



Asia Nano Forum
NEWSLETTER

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1. NANATECH JAPAN 2017 and ANF EXCO MEETING SUMMARY



Asia Nano Forum exhibited at the Japan nanotech 2017, which is the world's largest nanotechnology conference and exhibition held annually in Tokyo since 2003. ANF booth provides a platform for its members to showcase their nanotechnology activities to over 50,000 visitors during a 3 period from all over the world. This year, the ANF booth showcased exciting nanotechnology R&D, policy and commercialization activities from Hong Kong, Malaysia, and the Philippines. This event presents excellent learning opportunities for our participating members to learn the state of the art nanotechnology development but also an unique partnership opportunity as well.

Hosted by the Japan Science and Technology Agency (JST), one of ANF members, ANF organized the first Executive Committee (ExCo) meeting of 2017 on Feb. 16th, 2017 at the nanotech 2017 conference site. The ANF ExCo meeting was very well participated by most of its members and observers from 9 economies including Austria, Iran, Japan, Korea, Malaysia, Philippines, Russia, Singapore, Taiwan and Thailand. The meeting reviewed ANF activities and financials in 2016 as well as highlight of activities from Education Working Group and Nanosafety Working Group. Future strategic matters including summit 2017 and beyond as well as membership growth was elaborated as well. ANF collaborated with Nanotechnology Business Creation Initiative (NBCI) Japan in NBCI's annual roundtable discussion on nanotechnology updates from different countries including Canada, Japan, the Netherlands, Taiwan and USA. Rezel represented ANF commercialization working group (CWG) and presented ANF CWG's planning and invitation for collaborations.

2. NEWS

✧ Partnerships/Collaborations

Malaysia (Source: NanoMalaysia)

Lux Research-NanoMalaysia Forum 2016: The Fourth Industrial Revolution

Kuala Lumpur. 24th October 2016- NanoMalaysia Berhad and Lux Research were once again joined forces brought in together executives and decision makers from multinational corporations, as well as leading entrepreneurs, policymakers and investors for an opportunity to network, to exchange ideas and to gain insights into nanotechnology as the harbinger of the fourth industrial revolution. The Lux Research-NanoMalaysia Forum 2016:



Nanotechnology as A Primary Driver Of The Fourth Industrial Revolution was held at the Kuala Lumpur Convention Centre, offered participants positive insights from industry experts on emerging technologies in advanced materials, the challenges and opportunities in

nanotechnology as one of the drivers of the fourth industrial revolution, as well as its impact on business, government and people.

Forum speakers and panellists were NanoMalaysia Berhad Vice President of National Graphene Action Plan 2020 Murni Ali, NanoMalaysia Berhad Vice President of Innovation Office Dr. Daniel Bien, and Lux Research Inc. analysts Anthony Schiavo and Yuan-Sheng Yu. Through the presentations, networking sessions and panel discussions, forum participants had the opportunity to exchange ideas, network, and gain a deeper understanding about technology, growth, and strategy that can then be applied to their respective industries.

In his welcoming speech, Dr. Rezal stressed that NanoMalaysia through iNanovation and National Graphene Action Plan 2020 prioritises the commercialisation of endogenous nanotechnology innovations. It is also amenable to collaborations in the form of technology transfer, joint ventures and co-investments, and as such the forum was the appropriate platform to explore such ventures.

Taiwan (Source: IANTP)

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 Call 2016 selection and Steering Board Meeting of M-ERA.NET Consortium held in Ljubljana, Slovenia on January 23-24, 2017. The main function of this meeting in Ljubljana is to determine the list of proposals agreed to be funded by all participating funding agencies. The rules are that the proposal must have the support from at least two EU and associated countries and three funding agencies. Three projects involving Taiwan's teams got the necessary funding this year. The call will be launched on March 14, 2017. Six research topics of Call 2017 are Integrated computational materials engineering (ICME); Innovative surfaces, coatings and interfaces; High performance composites; Multifunctional materials; New strategies for advanced material-based technologies in health applications; and Materials for additive manufacturing. M-ERA.NET is a program setup by EU in 2012. It invites research organizations in EU countries to join together to promote the research in material science and application. These member countries invest about 2/3 budget and EU provides about 1/3. Taiwan Ministry of Science and Technology (MOST) also joint as an

observer with one million euros to support joint research projects every year. Last year we started the phase II or M-ERA.NET 2. In Phase I, there are 29 national and 12 regional funding organizations. In phase II there are new members and some old members have departed. Hence there are now about 35 research funding agencies from 26 countries including three countries outside Europe, i.e. Taiwan, Brazil and South Africa.

