



Asia Nano Forum

Asia Nano Forum Newsletter

November 2016

Issue No.32

**ANF Secretariat
Singapore**

**Editors:
Liuyang ZHANG
Lerwen LIU**

TABLE OF CONTENTS

Acknowledgement of Contributors	1
1. NEWS.....	2
✧ Partnerships/Collaborations	2
Indonesia.....	2
Malaysia	2
Taiwan.....	3
Thailand	5
✧ Commercialization and Business.....	7
Indonesia.....	7
Malaysia	7
Taiwan.....	9
✧ New Education/Research Program	10
Russia	10
Thailand	12
✧ General News	13
Japan	13
Malaysia	14
Philippines.....	15
Singapore	16
Taiwan.....	18
Thailand	19
2. REASEARCH BREAKTHROUGH.....	21
Indonesia.....	21
Singapore	21
Taiwan.....	24
3. EVENTS.....	24

Acknowledgement of Contributors

Indonesia: Indonesian Society for Nanotechnology (MNI)

Japan: The National Institute of Advanced Industrial Science and Technology (AIST)

Malaysia: NanoMalaysia Berhad

Philippines: NANOLAB – Department of Science and Technology

Russia: RUSNANO

Singapore: Campus for Research Excellence And Technological Enterprise (CREATE)

Institute of Materials Research and Engineering (IMRE)

Taiwan: The Innovation and Application of Nanoscience Thematic Program (IANTP)

Thailand: National Nanotechnology Center (NANOTEC)

1. NEWS

✧ Partnerships/Collaborations

Indonesia

From Research to Industry : Collaboration between Indonesia Institute of Sciences and PT. Sinar Banten Utama to Build Nano Silica Processing Factory in Indonesia

Based on data from Statistic Indonesia Agency, total import of silica is amounted to 1599.291 tonnes in and predicted to increase every year in line with the increasing needs of silica in the national industry. Meanwhile, locally abundant source of silica contained in quartz sand and other silica rocks with total exceed 4 billion tons, which spread to almost all islands in Indonesia cannot be used to replace even though theoretically the technology required is already available.



Nano silica sample



Factory visit

Based on the fact above, Center for Innovation Indonesian Institute of Sciences with PT. Sinar Banten Utama plans to establish a nano silica processing factory in Indonesia. This factory will be located in Serang, West Java. The establishment of this factory demonstrates the seriousness of Indonesia government and the private sector in meeting the needs of silica sand domestically and increasing the added value of local raw materials.

Malaysia

NanoMITe Annual Symposium 2016

Kuala Lumpur, 28th September 2016 – The NanoMITe Annual Symposium (NMAS 2016) was organised at University Technology Malaysia by the NanoMITe Secretariat and the Malaysia Nanotechnology Association with the support from NanoMalaysia Berhad and Akademi Sains



Malaysia.

NMAS 2016 was touted as the premier gathering place in Malaysia for leading academic experts in the field of nanotechnology.

NMAS 2016 presented original and high impact research papers on all nanotechnology related topics within the consortium of academic institutions. Papers were peer-reviewed

and selected based on technical novelty, integrity of the analysis and impacts in current trends of nanotechnology.

Taiwan

Taiwan Continues to Participate in the M-ERA.NET

Dr. Ting-Kuo Lee, representative of National/Regional funding organization of Taiwan, the Ministry of Science and Technology (MOST), attended the Working Group Meeting and Board Meeting of M-ERA.NET Consortium held in the building of Norway Research Council in Oslo, Norway on 13-14 September, 2016. For the Call 2016 of Phase II, so called M-ERA.NET 2 (2016 – 2021), there are six research topics for applicants to choose under this program, including “*Integrated computational materials engineering (ICME)*”, “*Innovative surfaces, coatings and interfaces*”, “*High performance synthetic and bio-based composites*”, “*Functional materials*”, “*Interfaces between materials and biological hosts for health applications*”, and “*Materials for additive manufacturing*”. The main function of this meeting in Oslo is to determine the list of pre-proposals agreed by all participating funding agencies. The rules are that the proposal must have the support from two EU and associated countries and three funding agencies. All six pre-proposals involving Taiwan’s teams have passed the selection and are

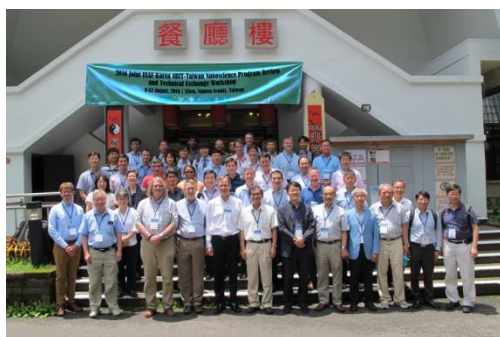
invited to submit full proposals. There will be a meeting in next January to determine which projects to support. M-ERA.NET started in 2012 under the FP7 scheme and continues from 2016 to 2021 under the Horizon 2020 scheme as a network of 41 public funding organizations, including 29 national and 12 regional organizations, from 28 European and non-European countries, such as Taiwan, Brazil and South Africa.

Iran Nanotechnology Initiative Council Dignitaries Visit Taiwan's Ministers of MOEA and MOST

Prof. Ali Beitollahi and Prof. Saeed Sarkar from Iran Nanotechnology Initiative Council (INIC) visited Taiwan's Minister of Economic Affairs and Minister of Science and Technology in July, accompanied by Dr. Maw-Kuen Wu, the Founding President (2008–2009) of Asia Nano Forum (ANF). Prof. Beitollahi and Prof. Sarkar's visit is expected to help with promoting the bilateral cooperation on scientific research and industrial potentials in the field of nanotechnology, and furthermore providing Taiwan's companies with the opportunity to participate in the rising market in Iran. Prof. Ali Beitollahi has been an INIC member since 2003 and the director of international collaboration committee as well as nano standardization committee of INIC. Currently he also acts as the Vice President of ANF. Prof. Saeed Sarkar is the Board Member of Nanotechnology Ministry of Health and Medical Education. He also has been serving as the Secretary General of INIC since 2008.

