the mangosten extract helps in easing the discomfort associated with acne and leaves no scare marks to the end-user" said Dr. Phikunthong. "One of the key strength of QAcnes pad is that it is breathable which is achievable by using electrospinning process". Also speaking at the business pitch was Dr. Sirasak Teparkum, Deputy Executive Director who gave an educational talk on "Nanotechnology and its Application to everyday life".

QAcnes from NANOTEC received both the Best Presentation Award and Outstanding Investor's Choice Award at the recent NSTDA Investor's Day 2012 held on September 20 in Bangkok

✧ New Education/Research Programs

India (Source:ARCI)

◆ *Workshop on 'Nanoscience and Nanotechnology' at Jamia*

NEW DELHI: Jamia Millia Islamia University has organized a Science Academics-Lecture Workshop on “Nanoscience and Nanotechnology” on March 1-2, 2013. The workshop was mainly focussed on recent advances in nanoscience and nanotechnology including an interactive session of faculty and students with renowned scientists of the country. Various eminent scientists delivered their lectures and exchanged their views on nanoscience. This workshop was sponsored by three National Science Academies viz. 1) IASc, Bangalore 2) INSA, New Delhi and 3) NASI, Allahabad. ([Source](#))

◆ *National Chemical Laboratory (NCL) received funds for expansion*

PUNE: National Chemical Laboratory (NCL) has received Rs. 200 crore grants to expand their innovation park for conducting research in the fields of nanotechnology, drug discovery and polymer chemistry. This expansion will help in bringing better technology and innovative products to the market in coming years. ([Source](#))

◆ *First medical park at Chennai*

MUMBAI: India is developing its first medical park named as ‘Frontier Mediville’ at Elavur village, Tiruvallur district, Chennai, Tamil Nadu. This medical park will have various distinct facilities for training and research centers for clinical and pre-clinical research, stem cell, nano-technology and tissue engineering research. The first phase of development has already been completed and funds are being raised for second phase expansion. ([Source](#))

New Zealand (Source: Univ. of Canterbury)

◆ *NanoCamp 2013*

The Institute’s 5th NanoCamp was held at the University of Otago during the week January 13–18, 2013. This year the NanoCamp was run in conjunction with, but as a distinct programme within, the University’s annual “Hands-On Science” school.

Fifteen Year 12 students were selected for NanoCamp (from 50 applications), with participants from all around New Zealand. All converged on Dunedin during Sunday and settled into Arana College before a Mihi Whakatau welcome, dinner with NanoCamp staff and a campus orientation.

Between Monday and Thursday, the students spent most mornings and afternoons in the Department of Chemistry in a mixture of introductory lectures and practical lab-based activities. These included the synthesis of an iron complex which was studied by Raman and Mössbauer spectroscopies, incorporated into dye-sensitised solar cells and crystallised for structural characterisation by X-ray diffraction. Other activities involved the preparation of gold nanoparticles and their visualisation by electron microscopy, and the synthesis and characterisation of liquid crystalline materials.



On Monday evening, all NanoCamp/Hands-On Science students attended a public lecture by Prof. Richard Blaikie on “Seeing Small”.

Social activities included a Quiz night, team obstacle course challenge and dance/games evening at the new Forsyth Barr stadium. During the Friday morning “Report Back Session” in front of 200 or so Hands-On Science peers, the NanoCamp students enthusiastically gave a short presentation of the experiments they had carried out during their busy week.

A survey of students at the end revealed that NanoCamp continues to be highly rated. The participants said that they will go away with a broadened view of science and the opportunities it presents, and seemed eager to share their new experiences.

