



ANF Executive Committee meeting in Japan

Asia Nanotechnology Leaders

Shaping the Future of Science & Technology for Socio-Economic Well-Being

Asia Nano Forum (ANF) is a **network organization**, founded in May 2004 and now a registered society in Singapore, known as Asia Nano Forum Society, since Oct 2007.

ANF mission

To promote responsible development of nanotechnology that educationally, socially, environmentally and economically benefits each economy by fostering international network collaboration.

ANF objectives

- Foster nanotechnology in the region by creating mechanisms to share information, human and physical resources and expertise
- Support regional economic and environmental development through joint projects addressing major regional issues, with an emphasis on support of developing and emerging economies
- Coordinate joint investment in and mutual access to major infrastructure by member economies
- Promote and coordinate standardization and safety of nanotechnology concepts and measurements
- Act as an advocacy group for nanotechnology in the region and for adequate regional representation of nanotechnology at global forums
- Initiate, promote and manage co-operative scientific and technology research projects within the member economies
- Enhance public awareness and education of nanotechnology and associated social, environmental, health and economic issues

◆ Working Groups

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Coordinator:

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(ITRI, Taiwan)

User-Facility Network

Coordinator:

Dr. Yasuo KOIDE
(NIMS, Japan)

Nano Safety and Risk Management

Coordinators:

Dr. Wannee CHINSIRIKUL
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Dr. Paul WRIGHT
(RMIT, Australia)

Commercialization

Coordinators:

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Mr. Alexander POGANY
(BMK, Austria)

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(JST, Japan)

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Overview

It's been six months since we held the Exco meeting during nano tech 2020 this February in Tokyo. Unfortunately, many countries are severely affected by COVID-19 these days and measures in containing this pandemic also disrupted scheduled activities. As all the uncertainty invoked the international travel ban in most countries till the end of this year, the Office-bearer meeting made a difficult decision to cancel all activities during nanotech 2021 that has been rescheduled to take place this December. On the other hand, we managed to hold the 17th ANF Summit delayed to this October in Vienna as a Virtual and On-Site event.

In the face of the global health threat by the coronavirus, nanotechnology platform technologies could offer valuable solutions. In this August issue of newsletter, we are grateful for seeing much about country's progress with nanotechnology and especially efforts against COVID-19 from our members such as *nano-based mask, device for early diagnose, nano-bio chip platform for diagnosis, and nanoscale trap-based capture technology for rapid screening*.

We would like to thank all members for their continued support and also expect more topics and activities to be featured in the newsletter. Alternatively, information on latest developments and activities from ANF community are also welcome to be disseminated through our website that has been updated recently.

Ting-Kuo Lee
President, Asia Nano Forum

Activities in Member Countries

■ IRAN

Iran's Proposed Standard on Clay Nanomaterial has been Published by the International Standardization Organization (ISO)



After 4 years of continuous efforts by Iranian experts, the proposal on "Nanotechnologies — Clay nanomaterials — Part 1: Specification of characteristics and measurement methods for layered clay nanomaterials" has finally been approved and published by ISO.

The standard was proposed by INIC's Nanotechnology Standardization committee to the International Standardization Organization (ISO) four years ago. After considerable lengthy discussions and debates, the document has been finally approved and published and it is now available at www.iso.org (standard number: ISO/TS 21236-1:2019).

Reports indicate that clay nanomaterials are of particular importance in today's industry and technology all over the world. Clay nanomaterials could be used in various medical and pharmaceutical industries, packaging, paint and coating, automotive, rubber and polymer composites. This standard deals with the various characteristics of Clay nanomaterials including mechanical, thermal, physical, chemical etc. and their measurement methods, which can be referred to and used as a basic standard in international transactions.

The 6th Iranian-led International Nanotechnology Standard is published

The international standard entitled "air filter media containing polymeric nanofibers — Specification of characteristics and measurement methods" was published by ISO after four years of tireless efforts of Iranian experts as well as other partner countries' experts. This was the 6th international standard that was directed by Iranian team collaborating with ISO technical committee (TC229) responsible for the development of international nanotechnology standards.



This standard has been developed with the support of Iran Nanotechnology Innovation Council (INIC) and leadership of a knowledge-based company being pioneer in the field of development of nanofiber technology as well as Nano filter media production for air filter applications. It is worth to mention that, Iran is among few countries which has developed nanofiber technology for wide range of applications, including air filters for vehicles, power generators, and facial respiratory masks such as N95 and N99 grades that have been highly recommended by various international medical authorities for being used as a reliable respiratory protection against corona virus these days.

The published standard specifies the key characteristics and parameters of the air filter media containing polymeric nanofibers affecting its efficiency and their measurement methods are also explained in this document as well. The utilization of this standard will facilitate the communications between the seller and the buyers of this Nano product.

Nanotechnology in the front line of battling Coronavirus in Iran

Several private companies, and organizations including INIC have joined forces to produce N95 and N99 Nano mask in Iran since few past months to overcome Coronavirus outbreak.

Iran`s N95 and N99 Nano mask production has reached to over 500,000 masks per day.

This was the result of several private companies, and organizations including INIC joining forces to boost Nano mask production in Iran during few past months to overcome Coronavirus outbreak.

This production is being done in several industrial plants including the biggest mask manufacturing plant in west Asia. The technology uses Nano fibers to prevent virus pass through the mask. This technology is completely developed in Iran and patented internationally.

It is worth mentioning that the Industrial machinery used for production of Nano-based Masks,



are completely designed and produced by Iranian Hi-tech companies.

The industrial production line has been already exported to several industrial countries. The quality and price of the machinery is quite competitive, which is very important in helping countries to meet the demands of tackling with the current Coronavirus outbreak.

The 7th International Iran-led Standard in Nanotechnology has been published

International standard developed for polymeric food packaging entitled “Nanotechnologies- Polymeric nanocomposite films for food packaging with barrier properties — specification of characteristics and measurement methods” has recently been published. This standard was led by Iranian experts.

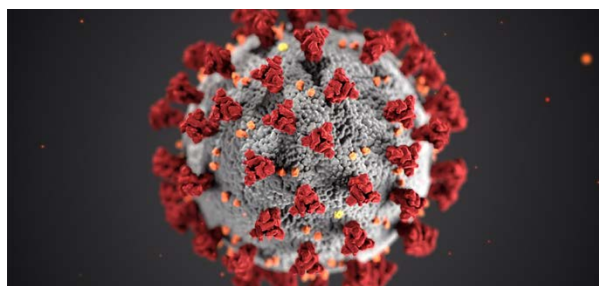
The seventh international standard in nanotechnology with leadership of Iran Nanotechnology Innovation Council (INIC) was developed and published.

This standard addresses the barrier property of polymeric nanocomposite films to improve the quality of food packaging. The barrier property includes the exchange of gas (e.g. oxygen) and water vapor as well as Ultraviolet-Visible light transparency.



