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SINGAPORE HONOURS EIGHT SCIENTIFIC TALENT FOR OUTSTANDING R&D CONTRIBUTIONS WITH SOCIO-ECONOMIC IMPACT

Professor Soo Khee Chee honoured for his distinguished, strategic and far-sighted contributions to Singapore's clinical services and healthcare landscape, particularly in spearheading research-led improvements in clinical care, and catalysing research in the public healthcare environment.

1. Eight outstanding research scientists and engineers will be conferred the 2011 President's Science and Technology Awards (PSTA) by President Tony Tan Keng Yam at the award ceremony held at the Marina Bay Sands on 8 November 2011. The awards are the highest honours bestowed on exceptional individuals and teams for their excellent achievements in science and technology, and their outstanding contributions to the research and development (R&D) landscape in Singapore.

Advancing Translational Clinical Research and Collaborations to Improve Patient care in Singapore's Healthcare Sector

2. The prestigious President's Science and Technology Medal (PSTM) 2011 will be conferred to Professor Soo Khee Chee, the first clinician-scientist to be awarded the PSTM. Prof Soo has made distinguished, strategic and sustained contributions to clinical services and translational clinical research (TCR) in Singapore, particularly in spearheading research-led improvements in the public healthcare sector.

3. As the founding Director for the National Cancer Centre of Singapore (NCCS), Prof Soo was instrumental in growing the fledgling healthcare centre from a small department in Singapore General Hospital to an independent healthcare institution that has achieved world-wide recognition for its leading-edge cancer research, excellent clinical services as well as advanced education. Under Prof Soo's guidance, NCCS successfully implemented a multi-disciplinary and holistic approach to rapidly translate basic research findings into clinical applications that will benefit cancer patients. These initiatives include setting up state-of-the-art technological platforms in NCCS to support clinical trials and a wide range of bench-to-bedside cancer research.

4. As Deputy CEO, Research and Education of Singapore Health Services (SingHealth), Prof Soo spearheaded the strategic centralisation of several R&D resources from different healthcare institutions under the SingHealth cluster. This far-sighted initiative has catalysed research collaborations between clinicians and scientists across local healthcare institutions, public research institutions and pharmaceutical companies to meet today's clinical needs.

5. A visionary leader with a personal interest in mentoring and grooming the next generation of clinicians-scientists, Prof Soo is also one of the most prominent and influential leaders in Singapore academic medicine who advocated the creation of Singapore's first graduate-entry medical school. This has led to the establishment of the Duke-NUS Graduate Medical School where he is currently the Vice Dean of Clinical and Faculty Affairs in the Duke-NUS Graduate Medical School.

6. The 2011 President's Science Award (PSA) will be presented to two teams: from A*STAR's Genome Institute of Singapore (GIS) Stem Cell Group comprising Dr Lim Bing, Dr Lawrence Stanton, Dr Ng Huck Hui and Dr Paul Robson, and from the National University of Singapore (NUS), Professor Ooi Beng Chin and Professor Tan Kian-Lee.

Putting Singapore on the World-Map for Stem Cell Research

7. The Stem Cell Group at A*STAR's Genome Institute of Singapore (GIS) is recognised as being the first in the world to map the gene regulatory networks controlling stem cell functions. Using cutting-edge genomic technologies, the team has advanced the critical know-how to maintain embryonic stem cells, and induce them to create a wide range of specialised cell types in the body. Currently, the team is engaged in several collaborative projects with clinicians to engineer different types of tissues for the replacement of diseased or degenerated tissues in the eye, heart, brain and joints. The team has also made significant discoveries on how differentiated cells like skin cells can be reverted to stem cells. Pharmaceutical companies are seeking to collaborate with the team to explore the use of such techniques to create "patient-specific" stem cells from a patient's own cells to develop tools for drug discovery and for personalised treatment.