Taiwan Hosted 2016 Joint USAF-Korea NBIT-Taiwan Nanoscience Program Review and Technical Exchange Workshop

The 2016 Joint USAF-Korea NBIT-Taiwan Nanoscience Program Review and Technical Exchange Workshop was held in Xitou, Taiwan on 8-12 August 2016. This annual workshop is a successful model to further international collaboration on nanoscience and nanotechnology between the US, Korea, and Taiwan. There were more than 70 distinguished scientists, engineers, and experts from premier research institutions in the US, Korea, and Taiwan to address issues in promoting the strategic development of nanotechnology and share their cutting-edge researches on nanotechnology. To leverage international research, the US Air Force Office of Scientific



many new fields of research.

Research (AFOSR) has been supporting a series of US-Korea workshops since 2002 and USAF-Taiwan workshops since 2004, respectively. As a result of these interactions, a number of international, particularly interdisciplinary research teams have been formed to challenge established boundaries in science and open up

Thailand

Japan-Thailand Joint Meeting on Nanofunctional Materials 2016 on 26-27 May 2016 at Dusit Thani Bangkok and Sirindhorn Science Home, Pathum Thani

National Nanotechnology Center (NANOTEC) and National Institute for Material Science (NIMS) co-organized “Japan-Thailand Joint Meeting on Nanofunctional Materials” to explore effective measures against infectious diseases using the most advanced nanomaterials and sensing technologies available. Professor Sirirug Songsivilai, the Executive Director of NANOTEC gave an opening address and introduction of NANOTEC. Professor Kazuaki Sakoda, chairman of doctoral program in Materials Science and Engineering, Graduate School of Pure and Applied Sciences, University of Tsukuba and Managing Researcher of Optical materials field, NIMS gave an introduction of NIMS as well. NANOTEC speakers and



researchers, professor and students from university of Tsukuba, Dr. Toemsak Sriksirin from Mahidol University and Dr. Darinee Sae-Tang Phromyothin from King Mongkut's Institute of Technology Ladkrabang joined this meeting in the scientific poster presentations, laboratory visit at NANOTEC, and collaboration discussion sessions.

Japan–Thailand Joint Seminar under JASTIP Program on 1 September 2016 at Thailand Science Park, Pathum Thani

NANOTEC hosted the Japan-Thailand Joint Seminar under JASTIP Program at Thailand Science Park. The title of the joint seminar is “Innovation in Biomass Application for Catalytic



Materials Synthesis and Energy Devices”. The aim of this seminar is to bring together leading Japanese and Thai researchers and scientists to exchange research ideas, knowledge, and also identify possible research collaborative opportunities. Participating Japanese university partners include Kyoto University and Hiroshima University. Thai

participants included representatives from Chulalongkorn University, Naresuan University, Kasetsart University, King Mongkut's Institute of Technology Ladkrabang (KMITL), Vidyasirimedhi Institute (VISTEC), and NANOTEC. JASTIP, a platform for innovation and a symbol of science and technology collaboration between Japan and ASEAN, is expected to contribute to promoting collaborative research through setting up a network of research hubs in Thailand, Indonesia and Malaysia. Research activities are intended to benefit as many ASEAN countries as possible in the five years. The 1st JASTIP Steering Committee Meeting was held in Bangkok on 27 February 2016 to discuss future plans of international collaborative research between Japan and ASEAN in the field of environment and energy, bio-resources and biodiversity and disaster prevention. JASTIP is a collaboration hubs for International Program (CHIRP) of Strategic International Collaborative Research Program (SICORP), Japan Science and Technology Agency (JST) and the JASTIP program–WP2 (NSTDA-Kyoto University collaboration)

✧ Commercialization and Business

Indonesia

PT. Nanotech Herbal Indonesia: Bring Herbal to Life

Generally PT. Nanotech Herbal Indonesia is a startup company which is engaged in the processing of herbal raw materials, pharmaceuticals and cosmetics. They have been developed nano propolis, nano vitamin A, nano rice, natural body was and nano mangosteen. Their latest product is nano chitosan. Chitosan itself is a linear polysaccharide composed of randomly distributed β -(1-4)-linked D-glucosamine (deacetylated unit) and N-acetyl-D-glucosamine (acetylated unit). It is made by treating the chitin shells of shrimp and other crustaceans with an alkaline substance, like sodium hydroxide.

Later, they develop chitosan into nano chitosan in collaboration with several research institutions at Indonesia Science and Tecnology Park. The ability of wound healing and collagen enhancers of nano chitosan has been tested in the laboratory and become the flagship product in the company. Currently, the company is doing market testing and explores cooperation with some cosmetic and pharmaceutical companies in Indonesia.



Nano chitosan

Malaysia

NANOMALAYSIA-UTP-HANS MOU EXCHANGE CEREMONY

KUALA LUMPUR, 17TH AUGUST 2016 - At the 4th World Engineering, Science and Technology Congress (ESTCON) 2016, NanoMalaysia, Universiti Teknologi Petronas and Hans System Design Services agreed to enter into a technology licensing partnership for the Commercialisation of Copper-Carbon Nanotube Nanocomposite for Thermal Management after

successfully completing the pre-commercialisation stage in 2015. The partnership will deploy novel applications of Copper-Carbon Nanotube thermal management for electric and electronics



sector through the country's National Key Economic Area, Entry Point Project (EPP) 20 under NanoMalaysia which aims at enabling industries through nanotechnology. The parties were represented by Dr. Rezal Khairi Ahmad, Chief Executive Officer of NanoMalaysia, Datuk Ir. (Dr.) Abdul Rahim Hashim, Vice Chancellor of University Teknologi Petronas and Mr. Pannirselvam Velu, Managing Director Hans System Design Services.