Early Diagnosis of The New Coronavirus Made Possible by A Reactive Oxygen Species Measuring Device

Iranian researchers successfully developed a device for early diagnosis of the new coronavirus by measuring the amount of reactive oxygen species (ROS) in sputum. The device has been now tested on more than 700 patients and it will be commercialized soon.



"Our team had previously shown how reactive oxygen species (ROS) can be used to diagnose lung diseases," said Dr. Mohammad Abdolahad, head of an Iranian knowledge-based company, "but we recently discovered that ROS increase in sputum can be considered as an indicator of infection with

SARS-CoV-2". While describing the advantages of this method of diagnosis, he added: "the level of ROS in patients infected with the virus changes even when a patient is asymptomatic. Therefore, by measuring ROS levels, we can diagnose the presence of the virus. An increase in ROS levels can be attributed to two factors; the body's inflammatory function against the presence of the virus, as well as cellular activities during exposure to the virus."

He added that this project has now reached the commercialization stage after it successfully showed satisfactory results for more than 700 patients in various hospitals in Iran and in the region. It should be mentioned that this device can be tuned for diagnosis of not only SARS-CoV-2, but also other lung diseases such as asthma and tuberculosis.

Over the past four years, Dr. Abdolahad has patented more than 20 US, European and Chinese patents and published more than 50 articles in some of the world's most prestigious scientific journals, most of which are related to cancer diagnosis methods.

More information about the technique is available in a recent scientific article entitled "Real-time diagnosis of reactive oxygen species (ROS) in fresh sputum by electrochemical tracing; correlation between COVID-19 and viral-induced ROS in lung/respiratory epithelium during this pandemic" which has been accepted for publication in "Biosensors and Bioelectronics", the second most important journal in electrochemistry area.

Activities in Member Countries

JAPAN

Latest Strategic Proposals on Materials/Nanotechnology in CRDS of JST

Since its establishment in 2003, the Center for Research and Development Strategy (CRDS) who is an affiliated institution of Japan Science and Technology Agency (JST) has made a significant contribution nationally as a public think tank by independently carrying out the investigation and analysis and by making proposals on science, technology, and innovation policy and/or research and development strategy. CRDS issued following three strategic proposals in the field of materials and Nanotechnology in the fiscal year of 2019. (available at <https://www.jst.go.jp/crds/report/report01/index.html> in Japanese)

(1) Sensor Fusionon Technologies in IoT Era

“Multimodal Sensing and Data Processing for Creating New Value”

A sophisticated IoT system capable of adding high values to sensing data requires an excellent edge-side sensing system along with high performance cloud servers and network, that acquires a variety of useful data, and processes those data in order to send them to the cloud side. So far, most sensing systems tend to be used in specified areas for a limited application and only acquire and process specific types and limited amount of data. On the contrary, the IoT system are currently required to collect much wider range of data without human intervention. In that situation, it becomes important to collect a variety of information at the edge side, to make a decision on the spot, and to take necessary actions instantly. With strength in sensing technology, which is positioned in the lower layer of IoT system, Japan is expected to lead IoT industry from the lower layer by developing an excellent edge-side sensing system.

Under this situation, this proposal proposes to work on the following research and development challenges in order to realize a sensing system capable of acquiring a variety of information and processing them in an integrated manner.

- Integrated processing of sensing information (system level challenge)

With consideration given to the role of the cloud, located at the upper layer of the IoT system, the architecture of an edge side information processing device and sensing system have to be designed. The research and development challenges also include those associated with sensor fusion which merges multiple types of sensing data to derive information with high-added values, with event-driven sensing which detects temporal changes in data to make changes of commands for actuation, and with active sensing which works with an actuator to change the way of next data acquisition based on the date acquired.

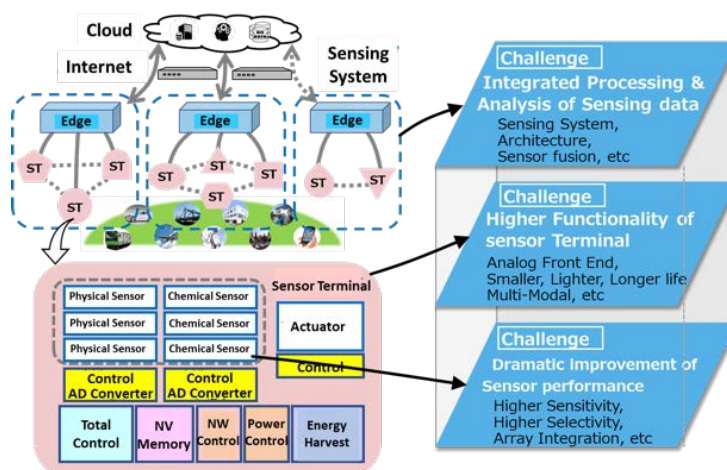
- Development of sophisticated sensor terminals (sensor terminal level challenge)

Sensor terminals involve individual blocks such as those related to sensor control, analog front end, data storage, analog-to-digital data conversion, communication, and power supply devices. Further research and development are required for each of these blocks. The integration and mounting technologies are also important in creating sensor terminals

with optimal functions and capabilities.

- Improvement in sensor performance (sensor level challenge)

In order to extract more useful information, it is required to increase the type and range of sensing data, and to improve the performance of sensors and to apply new detection principles to sensing. In particular for biosensors, it is required to increase the sensitivity of the sensors and improve selectivity in order to detect infinitesimal biomarker molecules. In addition, it is also important to apply new sensing principles, new physical phenomena and chemical reactions, and new materials to detect physical, chemical, and biological quantities that have been undetectable.



Technological Challenges for Sensor Fusion System

(2) Quantum 2.0

“Quantum Science and Technology open up New Horizon”

Quantum 2.0 is defined as the ability to control and utilize quantum specific properties which were difficult to utilize in the past, such as quantum coherence and entanglement. The related wide-ranging R&D should be promoted along with efforts to address social and economic issues, to strengthen national security and industrial competitiveness, and to form new academic fields, communities, and research networks. The movement to apply quantum mechanics to computation and communication goes back to Feynman’s proposal of quantum simulation in the 1980s. However, it was not until the late 1990s, when quantum behavior was able to be manifested and controlled as theoretically expected, that there was significant R&D progress after the birth of quantum information science from the merger of quantum mechanics and information science. In this proposal, the future R&D subjects in the four major areas of quantum science and technology are shown.

- Quantum computing and simulation

The R&D of hybrid quantum-classical algorithms, indispensable for killer applications of NISQ (Noisy Intermediated-Scale Quantum computing) machines such as quantum-chemical simulations and quantum machine learning should be promoted. Development of real machines with superconducting qubits as the building blocks, development of the overall computer architecture towards the realization of the fault-tolerant quantum

computer as a final goal, and basic R&D related to the control of various qubit physical systems are also important tasks to be tackled.

- Quantum measurement and sensing

In sensing technology using diamond nitrogen vacancy (NV) centers and/or quantum entanglement of light or matter, it is important to develop applications for biomedical measurement and to produce or commercialize prototype for medical and diagnostics purposes. Atomic interferometer type gyroscopes and optical lattice clocks should be miniaturized and stabilized to demonstrate practical application of self-location estimation and relativistic geodesy, respectively.