Innovative Solutions for Database Systems Management

8. This year's PSA is also conferred to the team from NUS for their pioneering research in decentralized database management, which has resulted in a suite of enabling technologies to manage 'big data' in large-scale parallel and distributed systems. To share data from different sources or organizations, existing approaches require data to be first centralized in a data centre or central server; this is costly and cannot be up-scaled easily. The team successfully demonstrates the practicality of peer-to-peer data management for large-scale parallel and distributed systems. Their innovative solution allows massive amount of data from autonomous sources to be shared, retrieved and processed quickly, while allowing individual information source to retain full ownership and control over their data sharing. Their project has spun off a company, BestPeer, which targets businesses that are geographically distributed.

9. A potential application is the integration of healthcare data from individual clinics and hospitals, which will allow doctors from participating clinics and hospitals to share patients' records from their existing systems, without excessive setup cost, while retaining ownership of patients' data.

Multi-disciplinary Research to Advance Healthcare Diagnostics

10. Professor Lim Chwee Teck from NUS is conferred the 2011 President's Technology Award (PTA) this year for his groundbreaking research that has led to the successful development of a novel micro biochip for the detection and diagnosis of human diseases such as cancer. This micro biochip, the world's first in using cell mechanics principles to detect and retrieve rare live cancer cells from blood, is a result of Prof Lim's multidisciplinary research in human disease mechanics. Already, this micro biochip is being clinically tested by clinicians and researchers at various hospitals and top cancer centres in Singapore, UK and the US. Several pharmaceutical companies have also expressed interest in this non-invasive medical device for cancer detection, diagnosis, prognosis and treatment. Prof Lim also demonstrated his entrepreneurial streak in co-founding three companies based on the technologies developed in his lab, the latest of which helped to expedite the bench to market and bedside application of this innovative technology.

11. Applauding the contributions of the award winners, Mr Lim Chuan Poh, Chairman of A*STAR said, "The PSTA winners have not only made significant scientific discoveries, some have also translated their discoveries into innovative solutions that impact the economy and bring benefit to society. Together, their achievements reflect the growing Singapore's R&D landscape that has what it takes to translate excellent basic scientific research into impactful clinical and industry applications thereby bringing us one step closer to becoming Asia's Innovation Capital."

12. Said Mrs Ow Foong Pheng, Permanent Secretary, Ministry of Trade and Industry, and Chairman of the PSTA Main Selection Committee, "It is heartening to see both an increase in the number and quality of nominations for the PSTA over the years. After 20 years of Science and Technology planning and development in Singapore, we now have a critical mass of high-calibre research scientists and engineers to support Singapore's goal of leveraging on R&D to enhance economic growth and improve the lives of our people."

Young Scientist Awards (YSA)

13. This year's Young Scientists Awards (YSA) will be awarded to three promising research scientists and engineers aged 35 years and below. They have shown great potential to be world-class researchers in their fields of expertise. The awards are organised by the Singapore National Academy of Science, with the support of A*STAR, and are presented by Mr. Lim Hng Kiang, Minister for Trade and Industry.

14. More information on the winners of PSTA and YSA are at Annex B and E respectively.

Background

15. This is the third year that the PSTA is presented. Formerly known as the National Science and Technology Awards launched since 1987, the Awards were elevated to the status of the President's awards in 2009 to highlight and give due recognition to the important role research scientists and engineers play in Singapore's development.

Enclosed:

Annex A – List of PSTA winners
Annex B – Citations of PSTA winners

Annex C – Factsheet on Judging Process and Award Selection Committees
Annex D – Information Sheet on YSA (including list of YSA winners)
Annex E – Citations of YSA winners

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About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is the lead agency for fostering world-class scientific research and talent for a vibrant knowledge-based and innovation-driven Singapore. A*STAR oversees 14 biomedical sciences and physical sciences and engineering research institutes, and six consortia & centres, located in Biopolis and Fusionopolis as well as their immediate vicinity.

A*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry. It also supports extramural research in the universities, and with other local and international partners.