IoNT FOR SWIFTLET FARMING

KUALA TERENGGANU, 22ND AUGUST 2016 - Internet of Nano-Things (IoNT) power generation and self-powered indoor environmental monitoring solution for Smart Swiftlet Farming was deployed at Swiftlet Eco Park, Kuala Terengganu.

As the lead agency in commercialising nanotechnology in Malaysia, NanoMalaysia together with Swiftlet Eco Park Holdings Sdn. Bhd., MIMOS Berhad and Nanopac (M) Sdn. Bhd. will provide environmental friendly IoNT solution for better yield and preventive measures to improve



harvesting and quality of edible bird's nest. Besides, this is the first pilot trial prior to an innovative and comprehensive adoption at economics of scale for all swiftlet eco parks in the world. All parties have entered into a collaborative arrangement to provide

Market Proof of Concept in establishing a viable and sustainable future development of swiftlet premises to be patented for value creation in the upstream practices.

Therefore, the adoption of Nano Photovoltaic (NPV) Cell will be functionally safe for energy solution. Meanwhile sensors technology would be installed as part of a remote control and advance monitoring mechanism for efficiency in identifying the humidity, oxygen and temperature for habitat.

Taiwan

NanoMark Program, MOEA

The nanoMark enhances the overall enterprise competitiveness. The nanoMark has been promoted for 12 years and has cumulative fruitful results. From 2004 to date, 52 published certification standards and 14 Registered test laboratories have been set up. Currently 43 companies within all 57 certified companies and 2,436 products within 2,715 certified products are still effective. Construction materials are the main categories of certified companies and products, more than 50% and 90% respectively. The results of a market research indicated that not only can the nanoMark help the companies who have passed the nanoMark certification to increase their "corporate image", gain customer confidence and promote "market sales". It can even enhance the selling price of their products by 20%.



Taiwan's Exhibitors at Iran Nano 2016

Iran Nano 2016 - the 9th International Nanotechnology Festival was held on 5-8 October 2016 in Tehran, with 109 institutes and firms participating. For the first time, Taiwan participated in the leading exhibition and festival for nanotechnology of Iran with the mission of contributing to the commercialization of nanotechnology. Taiwan's exhibitors, lead by Dr. Maw-Kuen Wu, the Founding President (2008–2009) of ANF, participated the event



this year with new exciting Nano products, including High Pressure Homogenizer, Nano Mixing and Milling Machine, Nano Metal Oxide Transparent Heat, Insulation Film, and Energy Saving Film & Glass.

✧ New Education/Research Program

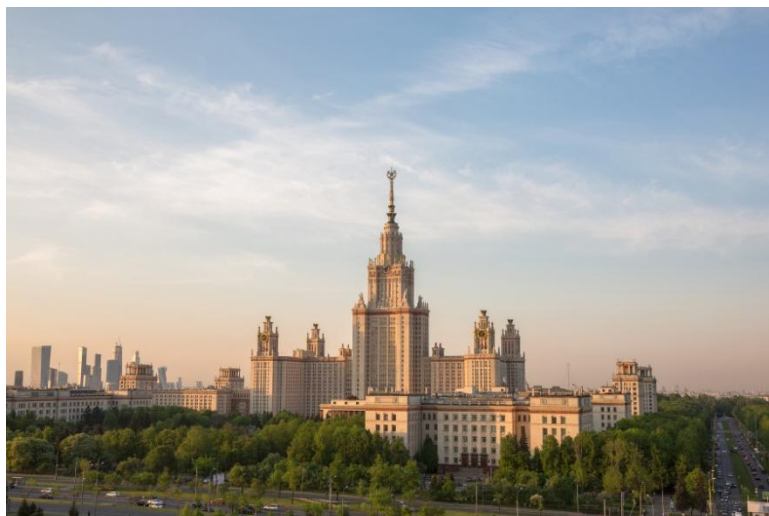
Russia

‘Breakthrough to the Future’ Olympiad

Prof. E.A.Goodilin, A.A.Semenova (Lomonosov Moscow State University, Department of Material Science)

A.E.Melnikov (Fund for Infrastructure and Educational Program RUSNANO)

Ten years ago a new complex tool for selection of talents and their career promotion - the Russian nanotechnology Olympiad “Breakthrough to the Future” - was established by Russian scientists. Nowadays, this official top level national wide multidisciplinary Olympiad represents joint educational, scientific and science promotion activities of two co-organizers, Moscow University and Fund for Infrastructure and Educational Programs (RUSNANO), involving a



wide range of participants – from young schoolchildren to young postdoc scientists and school teachers. The basic initial ideas of the Olympiad in 2006 – to raise the awareness of young people about the nanoscience and nanotechnology and to fight against pseudoscience – have been successfully transformed through

the years into sharing and social implementation of achievements of advanced chemical, physical, mathematical, biological sciences related to nanotechnology innovations. At the moment, the 30 000+ participants are united into the virtual ‘Nanoclub’ on site www.nanometer.ru representing both the Olympiad Internet event and also a famous web portal

of popular sciences. Such a combination attracts people since they learn new verified facts, present and discuss their ideas; earn new career pathways and contacts.

A quite unique feature of the Olympiad is related to a large number of social groups involved into the network Olympiad project lasting for years: many schoolchildren, former participants take part in the Olympiad each year and thus grow up to the student and PhD still participating in the Olympiad competitions of their level and even generating new authors of the Olympiad problems and increasing the population of its volunteers in different regions of Russia.