✧ General News

India (Source: ARCI)

◆ *India ranks fourth position in Nano S&T publications output for the year 2012*

HYDERABAD: India has overtaken Germany in fourth place, behind the China, United States, and South Korea in Nano S&T publications for the year 2012, according to an analysis of global trends in Nano S&T Publications by the Centre for Knowledge Management of Nanoscience & Technology (CKMNT). CKMNT analysis based on Web of Science reveals that the top 10 countries in Nano S&T publications for the year 2012 are China, USA, South Korea, India, Germany, Japan, France, the Islamic Republic of Iran, England and Spain. India attained 4th position in 2012, close to Germany, moving up in its ranking from 6th in 2011. India has strengths across the board, particularly large R&D funding in nanoscience & technology, highly qualified R&D manpower (leading to a prolific output of scientific publications), public-private partnerships, venture capital commitment and a skilled labour force engaged in research and patenting. ([Source](#))

◆ *National nanotechnology infrastructure network in India*

DELHI: Research grants have been allotted to prestigious institutes in India like Indian Institute of Technology (IIT) and Indian Institute of Science (IISc) in Bangalore for the high profile projects to build national nanotechnology infrastructure network. This include approximately \$11 million for Nanoscale Research Facility (NRF) at IIT-Delhi and the \$40 million for Centre for Nano Science and Engineering (CeNSE) for IISc-Bangalore. This framework will improve nanotechnology facilities across India to train experts and provide experimental facilities. ([Source](#))

New Zealand (Source: Univ. of Canterbury)

◆ *Occupational Safety and Health (OSH) Review*

The NZ Government is reviewing OSH matters, including those related to the use of nanomaterials/ The OSH Strategic Review consultation document is at: [Download Website](#)

◆ *Minister of Business Innovation and Employment visits the MacDiarmid Institute*

The Minister, Stephen Joyce, visited the MacDiarmid Institute and was introduced to the range of activities that are undertaken. A particular focus was the significant Nation-wide collaboration network that has grown significantly over

the 10 years since the Institute was established. This connectivity bridges between institutions and allows New Zealand to truly achieve critical mass and the best use of resources (see <http://macdiarmid.ac.nz/> for more detail).

The Minister visited research laboratories and met various Investigators, students and Postdoctoral Fellows. Professor Michael Kelly, University of Cambridge, and a member of our International Advisory Board, currently on sabbatical in Wellington.



◆ Awards

Several members of the MacDiarmid Institute have been recognised for their excellence in scientific research, their recognised ability to make strong future impacts, their work in supporting and driving applied research and their passion and expertise in science communication.

New Zealand Association of Scientists Research Medal: Eric le Ru (VUW) (the link for Eric's citation isn't up as I write this but it will be soon so keep an eye on <http://www.scientists.org.nz/awards/research-award>)

Royal Society of New Zealand Callaghan Award: Shaun Hendy (VUW/IRL, [Website](#)).

The Prime Minister's Science Media Communication Prize: Shaun Hendy (VUW/IRL, [Website](#))

Rutherford Discovery Fellowship: Geoff Willmott (IRL) and Martin Allen (UC), [Website](#).

New Zealand Institute of Chemistry Pickering Medal: David Williams (UoA, [Website](#)),

Thailand (Source: NANOTEC)

◆ Thailand awarded "nanotech 2013 Special Award" in Japan

The Team Thailand delegates were all cheers when it was announced that Thailand won the prestigious Special Award at the nanotech 2013 International Nanotechnology Exhibition and Conference, the world's largest nanotechnology event. Thailand Pavilion under the theme of "Nanotechnology in Thailand: Benefiting Society's Needs" was one of the highlight of this event. For this prestigious award, NANOTEC was cited for its leading role in developing unique and innovative technology and products that have societal and economic impacts, such as nano bednet, eco-friendly nano bacteria cellulose synthetic film, new catalysts and smart soil, etc. Prof. Sirirung Sonsivilai, Executive Director of NANOTEC was on hand to receive the award.



Representatives from Thailand exhibiting at this year event included Agricultural Research Development Agency (ARDA), Government Pharmaceutical Organization (GPO), Netto Manufacturing, Thailand Board of Investment (BOI), Siam Cement Group (SCG), Thailand Center of Excellence for Life Sciences (TCELS), and National Nanotechnology Center (NANOTEC).

The 12th International Nanotechnology Exhibition and Conference, "nanotech 2013", attracted over 500 exhibitors from 30 countries, a total of 800 exhibition booths, and over 50,000 registered participants. The annual 3 days event is

marked as the global platform for nanotechnology and Thailand is certainly making a mark at this global nanotechnology event.