For more information about A*STAR, please visit www.a-star.edu.sg.

About the President's Science and Technology Awards (PSTA)

The President's Science and Technology Awards (PSTA) are the highest honours bestowed on exceptional research scientists and engineers in Singapore for their excellent achievements in science and technology, and outstanding contributions to the development of the research and development landscape in Singapore.

The PSTA were formerly known as the National Science and Technology Awards (NSTA), which was started in 1987. The elevation of the award to Presidential status last year underpins Singapore's efforts to raise the level of excellence in R&D and strengthen the growing community of scientific talent in Singapore.

The PSTA consists of the following awards:

- President's Science and Technology Medal (PSTM)
- President's Science Award (PSA)
- President's Technology Award (PTA)

President's Science and Technology Medal (PSTM)

The President's Science and Technology Medal is awarded to outstanding individuals who have made distinguished, sustained and exceptional contributions and played a strategic role in the development of Singapore through the promotion and management of R&D. Recipients receive a specially designed gold medal and a citation.

President's Science Award (PSA)

The President's Science Award is presented to research scientists and engineers in Singapore who have made outstanding contributions in basic research leading to the discovery of new knowledge or the pioneering development of scientific or engineering techniques and methods. Recipients will receive a crystal trophy, a citation and a prize of $50,000.

President's Technology Award (PTA)

The President's Technology Award gives recognition to research scientists and engineers in Singapore who have made outstanding contributions to research & development resulting in the invention or discovery of significant technology with industrial applications. Recipients will receive a crystal trophy, a citation and a prize of $50,000.

ANNEX A

LIST OF PRESIDENT'S SCIENCE AND TECHNOLOGY AWARD WINNERS

President's Science and Technology Medal (PSTM)

- **Professor Soo Khee Chee**
  Director, National Cancer Centre Singapore

President's Science Award (PSA)

- **Dr Lim Bing**
  Dr Lawrence Stanton
  Dr Ng Huck Hui
  Dr Paul Robson
  Genome Institute of Singapore,
  *Agency for Science, Technology and Research (A*STAR)*

- **Professor Ooi Beng Chin**
  Professor Tan Kian Lee
  School of Computing,
  National University of Singapore (NUS)

President's Technology Award (PTA)

- **Professor Lim Chwee Teck**
  Department of Bioengineering and Department of Mechanical Engineering,
  National University of Singapore (NUS)

ANNEX B

CITATIONS OF PRESIDENT'S SCIENCE AND TECHNOLOGY AWARD WINNERS

President's Science and Technology Medal 2011

Professor Soo Khee Chee
Director, National Cancer Centre Singapore

"For his distinguished, strategic and far-sighted contributions to Singapore's clinical services and healthcare landscape, particularly in spearheading research led improvements in clinical care, and catalysing research in the public healthcare environment."

Professor Soo Khee Chee is the founding Director of the National Cancer Centre Singapore (NCCS), which is now a leading cancer institution renowned both locally and internationally for being at the cutting edge of cancer research. Under his strong leadership and foresight, the NCCS led in pursuing and promulgating the now widely accepted multi-disciplinary and holistic approach to cancer management in order to achieve the highest standards in cancer prevention, diagnosis and treatment. NCCS' integrated structure and intense clinical practice have enabled it to bridge the chasm between pre-clinical research and clinical practice. Notable examples are its groundbreaking research that has established chemo-radiation as the new standard for nasopharyngeal cancer treatment, and NCCS' international status in cell-based cancer immunotherapy. Both these research-directed advances in cancer care are the accomplishments of multi-disciplinary teams led by NCCS' clinician scientists. As a result of its clinical and translational research, the NCCS has developed new and advanced protocols in cancer treatments, with six of its doctors winning outstanding awards from the prestigious American Society of Clinical Oncology (ASCO). In recognition of his outstanding service and contribution to the nation, Professor Soo was awarded the Public Administration Medal (Gold) in the 2003 National Day Awards.