A key idea of the Olympic events of recent years falls into a sequence of three main stages of getting new knowledge and achievements. The first stage starts from publication of new hard tasks specified for each of the group of participants. The stage is lasting approximately for a month in order to allow the participants to search and to compose their original answers. The second stage includes publication of official solutions and on-line or indirect discussions of participants' solutions. The meaning of this stage is not only a formal appeal but also a first communication of participants and the jury. The third stage is also important and gives a chance

to the 30% of top selected participants to take part in the face-to-face Olympiad competition in Moscow. This stage combines such activities as solving theoretical tasks and oral presentations of the first research projects for schoolchildren; open panel discussions on educational ideas for teachers and a “black box approach” for students research skills and competencies assessment. Each “black box” contains an “unknown” piece of a modern device (or a material) as a subject to study by TES, SEM, XRD, Raman scattering spectroscopy methods etc. The contestants’ research activities which determine their rating in the competition are the following: selection of the investigation methods, comprehensive data interpretation, conclusions on the origin and appliance of the “black box” objects. Such competition opens up students’ creativity, allows them to demonstrate profound theoretical knowledge and practical skills, and verifies understanding of innovative nanotechnologies utilized in modern devices and materials. Information, learning and contest materials of the previous 10th Olympiad (2015/2016) are accessible on the official page of the event http://www.nanometer.ru/olymp2_o10.html

The experience obtained during the long-term Olympiad organizing in Russia could become a part of collaboration between the countries provoking a beneficial exchange of ideas and students and really useful for the future related international events.

Thailand

The First Semester of the Nano Program at KMUTT (Bangkok, Thailand)

KMUTT has kicked-off a new international academic program offering master’s and doctoral degrees. We are now during the first semester. The class consists of 12 students from 3 nations (Thai, Nepal, and Indonesia) from various backgrounds (material science, physics, biology and printing technology). The first semester offers them great learning opportunities in fundamental nanoscience, essential fabrication & characterization techniques, and research methodology. Outside the classroom, they have been enriched by series of Nanoseminars with topics ranging from microarray diagnostics, field effect transistors, DNA nanotechnology, internet of things, and Innovation & Entrepreneurship towards Sustainability by Dr. Lerwen Liu (left). In addition, we have organized a workshop on design thinking by Ms. May Sripatanaskul from Thailand Development Research Institute (right) to ignite their creativity.



✧ General News

Japan

SSDM 2016

The 48th International Conference on Solid State Devices and Materials (SSDM2016) was held in Tsukuba, Japan, from September 26 to 29, 2016. More than 800 scientists and engineers gathered from all over the world. In particular, the member economies of ANF contributed a lot to the conference; more than 90 participants were from Taiwan, and around 20 researchers were from each of China and Korea. The conference was also participated from Singapore, Australia, Malaysia, Thailand, and UAE.

The conference covers a diverse range of science and technology related to solid-state electronics from semiconductor devices, material science and process technologies to circuits and systems, including nanomaterials and nanodevices. This year, 520 papers were presented. One of the main topics was what turnaround we should make in the era when the miniaturization of Si devices is coming close to an end. The key question is what will be the promising technology alternative to the ultimately scaled Si LSIs. There are many possible candidates such as low-dimensional materials for nano-transistors, non-volatile memories using new materials, neuromorphic or cognitive computing, and quantum information technologies. Note that all of these candidates require nanoscale design and processing of novel materials. Thus, global collaborations on nanotechnologies are expected to meet the requirements.

The next 49th SSDM 2017 will be held in Sendai, Japan, from September 19 to 22, 2017.

Malaysia

Jumpstart Seminar 2016

Putrajaya, 6th October 2016 – NanoMalaysia Berhad organised the Jumpstart Seminar 2016 with the theme ‘Sustainable Economic Development through Nanotechnology’ at the Dewan Perhimpunan MOSTI, Ministry of Science, Technology and Innovation.



This seminar focused on the applications of nanotechnology, business opportunities of nanotechnology, nanotechnology commercialisation and industrialisation of nanotechnology and nanotechnology development challenges in Malaysia. This seminar was devoted to policy makers and government officials in Malaysia to improve understanding of the importance of nanotechnology as a catalyst towards economic development.

Nanomalaysia at Estcon 2016

Kuala Lumpur, 15th Aug 2016 - NanoMalaysia participated in the 4th World Engineering, Science & Technology Congress (ESTCON) 2016. Dr. Rezal Khairi Ahmad, the Chief Executive



Officer represented NanoMalaysia Berhad as a speaker to talk on "Nanotechnology as Malaysia's New Sustainable Growth Engine".

Nano Korea 2016& Asia Nano Forum Summit

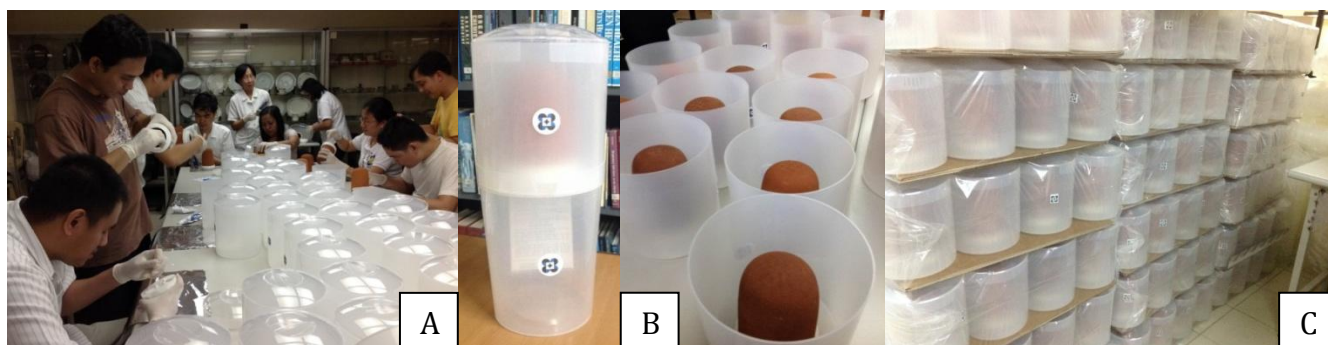
Seoul, 14th Aug 2016- Dr. Rezal Khairi Ahmad, Chief Executive Officer and Dr. Daniel Bien Chia Sheng, Vice President of Innovation Office, NanoMalaysia Berhad represented the company at the Nano Korea 2016 and at the 13th Asia Nano Forum (ANF) Summit. Dr. Rezal,



who is also the Treasurer of ANF ExCo and the Chair of Commercialisation Working Group was there to update on the latest Malaysian nanotechnology advancement including commercialisation, R&D, infrastructures and standardisation.