2017 Canada Taiwan Strategic Partnering Forum on Nanotechnology Applications

2017 Canada Taiwan Strategic Partnering Forum on Nanotechnology Applications was held in Taipei, Taiwan on 23 February 2017. There were about 60 participants in this forum and One-on-One meetings.

The visit of Canadian Delegation, led by

NanoCanada which brought together ChemRoutes

Corporation, Grafoid Inc., Luxmux Technology, Nanalysis Corp, NEMSOR Technologies Inc.,

Preciseley Microtechnology Corp., SensorUp Inc., and Wedge Networks Inc., is expected to

build long-term bilateral relationship in product development and market exploiting of

nanotechnology with potential Taiwan companies. Also, on 22 February, the day before the

forum, the Delegation paid a visit to Dr. Ting-Kuo Lee at Academia Sinica. Dr. Lee has been the director of Institute of Physics, Academia Sinica since 2012 as well as the Chair of International Affairs Committee of Taiwan Nanotechnology Industry Development Association (TANIDA).

Currently he also acts as the Secretary of ANF ExCo Committee.



Thailand (Source: NANOTEC)



Professor Pairash Thajchayapong, Chairman of NANOTEC Executive Board and Dr. Wannee Chinsirikul, NANOTEC Executive Director led a Thai delegation which consisted of research agencies and private sector groups to nano tech 2017 at Tokyo Big Sight, Tokyo, Japan. H.E. Mr. Bansarn Bunnag, Thai Ambassador to Japan, presided over the opening ceremony of the Thailand pavilion. The highlight of Thailand's exhibition under the theme "Nanotechnology Meets Life" was the joint research collaboration between the NANOTEC Nano Agro and Food Innovation Lab (NAF) and Klean Greentech Co.,Ltd on "self-emulsifying delivery system of sweet basil and oregano oil". This joint research received the National Innovation Award in October 2016.

The delegates also used this event to meet with partners to foster research and business collaboration opportunities that will help strengthen both Thai research and economy.

✧ **Commercialization and Business**

Taiwan (Source: IANTP)

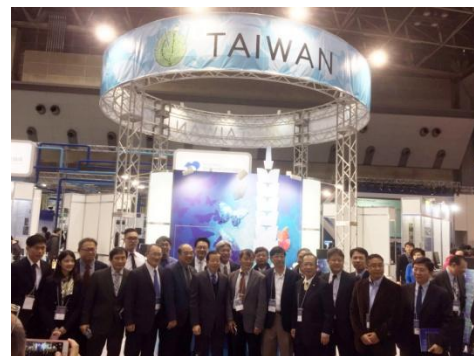
nanoMark Certification System

Taiwan's nanoMark, established in 2003 under the auspices of the government and also the world's first certification system of nano product, has been transferred to a professional and credible organization, Taiwan Nanotechnology Industry Development Association (TANIDA), early this year. The nanoMark enhances the overall enterprise competitiveness. Construction materials are still 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 Pavilion in nano tech 2017, Japan

“nano tech 2017 – the 16th International Nanotechnology Exhibition & Conference” was held on 15-17 February 2017 in Tokyo, Japan. Taiwan Pavilion has been participating this event for 13 consecutive years. “Project of 2017 Japan nano tech and International Collaboration on Nanotechnology Education” selected 30 technology and research achievements from 26 industry, academia, and research units to demonstrate



Taiwan's latest nanotechnology status. Representative of Taipei Economic and Cultural Representative Office in Japan, Frank Hsieh, and staff visited Taiwan Pavilion during the exhibition. This year, OME Technology of Taiwan Pavilion won the "Business Matching Award". This award represents that OME Technology obtained a largest number of business meeting appointments with various exhibitors and visitors by using a business matching system, and strenuously committed to the open innovation.