<u>Growing The National Cancer Centre Singapore</u>
Professor Soo has grown the NCCS since its establishment in 1997, from a department within the Singapore General Hospital (SGH) to an autonomous internationally recognised tertiary centre known for being at the leading edge of cancer treatment and research. Due to his foresight, NCCS now exhibits the hallmarks of a US National Cancer Institute (NCI)-designated comprehensive cancer centre programme: namely, commitment to rapid translation of basic research findings into clinical applications; critical mass of high-quality clinicians and laboratory researchers engaged in collaborative research; and a group of opinion leaders dedicated to mentoring the next generation of cancer researchers.

Through Professor Soo's initiatives, the NCCS developed key research capabilities that have become essential in the translation of basic findings into clinical applications that can benefit the patient. The NCCS is at the forefront of research in areas such as head and neck cancers, nasopharyngeal cancer, liver cancer, lung cancer and lymphoma. NCCS has one of the largest numbers of clinical trials within a Singaporean medical institution. In 2010 alone, there were more than 140 planned, active, and completed Phase I-IV clinical trials. This is a ten-fold increase in the volume of trials since 1999. Due to the high number of clinical trials and patient throughput, the NCCS has become the lead investigator in a number of multinational & multicentre clinical trials in cancer. Its Asia-Pacific Hepatocellular Cancer Consortium has completed five international trials while another four are on-going. It leads an international trial on head and neck cancer, involving 26 cancer centres in 15 different countries, and another phase III trial on colorectal cancer ready to recruit more than 2,000 patients.

Reflecting the importance and commitment to research, a quarter of NCCS' annual turnover is dedicated to research, as are more than a quarter of the staff. As a result, within the short span of 10 years since its inception, the NCCS produced over 1,200 peer reviewed papers, of which more than 25% are above the benchmark Journal Impact Factor (JIF) of 5. This has made the NCCS most productive in terms of research dollars spent.

Grooming Clinician Scientists

Despite Professor Soo's heavy national and cluster level commitments, he is devoted to grooming and developing clinician scientists. He has personally mentored a successful cadre of at least nine clinicians and seven clinician scientists, and continues to support the new generation of talents. He motivates his scientists to acquire research training that equips them to address clinically relevant needs and to engage in collaborative investigations that advance basic, pre-clinical research to clinical cancer care. In recognition of this exceptional work, Professor Soo was awarded the National Outstanding Clinician Mentor Award in 2008. Indeed, through his constant encouragement, NCCS arguably has Singapore's highest proportion of clinician scientists among its clinical faculty.

Establishing the Duke-NUS Graduate School of Medicine

Professor Soo was instrumental in his role of establishing academic medicine in the Outram campus, recognising the need for a strong academic foundation for medical excellence and research. Professor Soo was among the prime movers in obtaining the Government's support for the establishment of a new world-renowned medical school in the Outram campus. He was the chairman of the Graduate Medical School Protem Committee (2003-2006), working tirelessly towards this objective, which culminated in the Government's decision to establish the Duke-NUS Graduate Medical School (GMS) in Singapore. The presence of this new medical school and the close collaboration that has now been established with SingHealth has significantly transformed SingHealth's institutional milieu. Professor Soo and his team are currently in the midst of

formulating academic clinical departments and programmes necessary for the proper institutional structures for academic research to be established from the clinical departments on the campus. Within the next two years, there will be at least 10 such academic clinical programmes established in collaboration with Duke-NUS GMS.

For his efforts in establishing Duke-NUS GMS, Professor Soo was appointed its Vice Dean of Clinical and Faculty Affairs. He holds the distinction as the first recipient of the Duke-NUS Graduate Medical School Benjamin Sheares Professorship in Academic Medicine, in recognition of his pioneering contributions to research, scholarship and clinical service which have significantly impacted the practice of medicine in Singapore.