Philippines***Innovative Ceramic Water Filter System with Nano-Anti Microbial Coating for Drinking and Disaster Mitigation***

An innovative ceramic water filter system with nano-antimicrobial coating was developed by researchers of NANOLAB to address the demand for simple, effective and inexpensive water filter in urban and rural areas nationwide. The developed system consists of ceramic candle-type water filters with anti-microbial coating to eliminate disease-causing water borne microorganisms. Red clays from the different regions were characterized and this study was able to map the areas in the Philippines where the clays are potential for the production of ceramic filters. Using the developed portable water system, the filtered water conformed to the microbiological criteria set by the Philippines National Standard (PNS) for drinking water. To date, a total of 10,000 beneficiaries/families were recipients of this technology including the victims of typhoons: Haiyan, Washi and Sarika (International names). Recently, 800 units were immediately distributed to the victims of Super Typhoon Haima (local name: Lawin) in the provinces of Isabela and Cagayan. The Philippines' ceramic water filter systems using nanotechnology is affordable to every Filipino and can be utilized for disaster mitigation.



A) NANOLAB researchers assembling the units, B) Complete assembly of the candle type ceramic water system, C) Packaging of the ceramic water filter systems ready for transport.

Singapore

NEW CREATE programme renewed to phase II

Nanomaterials for Energy and Water Management (Phase II) known as NEW is one of the programme funded by SHARE (Singapore-HUJ Alliance for Research and Enterprise) under the Campus for Research Excellence and Technological Enterprise (CREATE). It is a collaborative research effort between NTU and HUJ, which aims to bring scientific excellence and innovation, leading to technology transfer, licensing and entrepreneurship.



Left: NEW CREATE Phase II Kick off meeting on 11 August 2016; Right: Proposed strategic collaborations with other printing centers in Singapore

This project originally started with NTU-HUJ-BGU program in 2011 and was renewed to Phase II (NTU-HUJ programme) in October 2016. During Phase I, the program trained 22 PhD students and 130 man-year of postdocs under 16 projects together with the PIs from HUJ and

BGU. It initiated two joint Ph. D program NTU-BGU and NTU-HUJ with four Joint Ph. D candidates from Israel and Singapore. The programme also supported over 183 man-months of exchange activities between Singapore and HUJ/BGU over the last 5 years. The researchers filed 56 patents and 328 publications. Many publications have been featured in high impact journals and media or newspapers. In addition, the programme commercialized 4 patents with 2 spin-off companies. The PIs in the program also attracted 22.6 million external funding and 1.3 million is the direct cash flow from industry. The NEW-Phase II project aims to innovate advanced materials in pushing the scientific frontiers in energy harvesting, conservation and storage to meet the energy-water nexus needs through innovative manufacturing processes. Through extensive collaborations with various CREATE entities, government agencies, institutions and industries. These projects will develop novel materials and devices in three themes: printable energy materials and devices, energy modulation and storage systems for buildings, and materials and processes for energy-water nexus.

Discovering Solutions through Innovations

Rubber that conducts electricity, a powder that changes colour when it is exposed to UV rays and a sticker that detects freshness in food—these are a few of the innovations that were showcased at IMRE's booth during A*STAR SME Day on 5 April. Amidst the hustle and bustle of exploring and networking, industry professionals and representatives from a multitude of SMEs in Singapore had the opportunity to explore IMRE's capabilities and innovations in materials research and speak to IMRE scientists to spark more ideas. Other exhibitors included local SMEs who have partnered A*STAR, local institutes of higher learning and other government agencies which promote innovation among SMEs. Mr S. Iswaran, Minister for Trade and Industry (Industry), was the Guest of Honour for this full-day event. He presented T-Up Excellence Awards to four A*STAR scientists, including IMRE's Dr Xiao Yang, for their impactful contributions to



IMRE scientist and Materials Center of Innovation (MCOI) manager, Dr Leong Yew Wei, introducing InnoVent to Mr S. Iswaran, Minister for Trade and Industry (Industry) by explaining how it can be a useful platform for SMEs to embark on open innovation and expand their product portfolio.

local enterprises. He said, “The continued competitiveness of our SMEs depends critically on their ability to adapt quickly and to adopt new business models through innovation. I urge our SMEs to work with A*STAR, SPRING and other Government agencies to tap on innovation and technology to continue the transformation to innovation-led growth.”

Learning About Science through Play

Members of the public came in masses to check out X-Periment!, an annual science carnival which celebrates the developments and research work in the field of science and technology. This year, IMRE showcased a materials-related technology which repels water. Our interactive presentation of the silicon-based superhydrophobic coating attracted hundreds of curious young



minds and numerous enquiries from interested parties from various industries. The three-day event was jointly organized by Agency for Science, Technology & Research (A*STAR) and the Science Centre Singapore.

Nurturing Future Scientists and Engineers

As part of IMRE’s outreach efforts, our scientists conducted talks for international students and shared the institute’s extensive materials research portfolio and capabilities. Dr Jiang Ying and Dr Hendrix Tanoto spoke to participants of the Singapore International Science Camp and



engineering students on exchange with NTU. More than 70 students from New Zealand, Brunei, India and Indonesia were interested about the attachment programmes available at IMRE and how they could experience working at a real lab.

Taiwan

IANTP Call for Proposal 2017

Through the initiation of Call-for-Proposal 2017, Taiwan's Innovation and Application of Nanoscience Thematic Program (IANTP) encourages scholars to engage in translational research based on scientific discoveries, from a basic Technology Readiness Level (TRL) of "Concept Development" to a more advanced "Prototype Validation", to produce original nanomaterials, components/devices and technology, and to meet the societal needs and to strengthen the industry competitiveness. IANTP focuses on 4 key areas, including "*Nanomedicine and Biotechnology*", "*Nanomaterials for Energy and Environment*", "*Nanoelectronics and Optoelectronics*" and "*Fabrication, Characterization and Mechanics of Nanostructures*". The majority of submitted proposals this year are relevant to biomedicine just like last year. The passing rate for pre-proposal this year is 40%, and 17 PIs are recommended to submit full proposals. The success rate for invited full proposals is in the range of 18%-23% since Call 2015. Innovation of technology development and feasibility of marketable application are the main criteria of the review. Also, an Orientation was held to help PIs to develop full proposals after the invitation to submit full proposal.