Thailand (Source: KMUTT)

Industrial Visit (Bangkok, Thailand)

Nano@KMUTT has been continually establishing strong ties with local industries. During the month of January 2017, we have hosted three visits from private sectors ranging from a Thai major telecommunications service provider (Advanced Info Service), a major petrochemical industry (PTT Global Chemical Public Company Limited) and Thai leading microchip manufacturer (Silicon Craft). These fruitful discussions have led to a better understanding of the industrial demands, which help shape the future direction of our research projects.

Thailand (Source: NANOTEC)

The New Minister of Science and Technology visited National Science and Technology Development Agency (NSTDA), Thailand Science Park on January 11, 2017



H. E. Dr. Atchaka Sibunruang, the new Minister of Science and Technology visited Thailand Science Park and National Research Centers under NSTDA. Dr. Narong Sirilertworakul, President of NSTDA and Dr. Wannee Chinsirikul, the Executive Director of NANOTEC were on hand to welcome the ministerial entourage. Dr. Wannee presented highlight research activities related to nano textiles, nano anti bacteria wipe, disposable nanofibrous, nano cosmeceuticals, and nano liquid supplement to enhance chicken wellbeing. Moreover, Dr. Wannee introduced 2 NANOTEC facilities, namely, Cosmetics Pilot Plant that is ready to work with local companies in areas related to using nanotechnology for encapsulation and coating of organic formulas for effective and safe absorption, and National Advanced Nano-characterization Center (NANC) is a world class facility provides services for Nanoscale measurement in ASEAN to test nano products i.e. nanocosmetics, food, and petrochemical. H.E. Dr. Atchaka Sibunruang is interested in these NANOTEC facilities and give the policy on research and development of Nanotechnology.

✧ Education

Japan (Source: AIST)

The WMRIF 5th International Workshop for Young Scientists was successfully held in Tsukuba

The “WMRIF 5th International Workshop for Young Scientists” had been held for three days from November 8th to 10th., 2016 hosted by NIMS at Tsukuba International Congress Center.

The theme of the workshop was “Structural Materials for Innovation and Integrated Computational Materials

Engineering for Their Developments” collaborating with The Cross-ministerial Strategic Innovation Promotion Program (SIP). 20 institutes in 10 countries participated in the workshop and young scientists from the institute presented their latest research achievements. Dr. Hideaki Nishikawa, researcher of Fatigue Property Group at Research Center for Structural Materials, NIMS, received The WMRIF Young Scientist Award that the best 5 presenters were selected for.

WMRIF-World Materials Research Institute Forum was established by the former NIMS president Prof. Teruo Kishi in 2005 to connect world-prestigious research institutes. 50 research institutes in 22 countries have joined WMRIF as of November 2016 to promote innovative research and to discuss future strategies on materials science.

In addition to Biannually General Assembly, WMRIF holds the workshop for young scientists every other year in a host research institute to facilitate young scientists’ growing international experience.

Thailand (Source: KMUTT)***Nanoscience and Nanotechnology Graduate Program at KMUTT***

KMUTT now offers master's and doctoral degrees in nanoscience and nanotechnology. The program aims to nurture the new generation of researchers in nanotechnology. It is run by a team of vibrant investigators from around KMUTT. Its diverse working environment leads to multidisciplinary research including, but not limited to, smart nanomaterials, flexible nanoelectronics, DNA nanotechnology, photovoltaics, and point-of-care diagnostics. Students in the program will have research opportunities overseas with our international network partners as well as internships with regional industries. Full financial support is available for all qualified candidates. Please contact nano@kmutt.ac.th for more information.

Innovation and Entrepreneurship Workshop by Dr. Lerwen Liu (Bangkok, Thailand)

KMUTT is very fortunate to welcome Dr. Lerwen Liu for the third time. In October 2016, Dr.



Liu was invited to organize a two-week-long workshop on Innovation and Entrepreneurship. The aim of the workshop was to guide KMUTT students to establish a new mindset on entrepreneurship with environmental sustainability. The participants including all Nano@KMUTT students had attended

intensive sessions of group discussion and individual mentoring sessions by Dr. Liu herself.