◆ *Thai research agency awarded testing standardization certificate*

NANOTEC strives to become an international recognize agency for this reason, obtaining international standards helps to ensure that services rendered are reliable, safe and with good quality. In 2012 NANOTEC undertook a strenuous management system auditing process which resulted in NANOTEC receiving “3” certifications in one year, this is a remarkable achievement given the fact that NANOTEC is only 9 years old. The 3 certifications are: ISO9001 on the design and execution of R&D operation, TIS 18000 for safety standards, and finally the ISO/IEC 17025 for competence of testing and calibration laboratories focusing on anti-bacteria and dynamic light scattering (DLS) properties.

The ISO/IEC 17025 was award on November 26 by Mr. Virat Aja-apisit, Deputy Secretary General for Thai Industrial Standards Institute, Ministry of Industry. Receiving the award for NANOTEC was Prof. Sirirung Songsivilai, Executive Director who praised all staff who took part in the strenuous auditing process.

“This is a remarkable achievement for a very young research agency” said Prof. Sirirung. “The certifications will pave the way to helping Thai research agency stand toe-to-toe with its regional partners. The certificate could not have come at a better time given the fact that the ASEAN Economic Community (AEC) will soon come of age in 2015 and we want to build confident to our customers”.



RESEARCH BREAKTHROUGHS

India (Source: ARCI)

- ◆ *Nanotechnology to outsmart counterfeiters of traditional pashminas*

SRINAGAR: To preserve the authenticity of Pashmina shawls, Government has taken a new measure to label it with a secure fusion label (SFL) having an identity number that can be used to check the quality and genuineness of these shawls anywhere worldwide. This SFL which is embedded with nanotechnology will look like a normal label which is fused with shawls and will contain information about purity after being tested at state-run laboratory in Srinagar. These new tags cannot be replicated or removed and can withstand repeated washing. Their unique identity number will be stored at central database which can only be read by unique pen. ([Source](#))

- ◆ *Nano-Gefitinib complex with improved anticancer activity*

MOHALI: Researchers from the National Institute of Pharmaceutical Education and Research (NIPER), Mohali, Punjab have proved that the drug Gefitinib, a well-known anticancer drug when used in nano-particulate form is more effective. This nano-gefitinib complex is delivered as poly lactic-co-glycolic acid (PLGA) encapsulated nanoparticles and act as 'histone acetyltransferase' activator, which is an entirely different mechanism compared to free drug that is 'tyrosine kinase inhibitor'. The researchers also studied the molecular mechanism to understand this enhanced activity and have published this work with Nature India. ([Source](#))

- ◆ *Affordable water purifier developed by IIT-M*

CHENNAI: A team of scientists team lead by Prof. T. Pradeep, Department of Chemistry, Indian Institute of Technology-Madras (IIT-M) has developed an affordable water purifier based on nanotechnology. This water purifier is made up of nano-form of iron oxyhydroxide, which is capable of removing arsenic from drinking water without consuming electricity. IIT-M in collaboration with some companies will soon commercialize this technology. This research group is currently developing a nanomaterial-based fluoride water purifier. ([Source](#))

- ◆ *An easy way to extract DNA from samples in a minute*

PUNE: A team of Indian scientists from Agharkar Research Institute (ARI), Pune have developed a new technology to extract DNA in 60 seconds from various water, clinical, environmental and food samples. The earlier techniques were quite tedious involving three steps and about 3-4 hrs to extract DNA from samples. The new technique involves use of specialized magnetic nanoparticles which enables to extract DNA in single step in just one minute. The DNA extracted using this technique is in purest form, which is required in many detection methods like PCR, genome sequencing and analysis. This method is rapid, cheap and user-friendly. The technology is already patented and transferred to a company for commercial use. ([Source](#))

- ◆ *New innovative Lead nano-powder as semiconductor*

RAJAPALAYAM: A group of researchers from Centre for Research and Post Graduate Department of Physics, Ayya Nadar Janaki Ammal College, Sivaski, Tamil Nadu has explored the semiconducting nature of lead nano-powder. So far, lead has been recognised as good conductor. For the first time its nano-form has been established as

semiconductor. The photoluminescence study confirmed the emission of photons and suggested the presence of bandgap in material which proves its semiconducting properties. This material can be utilised for making solar cells, optoelectronic and other semiconductor devices. This research has been published in arXiv of Cornell University. [\(Source\)](#)