Thailand

Nano@KMUTT Has a Chapter in a Book by RSC.

Nano@KMUTT members have co-authored in a book "Food Biosensors" by Royal Society of Chemistry. Their chapter under title "Nanomaterial-Based Electrochemical Sensors for Highly Sensitive Detection of Foodborne Pathogens" covers the latest advancements of the applied nanotechnology and electrochemistry for a highly sensitive detection of bacteria that cause gastrointestinal infection and lead to food-borne diseases that kill approximately 2 million people annually. The book will be released in October 2016.

OECD's WPMN Seminar on Risk assessment and The 16th Meeting of WPMN on 13-16 September 2016 in Paris, France



OEC
D's

www.oecd.org



WPMN Seminar on risk assessment: state of the science, challenges, needs and opportunities for hazard, exposure and risk assessment of the nanomaterials at OECD in Paris on 13 September is the pre-event activity of the 16th Meeting of the OECD Working Party on Manufactured Nanomaterials (WPMN). The seminar is important as it identifies future works capable of meeting some of the stated objective outlined for the WPMN Programme of Work 2017-2020. As developer of nanotechnology we need to understand and be aware of this important information. The seminar covers various topics such as important issues in risk assessment of manufactured nanomaterials, future horizons in alternative testing for nanomaterials, current status of research on nanotoxicology: Validity and reliability of data and study design, and discussion making framework for the grouping and testing of nanomaterials NANOTEC participated in the 16th Meeting of the OECD Working Party on Manufactured Nanomaterials (WPMN) at OECD Conference Center in Paris, France. About 100 participants from 35 member nations and observing nations attended. Representatives from NANOTEC, Dr. Pavadee Aungkavattana, a deputy executive director, presented the Thailand report which highlighted past and planned activities at the national level. The 2017 Meeting will be held in June at the same place.

NANOTEC researcher was awarded the L'Oréal Thailand for Women in Science fellowship 2016 on 21 September 2016 at Renaissance Bangkok Ratchaprasong Hotel, Bangkok

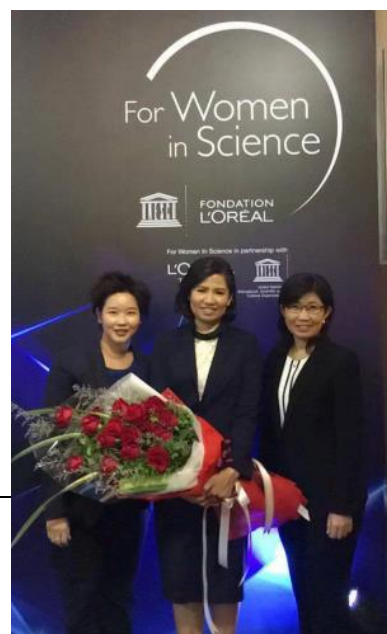
L'Oréal Thailand and UNESCO recognizes and supports the advancement of women in science



info@aiaa-anf.org

and encourages women to continue careers in scientific fields.

The annual L'Oréal—UNESCO for women in science fellowship is awarded to women working in doctoral and post-doctoral research who have already distinguished themselves in the Life Science, Materials Science and Chemistry. Dr. Supawadee



www.asia-anf.org

Namuangruk, team leader of Nanoscale Simulation Laboratory,

NANOTEC recipient of the L'Oréal Thailand" for Women in Science Fellowship 2016 under the Chemistry category for her research work entitled "3D molecular modeling and advanced computational techniques for design and development of nanomaterials in sustainable energy and environmental applications.

2. REASEARCH BREAKTHROUGH

Indonesia

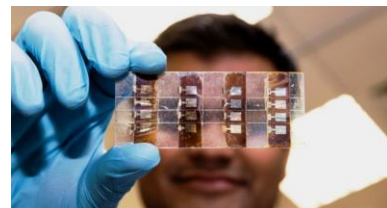
Tropical Marine Chlorella sp. PP1As A source of Photosynthetic Pigments For Dye-Sensitized Solar Cells (Bandung Institute of Technology – Research Center for Oceanography, Indonesian Institutes of Sciences)

To understand the potential for cultivating tropical marine Chlorella sp. PP1 to produce photosynthetic pigments, particularly β -carotene (β -Car), team from Bandung Institute of Technology and Research Center for Oceanography, Indonesian Institutes of Sciences investigated the growth characteristics and pigment properties of Chlorellasp. PP1 under three different irradiances and properties of solar cells sensitized by β -Car. Chlorella sp. PP1 cells that were cultured under fluorescent lamp irradiance (12:12-h photoperiods) showed better cell development and density. However, photoinhibition of cell growth was observed in the cells under both continuous fluorescent lamp irradiance and direct natural sunlight exposure. Photosynthetic pigments of Chlorella sp. PP1 were identified as chlorophylls and carotenoids, and carotenoids were produced more dominantly under light stress conditions. The solar cells that only used β -Car adsorbed by a nanocrystalline TiO_2 film electrode exhibited photovoltaic effects, indicating that β -Car was capable of performing as an antenna of the solar cells.

Singapore

Breakthrough in Solar Technology

Prof Subodh Mhaisalkar, Nripan Mathews and Sum Tze Chien led a team that developed a solar cell made from hybrid perovskite materials. The cell has an efficiency that is close to the efficiency of current solar cells, but costs about 5 times lesser. This team is also the first in the world to provide insights into the high efficiencies observed in this material, and published their results in the world's most prestigious academic journal, Science.