Toward the end, the students had chance to develop their own business plans that have to be presented and also defended it in front of the selected committee from KMUTT executives and Australian embassy.

Several Postdoc Positions are Opening at King Mongkut's University of Technology Thonburi (Bangkok, Thailand)

Nano@KMUTT is looking for three qualified candidates for the post-doctoral fellowship. Please submit your CV to nano@KMUTT.ac.th

Qualifications

1. Candidates must have Ph.D. degrees or expecting their degrees prior to the start date.
2. Strong research track record in any related field

Preferred Specializations

Printing Technology (inkjet or roll-to-roll), Nanofabrication, Flexible Electronics, Medical Diagnosis, Photovoltaic, DNA Nanotechnology, Surface Chemistry, Cell-based Assay (but all fields are welcome)

Appointment Term 2 years Expected Start Date Early 2017

✧ General News

Taiwan (Source: IANTP)

Entrepreneur Seminar

Entrepreneur Seminar is a two-stage training and matching activity that gives the young researchers, mainly Postdoctoral researchers and PhD students, an opportunity to interact with technology experts and entrepreneur mentors. The first stage of the activity is expected to inspire young researchers' in-depth thinking of technology commercialization after an advanced Technology Readiness Level (TRL) of "Prototype Validation". Invited teams would enter the second stage, a One-on-One matching with venture capital. The Entrepreneur Seminar, scheduled in April, is organized by MOST's Innovation and Application of Nanoscience Thematic Program (IANTP) and co-organized by Germination Program which is also a plan under the auspices of MOST. 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". Prior to the seminar, an orientation will be held to help participants to prepare for their presentations.

Thailand (Source: KMUTT)

Thai Technologist Award (Bangkok, Thailand)

Assoc. Prof. Werasak Surareungchai has been presented a 2016 Outstanding Technologist Award from Her Royal Highness Princess Maha Chakri Sirindhorn (photo) in recognition of his



carrier-long development of electrochemical sensors for environment and industries. The award is organized by the Foundation for the promotion of science and technology. Currently, Assoc. Prof. Surareungchai is the program chair of the nanoscience and nanotechnology graduate programs at KMUTT. Congratulations!

Thailand (Source: NANOTEC)

Joint Innovative Project entitled Dezipner 8™ was awarded the 2016 National Innovation Award on October 5, 2016



Dr. Kittiwut Kasemwong, Head of Nano Agro & Food Innovation Laboratory and his team conducted the research on the topic of “Self-emulsifying delivery system of sweet basil and oregano oil”. Designable egg is a global innovation that utilise nanotechnology to develop a unique target delivery system improve the quality of chicken eggs. The technology is adapted from self-emulsifying drug delivery systems (SEDDS) which features the delivery of substances such as basil and oregano oils with active target agents to prevent and cure chicken coccidiosis disease, counter bacteria and free radicals, and stimulate appetite in the targeted organs of chicken, resulting in enhanced quality of eggs to satisfy market demand.

This innovation has been licensed to KLEAN Greentech Company Limited, Thailand and launched onto the market under the name “Dezigner 8™

Malaysia (Source: NanoMalaysia)

The Launch of Nano Valley 2.0



Puchong. 17th October 2016 - Nano Valley which will be equipped with cutting-edge facilities and nanotechnology features located in a 9.35-acre land in Behrang, Perak was launched by YB Datuk Seri Panglima Madius Tangau, Minister of Science, Technology and Innovation at Nanopac Manufacturing Factory in Puchong. This initiative is aimed to attract RM 500 million foreign investment and create 10,000 jobs in Malaysia. Nano Valley is a land development project through a joint-venture between NanoMalaysia Berhad, Nanopac Group of Companies and ACC Wildcat Energy Services.