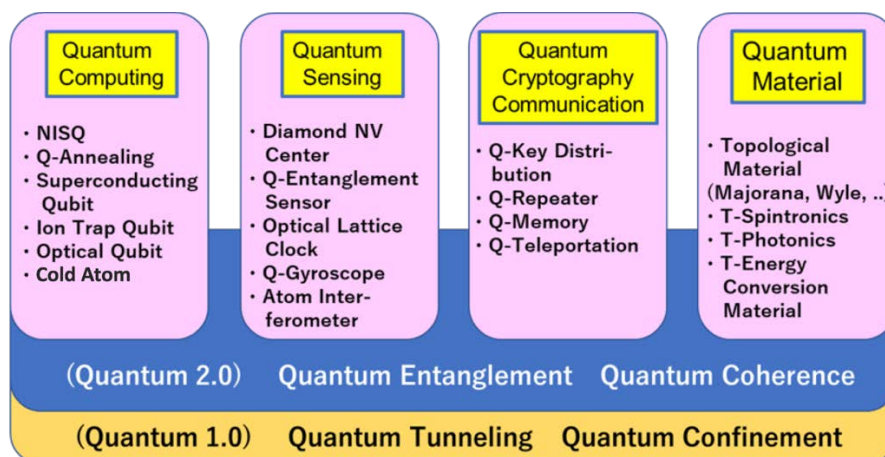
- Quantum cryptography and communications

In the short term, we should search for killer applications of quantum key distribution (QKD) devices, identify their application fields by early commercialization or trial use, and lower their price. In the medium-to-long term, it is necessary to promote the R&D of the satellite-based QKD, long-range QKD, and new-principle-based QKD technologies. Intensive standardization activities in international organizations are also required for the future.

- Quantum materials

We should make continuous effort to develop new quantum materials that are robust to environmental disturbance and produce attractive functions. Representative example are topological quantum materials, spintronic materials, energy-conversion materials, and photonic materials.

In order to promote R&D of quantum science and technology where diverse knowledge and technologies are needed to realize their practical applications, establishment of R&D core hubs is desirable, which can become internationally recognized and therefore be expected to serve as a place to attract excellent researchers from Japan and overseas.

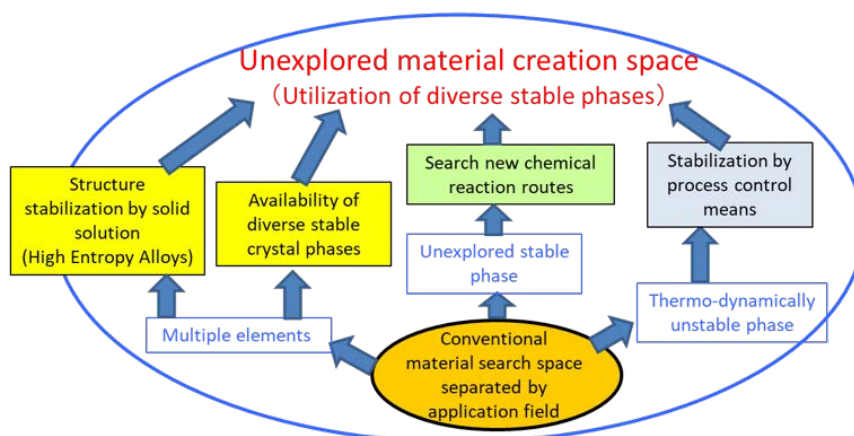


Quantum 2.0 Overview

(3) Future Materials Exploring Initiative

“Engineering for Diverse Crystal Stable Phase”

There is a growing demand and expectations for higher performance and advanced functionality of materials and devices to cope with diverse social requirements. These include the massive introduction of renewable energy and advanced energy management technology aimed at reducing CO₂, realizing Society 5.0 through comfortable and safe automobiles with autonomous driving and smart cities supported by IoT/AI, and lessening environment impacts associated with product manufacturing and at their use. In these applications, demands for higher performance materials with coexistence of multiple functions and compatibility of conflicting functions are becoming acute. In order to design and synthesize new materials to fulfil these complex requirements from the application side, expanding the material search space by increasing number of constituent elements, utilizing emerging diverse crystal stable phases including metastable ones with different properties, and realizing targeted crystal stable phase by process control means through controlling chemical reaction route dynamically are required. In the material design under such complex conditions, materials informatics will become a powerful tool, which have already revealed their effectiveness in various application. In the material process design, it is important to understand the chemical reaction process under various process conditions and their reaction route in the thermodynamic energy landscape. Even when there is a strong tendency for undesired stable phases to appear preferentially during the chemical reaction process, we need to explore reaction route for reaching the target stable phase and develop the appropriate process condition which avoids the route to reach the undesired stable phases. In these situations, process informatics will be needed with massive accumulated process data. In order to acquire the massive process data, process simulation from molecular scale to macro scale to make clear the chemical reaction route, high-throughput experiments using combinatorial chemistry and intelligent robots to conduct a large amount of process experiments efficiently, and operand measurements to monitor chemical reaction dynamically during the process are needed to be developed. (JST)



Expanding Material Search Space for Future Materials

A platform for open innovation

TIA is an open innovation hub operated by six public organizations: the National Institute of

Advanced Industrial Science and Technology (AIST), National Institute for Materials Science (NIMS), University of Tsukuba, High Energy Accelerator Research Organization (KEK), University of Tokyo, and Tohoku University as shown in Fig. 1. It is supported by these institutions and the Japan Business Federation. To drive innovation in Japan, these six stellar organizations of TIA collaborate and compile their resources for R&D (e.g., researchers, facilities, and intellectual property) and support the creation of knowledge and its application in industry. TIA also fosters next-generation scientists and engineers. TIA was first named the Tsukuba Innovation Arena for Nanotechnology (TIA-nano) in 2009, and then renamed to TIA in 2016. Since then, TIA has expanded its research focus from nanotechnology to biotechnology, healthcare, computer science, and the internet of things (IoT). In the same year, the TIA unique collaborative research program “Kakehashi” was commenced. Kakehashi plays a role in fostering the seeds of research with the potential to spark innovation through close cooperation among the core organizations and matching these seeds to needs, and then developing the latter into large-scale R&D projects or enabling commercialization. From 2020, TIA 3rd period started under the new vision “TIA to open up the future by expansion and deepening”.



Fig.1 Structure of TIA

Platform activities

■ Research and development platforms

TIA provides organizations and companies both inside and outside TIA with an environment for R&D at the TIA platforms. At the core of these platforms are the Super Cleanrooms (SCR), the MEMS foundry, and the power electronics production lines among others. TIA projects and consortiums are the major R&D activities, including Nanoelectronics, Power electronics, MEMS, Nano-GREEN, Carbon nanotubes, Light/quantum measurement, and Biotechnology and medical treatment.