◆ *Detection of Arsenic in water by gold nanoclusters*

KOLKATA: A novel highly precision technique has been developed by Indian scientists to detect arsenic in water. Arsenic is one of the major pollutants present in the groundwater of India and Bangladesh, which can cause skin cancers. The technique uses ultra-sensitive sensor made up of tiny gold clusters of nano-dimensions that are highly sensitive to

Table1: 60-watt Incandescent Requirements ^o	
Bright Tomorrow Lighting Competition ^o	
Light Output ^o	greater than 900 lumens (initial). ^o
Wattage ^o	less than or equal to 10 watts. ^o
Power Factor ^o	greater than or equal to 0.9. ^o
Luminous Intensity Distribution ^o	mean luminous intensity for the entire 0° to 150° zone by more than 10%. ^o
Correlated Color Temperatures (CCTs) ^o	not less than (2725 ± 80)K and not more than (3045 ± 100)K. (Duv) is 0.000 with a tolerance of ± 0.004. ^o
Color Rendering Index (CRI) ^o	greater than or equal to 90. ^o
Dimensions ^o	the maximum dimensions and form factor of an A19 bulb.
Base Type ^o	a single contact medium screw base E26/24. ^o
Lifetime-Lumen Maintenance ^o	lifetime exceeding 25,000 hours. ^o

detect arsenic in water even in the presence of other metal ions like manganese, magnesium, zinc and iron. These gold clusters are capped with small peptides to avoid aggregation. Gold clusters show fluorescence in the presence of arsenic, and fluorescence intensity is proportional to the amount of arsenic present in the water.

[\(Source\)](#)

Taiwan (Source: NPNT)

◆ *Innovative technology of integrated materials for high efficiency LED bulb*

Program of ITRI Innovation and foresight, Material and Chemical Research Laboratories, Industrial Technology Research Institute

To significantly impact the national market and lighting use, the SSL products selected must perform similarly to the incandescent lamps they are intended to replace in terms of color appearance, light output, light

distribution, and lamp shape, size, form factor, appearance and operating environment. The L-Prize competition requirements issued in 2008 included technical specifications for the 60-watt and PAR 38 categories. The competition requirements were developed to ensure compliance with the general requirements outlined in the 2007 energy legislation, with additional details specified for quality, performance, and mass manufacturing. They must be reliable, available through normal market channels, and competitively priced. The detailed technical requirements are listed by category below.



The annual production value of water bamboo (*Zizania Latifolia* Turez) is about 20 billion NTD in Taiwan. In order to deal with dwarf and the overproduction, famers often use night light to rearrange growth periods. The night light could increase harvest from 2 time to 3 time a year. However, night light is the high cost way, it takes 50 million

NTD a year for the utility. ITRI has developed a LED lighting system that could decrease the utility under 10 million while the production rate increased 10%. In Puli, there are 20 Km² water bamboo. If all the water bamboo farm were used LED lighting system, it would be possible to increase 3 billion production value. In addition, LED lighting system could avoid the light pollution and light leakage to surrounding farms. It may also turn the location to the tourist attraction for the night view.

Preliminary trial of LED lights in Siyu vineyard: The current experiment, LED lighting could enhance growth rate of grape and saving energy that compare with original lighting. High-price and large-scale of vineyard experiments will be conducted in next month, its derived benefits are not below the water bamboo block field.

Singapore

♦ *Nano devices to dramatically boost energy efficiency (Source: NUS)*

(From left) Dr Nijhuis, together with PhD students Mr Jiang Li (sitting), Mr Li Yuan and Ms Nisachol Nerngchamnong, designed the ultra-small devices using molecules

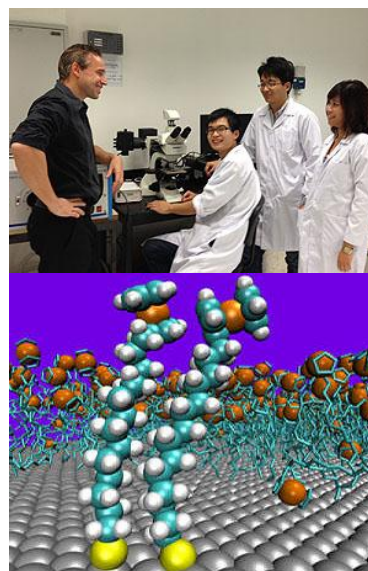
Redox active ferrocenealkanethiol molecules pack together and assemble into monolayer thin films on silver electrodes. Molecules standing tall instead of crouching form tighter assemblies, which dramatically improve the device properties.