MoU Exchange Between Nanocommerce Sdn. Bhd and MDT Innovations Sdn. Bhd



Kuala Lumpur. 8th November 2016 - Memorandum of Understanding (MoU) between NanoCommerce Sdn. Bhd., a fully owned subsidiary of NanoMalaysia Berhad and MDT Innovations Sdn. Bhd., a Malaysian company that specialises in the design, research and development of Internet

of Things (IoT) solutions globally (in the US, China, Japan, India and the Middle East) was exchanged between YBhg. Prof. Emeritus Dato' Ir. Dr. Mohamad Zawawi bin Ismail, Chairman of NanoCommerce Sdn. Bhd. and Mr. Sim Hon-Wai on behalf of Mr. Liew Choon Lian, Group Chairman and Chief Executive Officer of MDT Innovations Sdn. Bhd. during Graphene Malaysia 2016. This MoU will be the first milestone in a collaborative effort on developing the telecommunications and IoT, particularly the use of graphene conductive ink for Radio-frequency identification (RFID) and other electronic applications, and working together in the area of energy harvesting and generation; transmission, storage and efficiency technology based on nanotechnology for IoT applications.

The NanoMalaysia Advanced Materials Industrial Ecosystem is launched



Kuala Lumpur. 8th November 2016 – The NanoMalaysia Advanced Materials Industrial Ecosystem, an initiative under the Eleventh Malaysia Plan for cross cutting sectors is officially launched during Graphene

Malaysia 2016. It is expected to impact the growth of industries, SMEs and start-ups in Malaysia by providing access to facilities for enhancing the performance and adding new functionality to value current product to products through the usage of advanced materials.

Collectively, this strategic industrial ecosystem serves as an inclusive platform to support and strengthen the National Graphene Action Plan 2020 by catalysing the growth of manufacturing industries in producing high value add and complex products through expert facilitation in form of technical and business advisory as well as product prototyping, testing, certification, and strategic commercial positioning to ensure successful product commercialisation and market penetration.

Chief Executive Officer of NanoMalaysia Berhad, Dr. Rezal Khairi Ahmad in his remarks said, “We foresee that this network of facilities will be a platform to further spur the growth of our local companies to compete and lead our country into the 4th Industrial Revolution.” Rezal added, “We are sincerely thankful to Sectoral Policy Division of the Ministry of International Trade and Industry (MITI) for supporting and funding this initiative as part of MITI’s RMK-11 Manufacturing of High Value Added and Complex Product Development Programme, creating an NBOS platform to further strengthen collaborative efforts between the Ministry of Science, Technology and Innovation as knowledge creation hub and MITI to drive the growth of the Malaysian industry and economy through the use of advanced materials.”

President and Chief Executive Officer of MIMOS Berhad the national agency in ICT R&D, Datuk Abdul Wahab Abdullah said, “Being one of the world’s leaders in graphene electronics applied R&D, MIMOS lauds this initiative, which is crucial to the national E&E agenda. It is reported that the next generation global graphene flexible electronics market will be around USD35 billion per year,”

The initiative is also expected to provide a collaborative framework for research, development and commercialisation activities between the government, industries and academia through a common graphene platform which ultimately reduces the reliability on foreign technologies and increases local experts added Abdul Wahab.

SIRIM President & Group Chief Executive Dato’ Dr. Zainal Abidin Mohd Yusof highlighted that the SIRIM-NanoMalaysia Advanced Materials Industrial Laboratory is entrusted to upgrade existing facilities with Thermal Conductivity Measurement which is expected to serve at least 25 Companies; as well as train 50 engineers or researchers in the related field by the year 2020. “The facility will also provide SME or SMI the opportunity to leverage on the ecosystem in developing high value complex products to expedite development of Advanced Materials Products and enable quick go-to-market projects locally and internationally,” said Zainal.

Technology Park Malaysia’s President & CEO, Datuk Ir. Mohd Azman Shahidin said that the collaborative effort between NanoMalaysia and Technology Park Malaysia (TPM) marks yet another significant step forward to encourage Malaysian entrepreneurs and SMEs adapt the latest technology towards gaining a leading edge in the competitive global market." TPM has the

necessary infrastructure, facilities and expertise to offer its services and a comprehensive incubation programme to assist start-ups and enterprises in commercialising their products and services."