■ Open research facilities

The six core organizations make their advanced research devices and facilities, including electron microscopes and synchrotron radiation facilities, available for shared use.

■ Human resource development

TIA fosters excellent researchers and engineers by offering intensive summer school sessions and degree programs, taking advantage of outstanding TIA researchers and facilities.

■ Kakehashi program to create technology seeds and innovation acceleration

TIA provides venues for gathering researchers with different affiliations or expertise and

accelerates innovation by conducting workshops, technical meetings, and other events, where technology seeds are created, fused, and matched with business needs. (NIMS)

TIA Symposium, 2019

2019 was the 10th anniversary of TIA, and the TIA symposium was held as the memorial symposium of 10th anniversary, on October 15th, 2019, at Iino Hall & Conference Center, Tokyo. The details have been already reported in the previous ANF NEWSLETTER, Issue:36 [1] (NIMS)

[1] https://www.asia-anf.org/wp-content/uploads/2020/04/ANF-NewsLetter_Winter_2019_V2%E2%BC%BF20191227.pdf

“Nanotechnology Platform Japan” program

“Nanotechnology Platform Japan” program [2] is based on a nation-wide alliance of selected universities and national institutes in Japan, and is providing public share-use of cutting edge equipment to strengthen the future development of nanotechnology. The "Nanotechnology Platform Japan (NTPJ)" is the project by the Minister of Education, Culture, Sports, Science and Technology (MEXT). The mission is to establish a reliable research infrastructure (Platform) for scientific innovation by the alliance of the institutes which have cutting edge equipment and research know-how. Through this program, it is promoted for any of researchers from young to industrial one to do the share-use of the equipment, and to provide the shortest way to solve the urgent problems in science and technology. Therefore, all of scientists are invited to participate in this project to share equipment beyond the barrier of scientific communities and research organizations. In this program, 37 groups from 25 institutes and universities are joined and establish one single structure for "Share-Use Cutting-Edge Facility for Nanotechnology", which will be supported by MEXT for 10 years from 2012. In this program, interactive researches and their integration are promoted through the coordination by the Platform Center which is located at National Institute of Materials Science (NIMS).

Since the present project period will end in two years, the framework of the new project period is being discussed in Japanese government. An important direction of the discussion is the combination of the user facility network with the materials data platform. It is aimed that the new data platform center should be established, and the novel, broad, high quality data should be produced by cutting edge equipment of the user facility network, and then stored and accumulated in the data platform center. Progress of the data driven materials development is strongly expected through the utilization of the high quality data, accumulated in the data platform center. (NIMS)

[2] <https://www.nanonet.go.jp/ntj/english/>

Activities in Member Countries

KOREA

NANO KOREA 2020

NANO KOREA, the largest international event in the field of nanotechnology in Korea was held in July 2020 with the slogans 'NANO! A Quantum Leap Innovator for Human'.

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|--------------------------------|---|
| Name of event | NANO KOREA 2020 - The 18 th International Nanotech Symposium & Exhibition |
| Slogan | NANO! A Quantum Leap Innovator for Human |
| Date | July 1 st (Wed) ~ 3 rd (Fri), 2020 |
| Venue | Goyang KINTEX Exhibition Centre I, South Korea & Online |
| Registered participants | 944 |
| Presentations | 657 presentations (including 109 invited lectures) from 12 nations |



Due to 'COVID-19' pandemic situation, NANO KOREA 2020 Symposium was held in a new format combining online symposium with offline one. The opening day programs consisting of opening ceremony, invited lectures (pre-recorded video lectures) and special sessions, were administered as offline in accordance with Korean government's guidelines of preventing epidemics. All the rest symposium programs were operated as online, including technical

sessions, poster sessions, and public sessions.

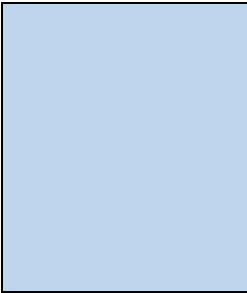


Technical sessions were organized to cover the important issues in nanoscience and nanotechnology and to comprise 6 different technical divisions with 2 to 3 sessions of specific topics for each division. As in recent years, public sessions were also introduced in the program for the increased exposure of nanotechnology to the teenagers and to offer short hands-on experience on nanotechnology experiments. Especially this year, public sessions were operated virtually and all the lectures of the sessions were on display in the NANO KOREA 2020 Symposium website during the symposium for open access to anyone who visited the website.

NANO KOREA will continue to serve as a leading national platform for disseminating and exchanging the latest research achievements and promoting the industrialization of nanotech-based products. The organizing committee plans to make the event more appealing with increased nano-convergence industrial contents, as the nano-based technology finds growing applications in the 4th Industrial Revolution.

BM : COVID-19 related Special Session

NANO KOREA 2020 hosted 'COVID-19' Special Session to handle the issues of the pandemic disease in regard to nanoscience and nanotechnology. During the session, 5 invited lectures were responded with active participation of the audience to review and discuss how nanotechnology is actually being applied to overcome covid-19 and how it will be potentially valuable to prevent and overcome similar epidemic diseases in the future.

| | |
|-----------------------------------|---|
| Name of event | BM : COVID-19 related Special Session |
| Date | July 1 st (Wed), 2020 |
| Venue | Goyang KINTEX Centre I, South Korea |
| The number of participants | 48 |
| Presentation | 5 invited lectures - Dr. Seok Jae Lee, National Nanofab Center <i>"Nano-Bio chip platforms of NNFC for diagnosis of infectious diseases using modular chip and dPCR technologies"</i> - Prof. Sungsu Park, Sungkyunkwan Univ. <i>"Towards automation of microfluidic system enabling preconcentration of pathogen and extraction of their genomic materials in clinical samples"</i> - Prof. Jungho Hwang, Yonsei Univ. <i>"Real-time bio-aerosol collection, enrichment and detection via enhanced electrostatic aerosol-to-hydrosol sampling technique"</i> |

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|  | <ul style="list-style-type: none">- CEO Do Young Lee, OPTOLANE Technologies Inc. <i>"Global Health Surveillance Systems for the public healthcare security during the pandemic COVID-19"</i>- Prof. Junhong Min, Chung-Ang Univ. <i>"Sample preparation automation for In situ nucleic acid-based detection of the pathogen from the enlarged surface"</i> |
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Activities in Member Countries

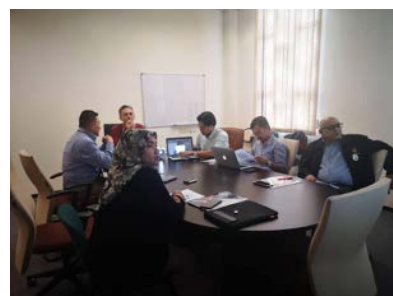
■ MALAYSIA

National Nanotechnology Centre (NNC), a division under the Ministry of Science, Technology and Innovation (MOSTI), previously known as MESTECC, are responsible for the coordination of research, development and all related activities of nanotechnology such as awareness programme in Malaysia. NNC has participated / conducted a few prominent programmes in 2020 such as:

The National Survey on National Nanotechnology Capabilities (January- June 2020)

NNC has conducted The National Survey on National Nanotechnology Capabilities from the month of January 2020 to June 2020 to identify the capabilities and capacity of existing nanotechnology laboratories at all institutions, agencies and universities in Malaysia. The survey methodology are conducted through face-face briefing and interview and through virtual meeting via SKYPE during the COVID 19 movement control order. This capability will be measured from four aspects namely Institutional Expertise, Technical Capability, Human Resource, Finance and R&D Achievement. In addition, the survey also seeks information and to promote co-sharing and access to critical equipment, facilities and expertise for rapid prototype development as well as to research and identify new technology development to a higher degree of Technology Readiness (TRL). The survey was also conducted by NNC to update on the national nanotechnology capability from 2015 to 2020. Surveys in the year 2020 were conducted in The University of Nottingham Malaysia Campus, Semenyih, University of Islamic Science Malaysia (USIM), International Islamic University Malaysia (IIUM), University of Malaysia Sabah (UMS), Malaysia Nuclear Agency (ANM), Institute of Micro-engineering and Nano-electronic (IMEN), National University Malaysia (UKM), University of Malaysia Sarawak (UNIMAS), Malacca Technical University of Malaysia (UTeM) and Sultan Idris Educational University (UPSI).

Results from the survey will be analysed and NNC will propose a National Nanotechnology Laboratory Network.



Malaysia Technology Expo (MTE) 2020 @ World Trade Center (WTC) Kuala Lumpur (20th to 22nd February 2020)

NNC MESTECC had participated in the 19th Malaysia Technology Expo 2020 on the 20th to 22nd February 2020 held at World Trade Centre (WTC), Kuala Lumpur organized by the

Malaysia Association of Research Scientist and Pro Temps Event. NNC conducted public survey and feedback on the National Nanotechnology Inter-laboratory Network Initiative and National Roadmap on Nano Product and Technology 2020. NNC also promotes nanotechnology awareness program such as the Nanotechnology Essay Writing (PENT) Competition and Adiwira Nano (Nano Superheroes Short Video) Competition. NNC also co-supported the Nanotechnology Symposium 2020 Seminar where MESTEC's Deputy Secretary General (Science), Dr Mohd Nor Azman Hassan officiated the event and delivered the keynote talk.



Workshop On The Development Of National Nanotechnology Roadmaps And Analysis Of Survey On The National Nanotechnology Interlaboratory Network (25th February 2020)

NNC organized the workshop on the Development of National Nanotechnology Roadmap and Analysis of Survey Findings on the National Nanotechnology Inter-laboratory Network on the 25th February 2020 at Ministry of Science, Technology and Innovation Hall. The workshops was attended by various stakeholders from the other Ministries, Institute of Higher Learnings, Research Institutes, Government Link Companies and Nanotechnology Industries. The workshop was officiated by NNC Director, Associate Professor Dr Ruslinda A Rahim and the sessions was moderated by Mr. Kamarulzaman Kamaruddin and Mr. Ismarul Nizam Ismail.





Malaysia-Japan International Conference (MJIC) on Nanoscience, Nanotechnology and Nanoengineering 2020 (29th February 2020)

The Director of National Nanotechnology Centre (NNC), MESTECC, Associate Professor Dr Ruslinda A Rahim was invited to deliver the keynote talk during MJIC 2020 in Mara University of Technology (UiTM), Shah Alam Malaysia on the 29th February 2020. She delivered the talk on “Nanotechnology Enabled Innovation; Technology Development and Commercialization Challenges in Malaysia”.



Workshop on Refinement of Nanotechnology Action Plan and Roadmap of Nano Product / Technology 2020 (6th & 13th March 2020)

2 series of workshops were conducted on 6th and 13th March 2020 at National Institute of Biotechnology Malaysia (NIBM) and were attended by senior officers and staff of the Application and Strategic Technology Division (TSA), National Nanotechnology Centre (NNC) and NanoMalaysia Berhad (NMB). Brainstorming and mind mapping sessions was moderated by Mr Kamarulzaman Kamaruddin for the development of National Nanotechnology Action Plan and Roadmap of Nano Product & Technology in preparation for the 12th Malaysian Development Plan 2021-2025.



ISO/TC 229 Interim Meeting (13-22 May 2020)

NNC participated in the series of virtual meetings via Zoom, 13-22 May 2020. Malaysia presented a Preliminary Work Item (ISO/PWI 4963) titled 'Radiotelemetry-spectral-echocardiography Based Real-time Surveillance Protocol for In Vivo Toxicity Detection and Monitoring of Engineered Nanomaterials' and welcomed participation of Experts in this project. A draft Technical Report will be presented during the ISO/TC229 Plenary Meeting later this year.

Development Project on Benchmarking Study for the Safety Risk of Nano-Based Products (23rd June 2020)

NNC's Standard and Regulatory Section held a kick-off project meeting at SIRIM Berhad, Shah Alam on 23rd June 2020. SIRIM Berhad has been appointed to carry out a study titled 'Risk Assessment Benchmarking of Nano-based Products'. This 36-month national study hopes to establish a local nano-based product inventory with safety and the life cycle assessment data. Project is expected to end on 30th June 2023.



National Nanotechnology Centre Workshop (July – August 2020)

NNC MOSTI organised the 3 series of National Nanotechnology Centre Workshop on National Nanotechnology Policy and Strategy 2021-2030 on the 8th to 9th July 2020, 21st to 22nd July 2020 and 18th to 19th August 2020 at Concorde Hotel, Shah Alam, Selangor. This workshops was officiated Deputy Secretary General (Technology) MOSTI, Dr Mohd Nor Azman Bin Hassan. This engagement session discussed the matters related to the direction and action plan of the country's nano technology policy involving representatives of various organizations from other ministries, research institutions, public and private universities and nanotechnology related industries. Proper standard operating procedures was implemented by Concorde Hotel to keep the participants safe from the spread of COVID-19 pandemic.





Nanotechnology Awareness Programme (January- December 2020)

Earlier this year, NNC manage to visit 5 rural schools in Sarawak and 3 schools in Pahang. The total number of students who joined the programme was 2,170 students.



NanoQuiz

When the Coronavirus Disease was announced pandemic and Malaysia underwent Movement Control Order (MCO), programmes were on halt and NNC have changed the method to conducting awareness activities through online platform such as media social. NNC have been conducting Nano Quiz since 22nd June 2020 until December 2020. The quiz is running every week and it is open for primary students and secondary students.



Activities in Member Countries

PHILIPPINES

The Industrial Technology Development Institute – Department of Science and Technology Spearheads the Philippines' Development of National Standards on Nanotechnology

The DOST-Industrial Technology Development Institute (DOST-ITDI), is at the forefront of developing the country's standards for nanotechnologies. DOST-ITDI, together with the Department of Trade and Industry's Bureau of Philippine Standards (DTI-BPS), already endorsed 25 Philippine National Standards (PNS) as of July 2020 through the BPS Technical Committee (TC) 85 on Nanotechnologies (Fig. 1).