A recent breakthrough by scientists from NUS and University College Cork may mean the arrival of highly energy-efficient smart phones and tablets that can last up to 10 times their usual life.

A group headed by Assistant Professor Christian A Nijhuis from the NUS Department of Chemistry and Dr Damien Thompson from Tyndall National Institute at University College Cork, Ireland managed to overcome the great challenge of developing miniature active components that do not overheat while showing electrical properties, to create ultra-small devices using molecules. These items are so small that 50,000 of them can be lined up back-to-back to fit on the diameter of a human hair.

The team succeeded in designing the devices with a tenfold jump in switching efficiency by altering just one carbon atom of the active molecular component. By acting as electrical valves, these molecules allow current to flow through them when switched on and stop current flow when switched off. The Singapore scientists packed these molecules tightly on metal electrode surfaces, and the defect-free assemblies can suppress leakage currents to operate efficiently and reliably. The device can be switched on and off cleanly based on the charge and shape of the molecules.

Through experiments and high-performance computer simulations, the investigators demonstrated for the first time that tiny enhancements in molecule orientation and packing trigger changes in van der Waals forces that hold molecules together. The modifications are substantial enough to dramatically raise the performance of electronic devices.



The weakest of intermolecular bonds, van der Waals forces only become significant when summed over large areas, thus the majority of research into ultra-small devices has used the stronger π - π interactions to stick molecules together. The current study shows how van der Waals interactions present in every conceivable molecular scale device can be tuned to optimise the performance of the device. Molecules with an odd number of carbon atoms stand straighter and thus pack more closely than those with an even number of carbon atoms. The findings establish the feasibility of boosting device performance by forming tighter attachment between molecules.

These nano products could mean new ways to counter overheating in mobile phones and laptops, as well as help the electrical stimulation of tissue for wound healing. The innovative work has been published in the [February issue](#) of *Nature Nanotechnology*.

The researchers are following up on new ideas arising from these exciting results, to ultimately invent a range of novel components for molecular electronic devices, said Dr Nijhuis. ([Source](#))

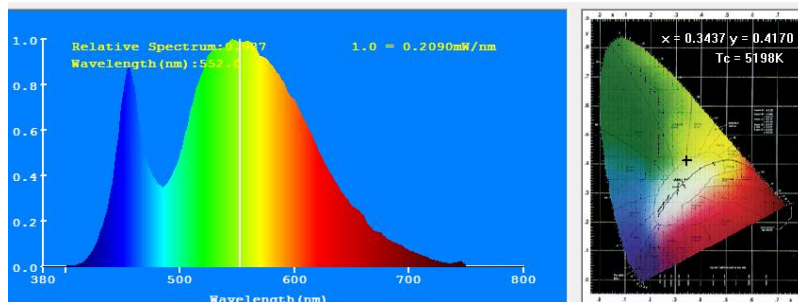
Vietnam

- ◆ *Nanomaterials for lighting* (Source: Dept. of Engineering Physics and Nanotechnology, Univ. of Engineering and Technology, VNU, Hanoi)

Organic light emitting diode (OLED) - With the aim to use a “flat film-like shape” excitation source in the opto-biomedical analysis system (OBMAS), a deep-blue organic light emitting diodes (OLED) with emission wavelength of 455 nm were fabricated by vacuum evaporation of low molecular-weight polymers. In the devices, N-Bis(naphthalen-1-yl)- N,N-bis(phenyl) benzidine (NPB) was used for hole transport layer (HTL), 2-methyl-9,10-bis(naphthalene-2-yl)anthracene (MADN) - for emitting layer (EML) and tris(8- hydroxyquinolato) aluminum(III) (Alq3) - for electron transport layer (ETL).