This Advanced Materials Industrial Ecosystem is jointly launched by YB Datuk Seri Panglima Madius Tangau, Minister of Science, Technology and Innovation, YB Dato' Sri Mustapa Mohamed, Minister of International Trade and Industry, NanoMalaysia Berhad, MIMOS Berhad, SIRIM Berhad and TPM.

To this date, there are 4 SMEs already signed up as participants to the Advanced Materials Industrial Ecosystem.

It is estimated through the Advanced Materials Industrial Ecosystem, revenue generation by companies implementing advanced materials and nanotechnology product and solutions are estimated to be RM 6 Million yearly per company and revenue for small-holders and entrepreneurs are increased by RM 1.2 million annually per company.

Graphene Malaysia 2016



Kuala Lumpur. 8th November 2016 - Graphene Malaysia 2016 was held under the aegis of the National Graphene Action Plan 2020 spearheaded by NanoMalaysia Berhad and in partnership with Malaysian Investment Development Authority. The global event was supported by the Ministry of Science, Technology and Innovation and the Ministry of International Trade and Industry. It offered participants the opportunity to interact, exchange ideas, network and form commercial collaborations with graphene business leaders and specialists from the world over

including the US, the UK, South Korea, China, Taiwan, Sweden and Italy. Held concurrently as the conference were an exhibition showcasing the latest products, services and technology in the graphene field, the Launching Ceremony of Advanced Materials Industrial Ecosystem, NanoMalaysia's 5th Year Anniversary Celebration and MoU Exchange Ceremony between NanoMalaysia and MDT Innovations Sdn. Bhd.

3. REASEARCH BREAKTHROUGH

Singapore (Source: IMRE)

Reducing noise pollution with 'green' technology



Prototype of the transparent piezoelectric film speakers.

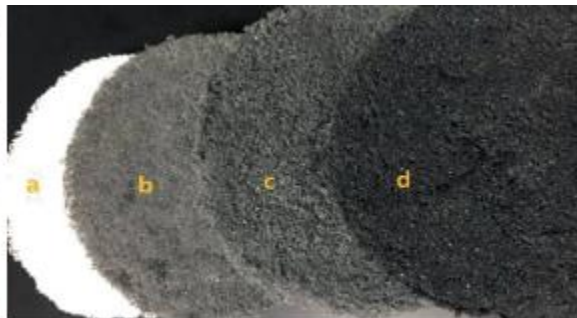
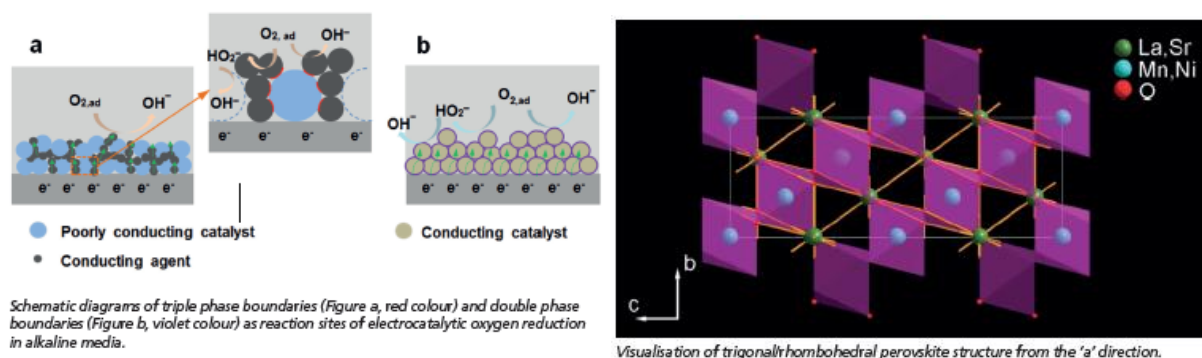


Image of the porous materials for noise mitigation.