Fig. 1. Technical committee meetings on Nanotechnologies, Bureau of Philippine Standard/TC-85 on Nanotechnologies (January 20, February 17, and June 1, 2020, virtual meeting) for the establishment of the EHS guiding principles and regulations.

As the influx of nanotechnology-related products in the country continue to increase especially in medicine, materials and manufacturing, consumer products, and household domains, the lack of information on the possible adverse health effects caused by exposure to these nanomaterials remains a major concern. The development of safety guidelines for various nanotechnology industries including manufacturing, monitoring of worker exposure, the ambient release of nanoparticles, and risk evaluations must, therefore, be ensured.

To answer this need, the BPS Technical Committee (TC) 85 on Nanotechnologies was created in October 2018 to develop the Philippine National Standards on Nanotechnology, through the DOST GIA-funded project on “Environmental, Health and Safety Research in the Risk Assessment of Nanomaterials”. The committee is chaired by Dr. Blessie A. Basilia, the Chief of ITDI's Materials Science Division, and vice-chaired by Dr. Milagros Peralta of the University of the Philippines-Los Baños. The Technical Committee is composed of subcommittees, which are mirrored to ISO/TC 229 Working Groups such as measurement and characterization, health, safety, and environmental aspects of nanotechnologies, and materials specifications. As a participating member (P-member) of ISO/TC 229 Nanotechnologies, the Philippines has the opportunity of creating world-class standards through participation in

various activities of the international organization.

Various stakeholders from the academe, government, consumer, testing institutions, research institutions, and industries, meet every month at the Advanced Device and Materials Testing Laboratory (ADMATEL) in DOST to continuously work on the different standards on Nanotechnology. The committee's efforts on the responsible use of nanotechnology will help not only the government's regulatory bodies but also the local nanotechnology industries and various stakeholders to maximize nanotechnology's potentials while practicing the necessary safety protocols in delivering globally-competitive products and services.

The Philippines' Develop Nanocomposites for 3D Printing Applications

The novel characteristics of nanomaterials have made their way into the world of 3D Printing. Headed by Dr. Blessie A. Basilia, a group of researchers from the Development of Multiple Materials Platform for Additive Manufacturing Project (MATDEV) of the Department of Science and Technology's Industrial Technology Development Institute (DOST-ITDI) develops various nanocomposite filaments for Fused Deposition Modelling (FDM) (Fig.2).

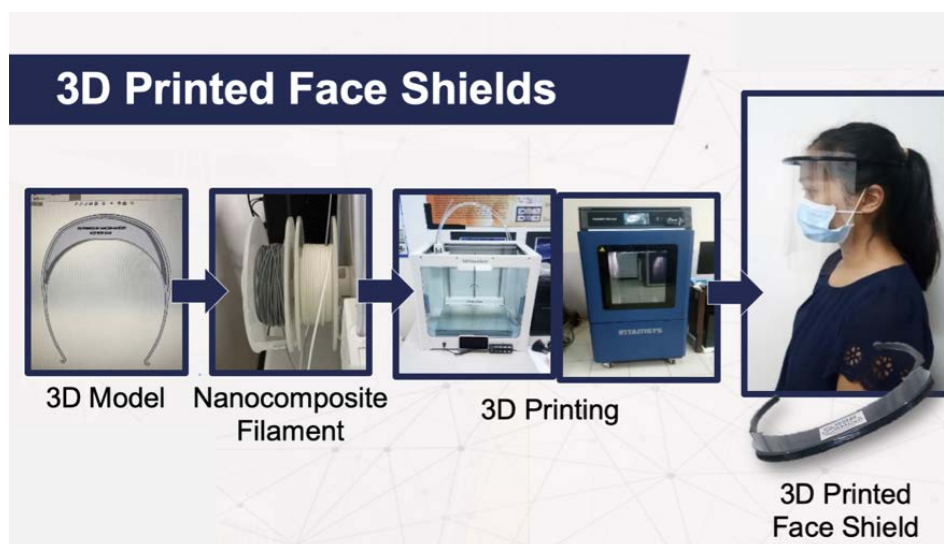


Fig. 2. Nanocomposite filaments used in 3D Printing Face Shields and other PPEs for the Covid19 Frontliners.

Nanomaterials such as the Nano Precipitated Calcium Carbonate (NPCC), Halloysite Nano Tubes (HNT), Carbon Nano Tubes (CNT), Nano Alumina, and Nanoclay were being studied as an additive to polymer matrices such as Polylactic Acid (PLA), Acrylonitrile Butadiene Styrene (ABS), Polypropylene (PP), and High-Density Polyethylene (HDPE) for FDM filament production. Through the addition of nanomaterials, promising results on the improvement of the properties of the polymer matrices were obtained.

As the institute strives to produce locally developed products, the country emerges towards global competitiveness and excellence in the field of Additive Manufacturing and Nanotechnology. DOST recently established the Advanced Manufacturing Center (AMCen), a national facility equipped with advanced laboratory and prototyping 3D printers for various

applications. The center aims to make an impact on the (i) fundamental understanding of Additive Manufacturing (AM) technologies, (ii) utilization of indigenous and non-proprietary materials development for use in 3D Additive Manufacturing systems and (iii) new process and applications for 3D AM technologies to complement or replace conventional manufacturing processes.

ITDI Conducted the Philippines' first Local Nanomaterials Interlaboratory Comparison

ITDI spearheaded the Local Interlaboratory Comparison on Nanomaterial Size Measurement. Standard Polystyrene samples were sent to various laboratories in the Philippines, which includes the academe, industry, private testing laboratories, and government research agencies (Fig. 3). Fourteen (14) participant laboratories analyzed 2 nano polystyrene reference samples using Dynamic Light Scattering (DLS), Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM) and Transmission Electron Microscopy (TEM). Training and workshop on MU Computation were provided to the personnel of participating laboratories. Results of the interlaboratory comparison were tabulated and interim reports were sent to the participant laboratories.



Fig. 3. Specimens and protocol manuals were given to the participating laboratories in the 1st Interlaboratory Comparison on Nanomaterials in the Philippines.