Materials for solid state lighting - Nanopowders of cerium doped yttrium aluminum garnet (Y₃Al₅O₁₂:Ce³⁺) - YAG:Ce were prepared by low-temperature sol-gel method. It exhibited a broadband green emission spectrum with the peak at 521 nm. The white light was obtained by mixing blue light from emission of the blue LED chip - Indium Gallium Nitride (InGaN), green-red light from the fluorescence of nano- YAG:Ce and yellow light from Poly[2-methoxy-5-(2'-ethyl-hexyloxy)-1,4-phenylene vinylene] (MEH-PPV) polymer. The hybrid nanocomposite-based WLEDs exhibited broad band emission spectra from blue light to red wavelengths and provided the white light with colour rendering index Ra = 84.36.



Emission spectra of a WLED made from a blue LED chip coated by the composite of YAG:Ce and MEH-PPV

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ASIA NANO FORUM SOCIETY NEWSLETTER

ISSUE No.19 Mar.2013

EVENTS

Date	Avenue	Events
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
May 12-15, 2013	Washington, USA	nanotech Conference@Expo 2013 Website: www.techconnectworld.com/Nanotech2013/
Jun.30-Jul.5, 2013	Singapore	International Conference on Materials for Advanced Technologies (ICMAT 2013) For more information: eileenso@mrs.org.sg
Jul.1-3, 2013	Sydney, Australia	4th International NanoMedicine Conference Webpage: http://www.oznanomed.org/
Jul.10-12, 2013	Seoul, Korea	Nano Korea 2013 Website: www.nanokorea.or.kr/
Jul.10-12, 2013	Gold Coast, Australia	4th International Conference on Smart Materials and Nanotechnology in Engineering (SMN 2013) Website: http://www.a-tech.hk/SMN%202013/
Jul.14-19, 2013	Chiba, Japan	12th Asia Pacific Physics Conference (APPS12) http://www.jps.or.jp/APPC12/index.html
Jul.25-27, 2013	Chennai, India	INTERNATIONAL CONFERENCE ON ADVANCED NANOMATERIALS & EMERGING ENGINEERING TECHNOLOGIES (ICANMEET-2013) Website: http://www.icanmeet2013.com/
Aug.5-8, 2013	Beijing, China	The 13th IEEE International Conference on Nanotechnology website: http://ieeenano2013.org/
Aug.13-16, 2013	Nanjing, China	The 4th International Conference of Bionic Engineering(ICBE 2013) http://www.icbe2013.cn
Sep.5-7, 2013	Beijing, China	ChinaNANO 2013 website: http://www.chinanano.org
Sep.14-15, 2013	New Delhi, India	4TH INTERNATIONAL CONFERENCE ON NANO SCIENCE AND TECHNOLOGY (ICNST 2013) Website: http://www.icnst.org/
Sep.15-21, 2013	Vladivostok, Russia	V Euro-Asian Symposium "Trends in MAGnetism", EASTMAG-2013 http://eastmag.wl.dvfu.ru/

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Sep.24-27, 2013	Suzhou, China	CHINANO Conference & Expo 2013 Website: http://www.nanopolis.cn
Oct.2-4, 2013	Taipei, Taiwan	Taiwan Nano 2013 Website: http://www.twnpnt.org/ Contact e-mail: npntoffice@nctu.edu.tw
Oct.3-6, 2013	Tainan, Taiwan	The 2013 IEEE Nanotechnology Materials and Devices Conference (NMDC) Website: http://conf.ncku.edu.tw/nmdc2013
Oct.28-31, 2013	Nagoya, Japan	6th International Symposium on Nanotechnology, Occupational and Environmental Health
Oct., 2013	Tehran, Iran	Iran Nanotechnology Festival in Parallel with Int. Forum on Nanotechnology Economy (Oct. 2013) Website: http://www.festival.nano.ir
Nov.3-5, 2013	Doha, Qatar	Inventions& Nanotechnology Expo&Conference ME Website: www.invnanome.com
Feb. 2-6, 2014	Adelaide, Australia	23rd Australian Conference on Microscopy and Microanalysis, International Conference on Nanoscience and Nanotechnology (ACMM 23 /ICONN2014) Website: http://www.aomevents.com/ACMMICONN
Feb. 8-12, 2015	Nelson, New Zealand	Advanced Materials and Nanotechnology 7 (AMN7) www.macdiarmid.ac.nz