Building the Research Framework in SingHealth

Professor Soo has played a significant role in championing and leading biomedical research efforts in Singapore's healthcare institutions. As Deputy CEO for Research and Education in SingHealth, he spearheaded the strategic centralisation of several R&D resources from different healthcare institutions under the SingHealth cluster to catalyse research. Under his leadership, SingHealth established the SingHealth Experimental Medicine Centre (SEMC) – the first AAALAC accredited facility in Singapore; the SingHealth Tissue Repository (STR) – which is currently the largest tumour tissue repository in Singapore, with a collection of more than 10,000 tissue samples and biospecimens; and the Centralised Institutional Review Board (CIRB).

In addition, Professor Soo was a key player in the decision to establish the Investigational Medicine Unit (IMU) at SingHealth, which was one of the two national early-phase clinical trial units established in 2009 with capabilities in micro-dosing and first-in-man studies to test novel drugs, devices, biologics, and diagnostics. The IMU is now able to carry out the first-in-man Phase I and Phase II clinical trials. He has thus been instrumental in the creation of a whole research eco-system of tremendous value to pharmaceutical companies. These efforts to centralise and establish these core facilities at SingHealth are essential to facilitating research collaborations across institutions, and enabling clinicians to do research. As a result, there are significant on-going research collaborations with multinational pharmaceutical companies such as Bayer, GlaxoSmithKline and AstraZeneca.

Championing Industry Collaborations

Professor Soo serves as a member of the Economic Development Board (EDB)-chaired Biomedical Sciences Industry Strategy Group. He contributes to and provides guidance on national strategies to engage big pharmaceutical companies, championing the role of the clinician scientists in such collaborations. Professor Soo's vision and personal leadership were instrumental in the inking of the recent EDB-led $100 million research investment-cum-collaboration with Roche. This collaboration is significant as it places Roche scientists side-by-side

with Singaporean scientists in an equal partnership that allows intellectual cross-fertilisation and the directed efforts to solve industry-relevant and clinically significant problems. This collaboration will develop new research competencies in Singapore through the setting up of a translational medicine hub in SingHealth in areas such as radiochemistry and exploratory pathology, as well as establish a new model of research collaboration between industry and the public sector. For his significant role in the Roche collaboration, he is now the Chairman of the Roche-Singapore Joint Steering Committee.

For his distinguished, strategic and far-sighted contributions to Singapore's clinical services and healthcare landscape, particularly in spearheading research led improvements in clinical care, and catalysing research in the public healthcare environment, Professor Soo Khee Chee is awarded the President's Science and Technology Medal 2011.

ANNEX B

President's Science Award 2011

Dr Lim Bing
Dr Lawrence Stanton
Dr Ng Huck Hui
Dr Paul Robson
Genome Institute of Singapore, A*STAR

"For their ground breaking work on the regulatory pathways controlling embryonic stem cell pluripotency and cell fate decisions"

Over the past nine years, the stem cell group at A*STAR's Genome Institute of Singapore has comprehensively assessed genes required for stem cell function, and helped to define the specific functions of these genes through cutting edge genetic technologies, such as genome-wide sequencing. These efforts have led to the discovery and definition of novel regulatory factors required for the functions of embryonic stem (ES) and other stem cells.

The team's work has advanced the capability to maintain and expand ES cells, and to direct their differentiation to create specialised cell types. This knowledge is critical for the successful application of stem cells for therapeutic, translational and academic purposes, particularly in providing industry, clinicians, or researchers with a variety of specific cell types needed for medical therapies, biotechnology applications and research experiments. Their work has significantly improved the derivation of stem cells from skin cells, which could not only enable cell replacement therapies from a patient's own cells, but also provides a greater scope of opportunities for *in vitro* disease modelling and drug screening. The ability to direct stem cell differentiation and to create "patient-specific" stem cells together greatly facilitates the important work in personalised regenerative medicine and drug discovery.