Being exposed to prolonged periods of noise pollution can lead to negative effects on psychological health and quality of life. For instance, reducing efficiencies in working and learning, and even hearing loss. Research projects such as IMRE's collaboration with IHPC, HDB and NEA are developing smart solutions for noise mitigation. Led by IMRE principal scientist, Dr Yao Kui, piezoelectric film speakers and high performance porous materials were developed for active noise cancellation and passive noise mitigation, respectively. The speakers generate anti-phase acoustic waves to cancel noise. Unlike the conventional electromagnetic speaker, the transparent film-like speakers can be potentially used in windows. The high performance porous materials consist of outstandingly large sound absorption coefficient that can effectively absorb sounds and it could be applied over large areas such as the interior of buildings (ceilings, walls and doors). This project was also featured in an article by local newspaper, Lianhe Zaobao, on 14 November 2016.

Boosting capabilities in energy storage technologies

Harvesting renewable energy has put an increasing demand on energy storage and conversion technologies, some of which rely on oxygen electrocatalysis. This phenomenon involves one of the most important electrode reactions in the field of electrocatalysis, oxygen reduction reaction (ORR). Carbon supported precious metals, heteroatom-doped carbons, and transition metal carbon hybrids are commonly used for ORR because of their proficient electric conductivity and high catalytic activities. However, the functioning abilities of these carbon containing catalysts in metal–air batteries and fuel cells are limited, as they are easily affected from electrochemical carbon corrosion.



Recently, an IMRE-led team of scientists discovered a class of perovskite nanocrystals that were highly conductive with good electrocatalytic activity for ORR. With this discovery, they designed a class of nickel-doped lanthanum strontium manganites (LSMN), of the formula, $La_{0.5}Sr_{0.5}Mn_{0.9}Ni_{0.1}O_{3-\delta}$ ($\delta = 0.06$). This optimized material exhibited the highest electrocatalytic activity for ORR, and most importantly, no degradation of oxygen reduction currents was observed during experimental testings. These promising results may place LSMN on par with metal/carbon catalysts, as a highly efficient ORR catalyst, and providing the possibility of efficient and low cost carbon-free oxygen electrocatalysis. The results were published in *ACS Catalysis*, entitled “Intrinsically Conductive Perovskite Oxides with Enhanced Stability and Electrocatalytic Activity for Oxygen Reduction Reactions.”

Industrial Translation

A*STAR Nanoimprint Foundry developed two nature-inspired technologies using nanostructures, both of which could be potentially applied in food packaging. The IMRE-led Foundry created superhydrophobic (water-repelling) surfaces using the same principle as hydrophobic lotus leaves. With this technology, food packaging could have an anti-stick surface. For example, the inside surface of the lid of yogurt cups often contains traces of yogurt, which tends to result in wastage. An anti-stick surface would prevent this from occurring. Water droplets also tend to form inside food packages when exposed to changes in temperatures. The Foundry team fabricated nanoimprinted structures that can pin water droplets, mimicking the surfaces of rose petals. By retaining water droplets on the food packaging, such as ice cream tub covers, the freshness and quality of the product can be preserved.



Rose petal inspired surfaces for anti-drip surfaces.

Quick solution to marine fouling

IMRE scientist Dr Guo Shifeng, and a team of researchers developed an easy, reliable and quick method to characterise the physicochemical property of the temporary adhesive proteins from barnacle cyprids, which are considered as one of the most problematic marine fouling organisms. Marine fouling could lead to the damage of protective coatings and man-made structures immersed in sea water. Taking advantage of the AFM based force spectroscopy method, they created a technique that enables the detection of protein isoelectric points based on trace amounts of proteins, and was able to obtain the isoelectric points of the cyprid's temporary adhesive

proteins. With this technique, they will be able to design more effective and environmentally friendly antifouling coatings.



Barnacles are problematic because of their size and ability to colonise any man-made structures.

Taiwan (Source: IANTP)

Polymeric design of cell culture materials that guide the differentiation of human pluripotent stem cells

Akon Higuchi(樋口亜紺)*, S. Suresh Kumar, Qing-Dong Ling, Abdullah A. Alarfaj, Murugan A. Munusamy, Kadarkarai Murugan, Shih-Tien Hsu, Giovanni Benelli, Akihiro Umezawa, Progress in Polymer Science 65, 83–126 (2017)