A webinar on the “Essential Components of Proficiency Testing or Interlaboratory Comparison” (ISO 17043 and ISO 13528), organized by the Industrial Technology Development Institute,

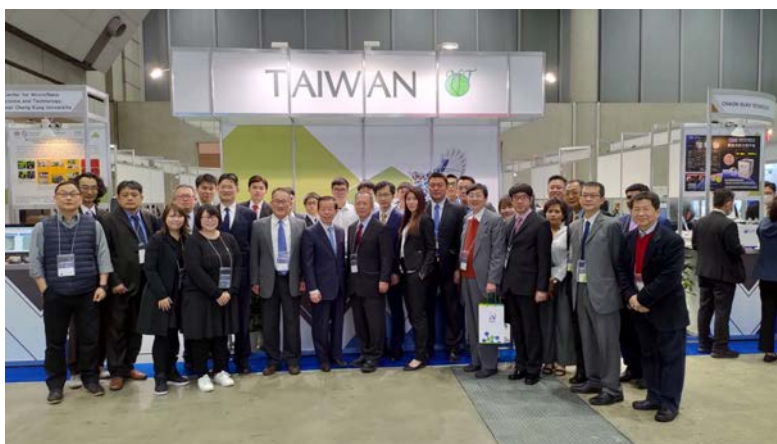
DOST was conducted on August 7, 2020. The objective of this webinar was to fully understand the requirements of Proficiency Testing or Interlaboratory Comparison and how data are used as a quality tool for the competence of the laboratory and for continual improvement. A total of ninety (90) participants registered in the webinar at this time of the new normal from various parts of the country.

Activities in Member Countries

TAIWAN

Taiwan in nano tech 2020, Japan

“nano tech 2020 – the 19th International Nanotechnology Exhibition & Conference” was held on 29-31 January in Tokyo. Taiwan Pavilion has been participating in this event for 16 consecutive years. A total of 28 new novel nano-materials, devices and techniques focusing on “Medicine”, “Energy”, “Electronics/Optoelectronics”, “Materials” and “Characterization/Fabrication” from 22 Taiwan’s institutions/companies were selected to demonstrate Taiwan’s latest nanotechnology status and offer visitors a better understanding of market opportunity in furthering business networking with Taiwan. In conjunction with nano tech 2020, representatives from ANF, Canada (Nano Canada), Germany (Fraunhofer), Japan (Cabinet Office, JST, AIST, and NBCI), the Netherlands (NanoNexNL), Taiwan (TANIDA), and USA (NNI) also gathered at the “12th Nanotechnology Association Conference” hosted by NBCI (Nanotechnology Business Creation Initiative) to exchange each other’s current practices and experiences.



Taiwan participated in ISO/TC229 on behalf of ANF

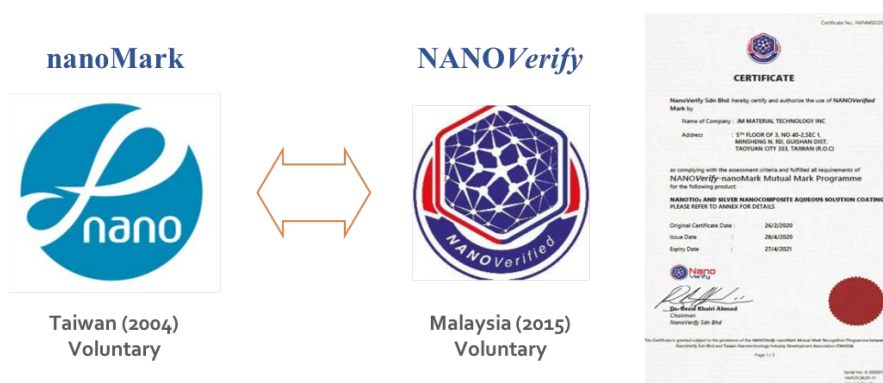


The 2020 ISO/TC229 Nanotechnologies Interim Meeting was held on 20 May virtually (originally in Washington DC, USA) during COVID-19. Dr. Tsing-Tang Song from Taiwan has participated in this online event on behalf of

Asia Nano Forum (ANF), the Liaison member of ISO/TC229. As a follow-up to the agreement at the Hangzhou meeting last November in China, the Preliminary Working Item Proposal (registered as PWI 4971) “Nanotechnologies- Performance Evaluation of Nanosuspension Containing Clay Nanoplates for Quorum Quenching” at WG5 (Products and Applications) proposed by Dr. Tsing-Tang Song was tabled for discussion. The WG5 committee recommended that this document review should take 4 weeks in circulation for comments from WG5 experts and for commitment of participation. Then the document will be submitted to apply for a NWIP (New Work Item Proposal) for ballot at the coming online meeting in November (originally in London, UK).

Mutual Recognition between Taiwan's nanoMark and Malaysia's NANOVerify

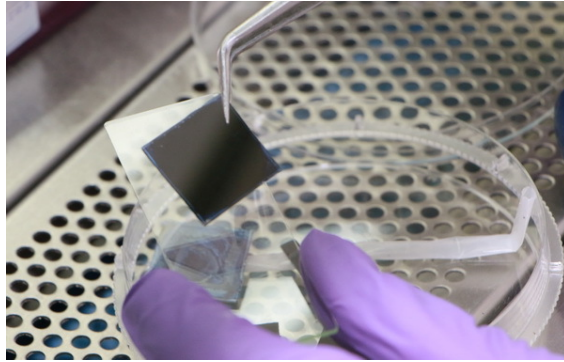
As pioneer countries in promoting voluntary nano-enabled product certification systems in the world, Taiwan and Malaysia have built the documentary SOP and collaborated a new scheme for mutual recognition between Taiwan's nanoMark and Malaysia's NANOVerify since the pilot program of mutual application in 2018. Taiwan's ITRI and Malaysia's MIMOS 1-TEM laboratories were accepted and qualified for the testing laboratories for mutual TEM testing lab. Both mark systems are also open for foreign company application. JM Material Technology Inc (京程科技) with "*TiO₂/Ag Nanocomposite Aqueous Solution Coating*" from Taiwan is the first company to be authorized this April to be able to use the NANOVerified Mark through the mutual recognition.



Nanoscale trap-based capture technology could be used to screen patients for COVID-19

Professor Jiunn-Der Liao's Virus Rapid Screening Test Selected for Ministry of Science Technology's Epidemic Prevention Technology Development Program (This article is reprinted from News Center of NCKU)

COVID-19 (SARS-CoV-2) has spread across the entire globe, and many countries are actively working to develop rapid screening techniques. Taking a material science and engineering approach, Professor Jiunn-Der Liao from the Department of Materials Science and Engineering at National Cheng Kung University (NCKU) and his team are developing nanoscale trap-based capture technology to catch antigen particles even if there is just one particle present. The test would relieve the need for repetitive nucleic acid or other serologic testing, and be able to detect the presence of the target virus simply by analyzing the chemical composition of the viral envelope. Coupled target virus with hot-spot test cluster has also been developed by Prof. Liao's team, the viral signals can be further identified to enable detection within a minute. This screening technology was selected to be part of the Ministry of Science and Technology's (MoST) development project for epidemic prevention technologies, and will be applied towards developing COVID-19 test pieces. The technology is expected to contribute to ongoing efforts in epidemic prevention.