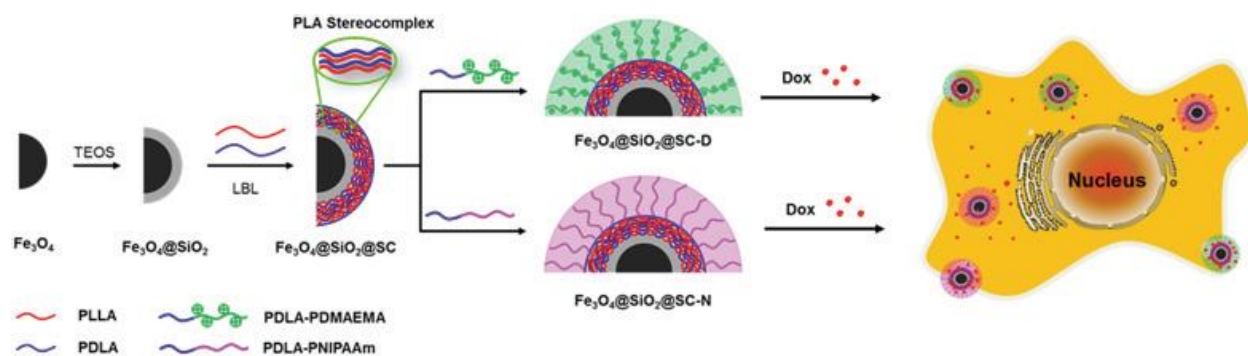
Chemically Converted Graphene (CCG) Films

A study on chemically converted graphene (CCG) showed that paper-like films of this material show high conductivity, mechanical stability, and their optical transmittance can be tuned by altering the deposition time. This resulted in the filing of a technical disclosure on gain medium and lasers.



Reshaping the Future of Drug Delivery

Dr Li Zibiao (lizb@imre.a-star.edu.sg)



Schematic illustration showing the design of highly tunable PLA Stereocomplex Coated Nanoparticles (NPs) and drug delivery to cells.

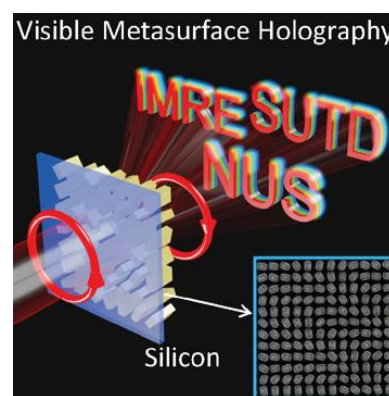
A joint research project between IMRE and NUS developed a highly tunable nanoparticle system with multi-functionalities as a drug nanocarrier, by utilising Poly(lactide) (PLA). PLA is

a biodegradable and biocompatible aliphatic polyester derived from renewable resources. This form of polyester has a very high potential use in biomedical applications such as drug delivery carriers and bio-implantation devices. Together with silica-coated magnetite coating (enabling strong magnetic sensitivity), the enhanced hybrids of nanoparticles demonstrated a great potential of control over the drug release at a targeted site. The coating method developed by the research team can be further optimised to fine-tune the nanocarrier size and operating ranges of pHs and temperatures for in-vivo applications. Further cytotoxicity and cell culture studies also revealed that PLA stereocomplex coated nanoparticles possessed good cell biocompatibility and the doxorubicin (DOX)-loaded NPs showed enhanced drug delivery efficiency toward MCF-7 cancer cells.

Breakthrough in the Development of Holograms

Dr Huang Kun Email: huangk@imre.a-star.edu.sg

The dielectric metasurface hologram promises higher efficiencies due to lower absorption than its plasmonic counterpart. However, it has only been used, up to now, for controlling near-polarisation photons to form single-plane holographic images in the near-infrared region. In a collaborative project by researchers from IMRE, NUS and SUTD, it was reported that the high-efficiency and ultra-thin meta-material made of lower absorption (compared with metallic materials) silicon nanorods was able to achieve multi-colour, multi-plane transmission holograms, and opened the doors to multifunctional, high-quality, small-volume and large-capacity holography. The silicon meta-hologram is capable of controlling lights with multiple wavelengths covering three primary colours (i.e., red, green and blue) and enables its application in colour display by tuning the weights of three-colour lights.



Additionally, the achieved optical efficiency is almost the highest among the previous visible-light meta-holograms due to the low absorption silicon. The potential applications of the technology includes optical holography encryption, data storage and as a key full optical chip of

arbitrarily shaping optical signals in a parallel or multichannel way for the future quantum computer and communications.

Taiwan

Performance and Design Considerations for Lithium Excess Layered Oxide Positive Electrode Materials for Lithium Ion Batteries

Sunny Hy*, Haodong Liu, Minghao Zhang, Danna Qian, Bing-Joe Hwang (黃炳照) and Ying Shirley Meng*, *Energy Environ. Sci.* **9**, 1931-1954 (2016)

The Li-excess oxide compound is one of the most promising positive electrode materials for next generation batteries exhibiting high capacities of $>300 \text{ mA h g}^{-1}$ due to the unconventional

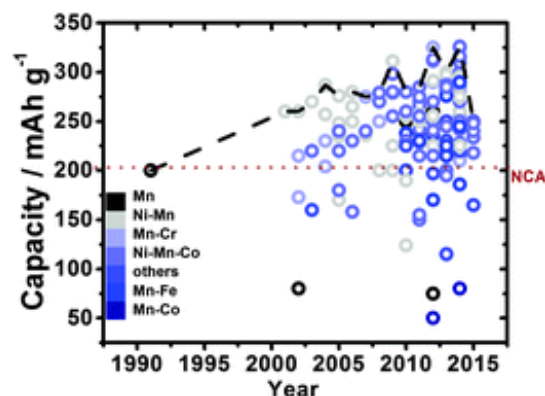


Fig. Evolution of the discharge capacity by years of Mn, ^{6,73-77} Ni-Mn, ^{5,78-113} Mn-Cr, ¹¹⁴⁻¹²⁴ Ni-Mn-Co ⁷⁻⁷² Mn-Fe, ¹²⁵⁻¹³⁵ Mn-Co, ¹³⁶⁻¹⁴⁰ and other ¹⁴³⁻¹⁵⁶ lithium rich positive electrode materials.

participation of the oxygen anion redox in the charge compensation mechanism. However, its synthesis has been proven to be highly sensitive to varying conditions and parameters where nanoscale phase separation may occur that affects the overall battery performance and life. In addition, several thermodynamic and kinetic drawbacks including large first cycle irreversible capacity, poor rate

tural transformation need to be addressed in order to focus on the recent progress and performance trends over the years and provide several guidelines and design considerations based on the library of work done on this particular class of materials.