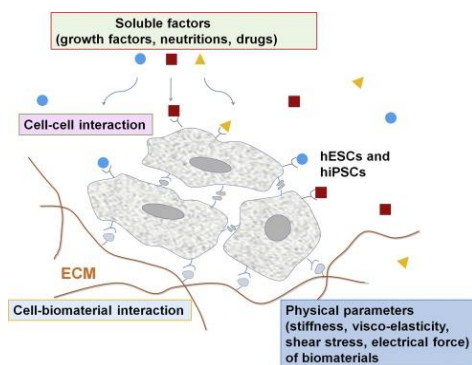


Fig. Schematic of the stem cell microenvironment. Stem cells are regulated by the following elements: (a) Cell–biomaterial interactions, (b) cell–cell interactions, and (c) soluble bioactive molecules, such as inhibitors, cytokines, growth factors, and nutrients. Physical characteristics of biomaterials (d) also regulate stem cell fate.

Human pluripotent stem cells (hPSCs), including embryonic stem cells (hESCs) and induced pluripotent stem cells (hiPSCs), have the potential to differentiate into many cell types that originate from the three germ layers, such as dopamine-secreting cells and insulin-secreting cells for the treatment of Alzheimer's disease and diabetes, respectively. However, it is challenging to guide hPSC differentiation into desired cell lineages due to their varying differentiation ability. A reasonable strategy is to mimic the stem cell microenvironment for the differentiation of hPSCs into specific cell lineages using optimal polymeric bio- materials for hPSC culture. This review summarizes various methods for differentiating hPSCs cultured on polymeric biomaterials and discusses the optimal methods and cell cul- ture polymeric biomaterials for hPSC differentiation into specific cell lineages. The recent trend in protocols avoids embryoid body (EB, aggregated cells) formation because EBs con- tain different types of cells. The combination of appropriate differentiation protocols and cell culture polymeric biomaterials for the differentiation of hPSCs into specific cell lin- eages will produce a large quantity of highly pure GMP-grade differentiated cells for use in translational medicine.

NEW PUBLICATIONS

1. Guifang Han, Sam Zhang*, Pablo P. Boix, Lydia Helena Wong, Lidong Sun, and Shui-Yang Lien(連水養), "Towards high efficiency thin film solar cells", Progress in Materials Science (2017)
2. Yu-Wei Chen, Yu-Lin Su, Shang-Hsiu Hu(胡尚秀)*, and San-Yuan Chen(陳三元)*, "Functionalized graphene nanocomposites for enhancing photothermal therapy in tumor treatment", Advanced Drug Delivery Reviews 105, 190-204 (2016)
3. Kazunori Okano*, Hsin-Yun Hsu(許馨云), Yaw-Kuen Li(李耀坤), and Hiroshi Masuhara**, "In situ patterning and controlling living cells by utilizing femtosecond laser", Journal of Photochemistry and Photobiology C: Photochemistry Reviews 28, 1-28 (2016)
4. Chuan-Pei Lee, Chun-Ting Li, and Kuo-Chuan Ho(何國川)*, "Use of organic materials in dye-sensitized solar cells", Materials Today (2017)
5. Bao-Hsien Wu, Wei-Ting Liu, Tzu-Yu Chen, Tsong-Pyng Perng(彭宗平), Jer-Hsing Huang, Lih-Juann Chen()* , "Plasmon-enhanced photocatalytic hydrogen production on Au/TiO₂ hybrid nanocrystal arrays", Nano Energy 27, 412-419 (2016)

4. 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](#)

June 2017

- **Nano Taiwan 2017**
14/06/2017 - 16/06/2017-Taipei, Taiwan
Contact Email: exhibit@mail.pida.org.tw (Ms. Pamela Hsiao)
Website: <http://www.nano-taiwan.com/?lang=eng>

May 2017

- **The 8th International Conference on Surface Plasma Photonics (SPP8)**
22/05/2017 - 26/05/2017 - Taipei, Taiwan
Contact Email: spp8@sinica.edu.tw (Ms. Kelly Tsai)
Website: <http://spp8.rcas.sinica.edu.tw>

February 2017

- **Nano tech Japan 2017 in Tokyo**
15/02/2017 - 17/02/2017 - nano tech matches innovative solutions with needs from various industries: Participants from various industries; Approach leading R&D specialists; High quality business matching opportunities.[more info](#)