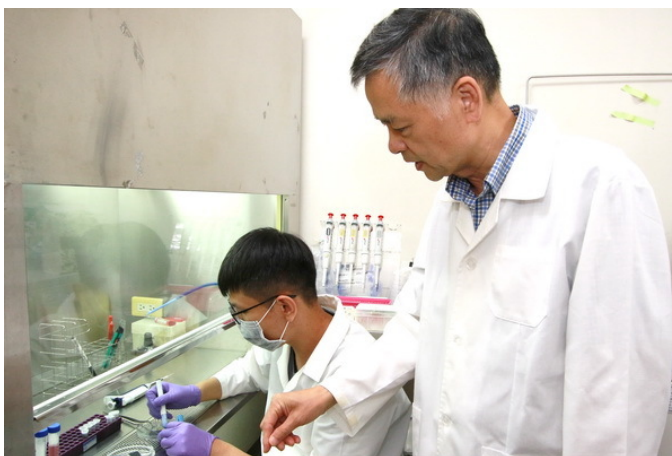


NCKU Professor
Jiunn-Der Liao's
Virus Rapid
Screening Test

Within then six months, Prof. Liao's team is aiming to finish building a mapping database for COVID-19 and as well as a prototype for a mobile testing facility that can offer on-site testing support anywhere. The team has already begun planning their collaborative efforts with the NCKU College of Medicine and the NCKU Hospital.

A viral particle is microscopic and is only around 100 nanometers in size. Between 2009 and 2012, Prof. Liao thought of the concept of “fighting (by finding) nano with nano” and applied it in his research to create nanoscale traps to capture viral particles. He developed a test piece with multiple nanoscale funnel-shaped cavities which could trap viral particles. The technique could detect a viral presence even if there is only one particle. To identify the virus species or strain, you would need only to analyze the chemical composition of the viral envelope. Moreover, the test could tell whether the virus was live, attenuated, dead, or even mutated. This test piece has experimented for seven types of viruses, including H1N1, SARS and influenza among other types of viruses. The technology was patented in 2012 and 2020, respectively.

The team has also considered the possibility of the viral particle missing its chance to be captured and landing outside of the nanocavity. In 2019, Prof. Liao led his students in developing an entirely new viral hot-spot test cluster that produce the effect of collective amplification. By applying lasers onto the test cluster, the strength and scope of the spectrometer would increase if any particle of the targeted virus is detected on the test cluster. By simultaneously using nanocavity and hot-spot test cluster, detection and confirmation can be achieved within one minute.



Professor Jiunn-Der Liao and his team are developing nanoscale trap-based capture technology to catch antigen particles even if there is just one particle present.

Current virus detection practices utilize multiple nucleic acid testing. The virus' ribonucleic acid can be read by leveraging nucleic acid sequencing and particle detection technologies. The entire process takes at least four hours, and the costly equipment used cannot be easily transported or moved. Within the next six months, Prof. Liao's team aims to build a Raman spectroscopy database for mapping COVID-19. The envelope of viral particles caught by nanoscale trap test pieces and hot-spot test cluster will be immediately experimented and compared against data in the database to achieve COVID-19 rapid screening and detection under one minute.

The COVID-19 pandemic has spread all around the world. Prof. Liao has expressed that installing testing facilities at airports and ports or moving mobile testing facilities closer to these areas will enhance surveillance efforts against the virus. Within the next six months, the team endeavors to build the prototype of the mobile emergency testing facility. The team hopes to receive further support in their efforts so that they can translate the fruits of their research and their concept of a mobile facility into reality.

Activities in Member Countries

THAILAND

Special Seminar of the Nanoscience and Nanotechnology Program at KMUTT (Bangkok, Thailand)

KMUTT is very fortunate to welcome Dr. Songpol Chunchaiyakul from the Surface and Interface Science Laboratory, RIKEN, Japan for his special seminar entitled “2D Self-Assembled Monolayers of a 3D Molecular Framework”. Dr. Songpol showed us the applications of triptycenes moiety as a core structure to control surface functionalities by its 3D intermolecular interactions giving the flexibility in fine-tuning the self-assembled structure and the capability to add multiple functional groups to a single molecule on the surface. At the end of the talk, all participants including students, researchers, and staffs at Nano@KMUTT had the chance to join the intensive discussion session. Dr. Songpol’s talk did enlighten us a promising platform which can be used to create a nanoscale device with molecular-scale precision. (KMUTT)



NanoThailand 2020 Postponement

Due to the COVID-19 outbreaks worldwide, KMUTT and Nanotechnology Association of Thailand are really regret to postpone NanoThailand 2020 (The 7th Thailand International Nanotechnology Conference 2020). The exact dates for the conference will be officially announced later. (KMUTT)

Nano Thailand 2020 Postponement

Regarding the tremendous Coronavirus disease (COVID-19) outbreak in many countries worldwide, it is with great regret that our committee have decided to postpone Nano Thailand 2020 (The 7th Thailand International Nanotechnology Conference 2020) which originally scheduled on December 2 - 4, 2020. It is expected that the conference is **going to be held in 2021**. The exact dates will be officially announced later.

COVID-19 Outbreaks can't stop us from research.

Many people have to work from home during COVID-19 outbreaks. We were conducting a big

task in the lab for the rapid diagnostic and highly sensitive sensor for this disease. Now we are ready for a large-scale diagnosis of COVID-19. (KMUTT)



Inter-Laboratory Comparison (ILC) 2019 Workshop



On 6 January 2020, NANOTEC with the support from Asia Nano Forum (ANF) organized the Inter-Laboratory Comparison (ILC) 2019 Workshop at Thailand Science Park, Pathum Thani, Thailand. The aim of this workshop is to discuss the result of analysis the gold nanoparticles size measurement among participating laboratories. There were 14 participating laboratories from 5 nations: Indonesia, Iran, Malaysia, Philippines, and Thailand. The workshop offered on insight into the knowledge sharing on the topic of “Preparation and Characterization of Nanoparticles” along with the ILC 2019 results and discussion. This discussion focused on the harmonization of measurement capability for nanoparticle size among the participating laboratories due to the measurements and regulations of nanoparticle characterizations are necessary to be in harmony of nano-products development in order for utilizing the most advantages of the nanoparticles. The variety and result discussion sessions are an important steps to promote collaborations and strengthen the networking among peers countries.

For the first comparison initiative, it was conducted on 6 September 2017. A total of 17 laboratories (13 overseas laboratories and 4 Thai laboratories). The measurement results were submitted to NIMT on 31 May 2018 and a workshop to discuss the results was organized on 24 September 2018 at NANOTEC, Thailand. (NANOTEC)

Calendar of Events

4th EU-Asia Dialogue on Nanosafety

7 October, 2020

Vienna, Austria

<https://www.nanosafetycluster.eu/4th-eu-asia-dialogue-on-nanosafety/>



nano tech 2021

9-11 December, 2020

Tokyo, Japan

<https://www.nanotechexpo.jp>



2nd International Nanotechnology Olympiad

10-14 January, 2021

Sultan Qaboos University, Oman

<https://www.nanoolympiad.org>



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Institute of Physics, Academia Sinica, Taiwan

National Nanotechnology Center (NANOTEC), Thailand

King Mongkut's University of Technology Thonburi (KMUTT), Thailand