3. EVENTS

Upcoming Events

July 2017

- **Nanotechnology Entrepreneurship Workshop for Early Career Researchers**
12/07/2017 - 13/07/2017 - Future Industries Institute, Mawson Lakes Campus, University of South Australia
The aim of this workshop is to provide a forum for early career researchers (ECRs) and postgraduate students working on nanotechnology research to interact with industry leader and learn about how to commercialise Nanotechnology. [more info](#)

February 2017

- **Nano Tech 2017**
15/02/2017 - 17/02/2017 – Tokyo, Japan
Nano tech Japan is the world's largest and one of the most comprehensive events for nanotechnologies. It will be held in Tokyo for the 16th time from February 15-17, 2017. In the industry focused exhibition, 600 companies, research institutes and universities show the latest Materials, Fabrication and Measurement Technologies at the nano level. The attendee list of more than 50,000 people reads like the Who-is-who of the Japanese and Asian Industry and includes Electronics manufacturers, as well as Chemical, Pharmaceutical, Automotive and Construction companies. [more info](#)
- **8th International Conference on Advanced Materials and Nanotechnology**
12/02/2017 - 16/02/2017 – Queenstown, New Zealand
AMN8 is the eighth in our biennial series of meetings that focus on the latest research in advanced materials and nanotechnology. The event will continue the very best traditions of previous events, including a range of high-impact plenary presentations, cutting-edge invited and contributed talks, interactive poster presentations and convivial social events. The intimate scale of AMN conferences and the broad interests of fellow delegates offer many opportunities for networking and interdisciplinary discussions. [more info](#)

January 2017

- **8th Biennial Australasian Colloid and Interface Symposium**
29/01/2017 - 02/02/2017 - Coffs Harbour
The eighth biennial Australian Colloid and Interface Symposium organised jointly by Flinders University and the Australian National University with support from ACIS. [more info](#)

December 2016

- **13th International Conference on Optoelectronics and Microelectronics Materials and Devices- COMMAD 2016**
12/12/2016 - 14/12/2016 - Colombo House - University of New South Wales
The 13th International Conference on Optoelectronic and Microelectronic Materials and Devices – is held biannually and provides a forum for Australian and international

semiconductor communities to meet and discuss topics related to microelectronic and optoelectronic materials, processes and devices including nanoscale and quantum technologies. [more info](#)

- **9th International Membrane Science and Technology Conference (IMSTEC)**

05/12/2016 - 08/12/2016 - Adelaide Convention Centre

The themes for the 9th IMSTEC will cover all areas of inorganic membranes, polymeric membranes, membrane science, membrane fabrication and modification, and membrane applications in a broad variety of areas such as filtration, distillation, desalination and biological separations. [more info](#)

Past Events

- **36th Australasian Polymer Symposium (36APS)**

20/11/2016 - 23/11/2016 - Lorne, Victoria

The themes for 36APS will cover all areas of polymer science, engineering and technologies from the latest innovations and new methods in synthesis, polymeric architectures and nanoparticles, characterisation, processing and molecular modelling. [more info](#)

- **Microprocesses and Nanotechnology Conference (MNC)**

08/11/2016 - 11/11/2016 - ANA Crowne Plaza, Kyoto, Japan

29th International Microprocesses and Nanotechnology Conference (MNC) will be held at during November 8-11, 2016. The MNC conference is now in its 29th year and is intended to provide a forum for discussing lithography science and process technology using photon, electron, ion, other energetic particles and nanomaterials. This conference covers not only their applications to micro- and nano-structure fabrication and related physics and devices, but also their fusion applications with other fields like bio, medical information, and communication technology. Details on MNC 2016 is shown in the website; <http://imnc.jp>.

- **2nd French-Japanese Workshop on Micro & Nanotechnology**

08/11/2016 - ANA Crowne Plaza, Kyoto, Japan

This workshop between French nanotechnology research network, RENATECH and Nanotechnology Platform Japan aims at information exchange and promotion of the collaboration among engineers working for user facilities. The workshop following the first workshop at Lyon last year, is held at Kyoto as a satellite event of 29th International Micro-processes and Nanotechnology Conference (MNC2016). In the workshop, new technologies supporting researches of micro and nanotechnology will be discussed through oral and poster presentations. The workshop is also held in cooperation with MicRO alliance workshop organized by three Universities (University of Michigan, Freiburg University and Kyoto University), co-supported by Nanotech Career up Alliance project and the Nanomics research division of Katsura Int'tech Center, Graduate

School of Engineering, Kyoto University, and a poster session by young researchers and students will be arranged.

- **Graphene Malaysia 2016**

08/11/2016 -09/11/2016 –Connexion Conference & Events Centre, Kuala Lumpur, Malaysia

Graphene Malaysia 2016 is a 2-days event centered on graphene industry interaction and collaborative innovation, launched under the National Graphene Action Plan 2020. This plan is the result of an extensive collaboration between the Malaysian government, private sector companies, domestic and international research institutes, and academia to assess how Malaysia can benefit from the potential of Graphene. The conference will feature talks by graphene key leaders from all over the world on the most relevant topics facing this new industry. Participants will have the opportunity to interact, exchange ideas, and build new connections and the agenda is designed to suit anyone who is currently working on graphene or wishes to include graphene in their products (end-users).