The group's present revolution in the understanding, control, and exploitation of stem cells represents not only a theoretical advance in stem cell biology but it has opened new opportunities for other researchers and Singapore. These works are published in prestigious international journals and have received international recognition in the stem cell community. The work has placed Singapore prominently on the global map for stem cell research. In addition, their discoveries in basic biology and translational applications of ES cells and reprogrammed stem cells have attracted interests from research groups in both academia and industry from across North America, Europe and Asia. The team has also been active in training the next generation of stem cell scientists in Singapore.

For their outstanding contributions in the stem cell research arena, the GIS team comprising Dr Lim Bing, Dr Lawrence Stanton, Dr Ng Huck Hui and Dr Paul Robson is awarded the 2011 President's Science Award.

ANNEX B

President's Science Award 2011

Professor Ooi Beng Chin
Professor Tan Kian Lee
School of Computing
National University of Singapore (NUS)

"For their outstanding contributions to database systems research for managing 'big data' in large-scale parallel and distributed systems"

Professor Ooi Beng Chin and Professor Tan Kian Lee have, in the past 20 years, helped to shape the development of various forms of non-centralised database systems, namely distributed database systems, parallel database systems, heterogeneous database systems, peer-to-peer data management systems and cloud-based data management systems. The two-man team has pioneered the use of peer-to-peer data management for managing 'big data' in large-scale parallel and distributed systems. Their work broke new grounds in the science and implementation of database management systems, becoming the first to demonstrate the practicality and usability of peer-to-peer data management systems.

It has been traditionally accepted that finding practical and highly decentralised solutions to manage distributed data requires solving several hard and challenging problems. It is costly to maintain and manage data distributed across autonomous nodes, and even more arduous to keep up with an acceptable performance as the system scales.

The team designed and developed a series of highly efficient mechanisms that tackle these notorious challenges. The solutions include: (a) a novel self-configurable distributed system, comprising autonomous database-enabled nodes, which facilitates data sharing without the need for explicit knowledge of the structure of the data content; (b) a distributed data structure and overlay for routing and discovering data that not only has a theoretical guaranteed worst-case bound but also performs several times faster than any known schemes in practice; (c) a query processing mechanism that significantly reduces the overhead of maintaining routing information and thus rendering large-scale distributed systems practical and feasible. Many other techniques and systems have also been developed by the team to support a wide variety of applications.
The work of Professor Ooi and Professor Tan has also provided the basis of data integration and analytics solution for enterprises. A good example is the integration of healthcare data belonging to individual autonomous clinics to a national network. The system allows clinics to share data from their existing systems, while retaining ownership of their data, through a peer-to-peer

arrangement. A company, BestPeer has been spun off from their project, targeting businesses that are naturally geographically distributed.

For their outstanding contributions to database systems research for managing 'big data' in large-scale parallel and distributed systems, the two-man team, Professor Ooi Beng Chin and Professor Tan Kian Lee, from the National University of Singapore is awarded the 2011 President's Science Award.

ANNEX B

President's Technology Award 2011

Professor Lim Chwee Teck
Department of Bioengineering and Department of Mechanical Engineering, National University of Singapore

"For the development and use of novel micro biochips in the detection and diagnosis of human diseases"

Professor Lim Chwee Teck's pioneering research in the multidisciplinary area of human disease mechanobiology has been hailed by many as highly original and creative. He is already considered one of the leading researchers for his contributions in using cell and molecular biomechanics to better understand human diseases such as cancer and malaria. In fact, his research was cited by the MIT Technology Review magazine as one of the top ten emerging technologies of 2006 that will "have a significant impact on business, medicine or culture". Another clear indication that he is well regarded by his peers is his election as Council Member of the World Council of Biomechanics in 2010 with only 40 such members worldwide. An elected membership by his peers is a clear recognition of his status as a world expert in his area. Professor Lim is also a much sought-after speaker having delivered more than 175 invited lectures around the world. He is a prolific writer and has authored more than 400 technical publications with more than 180 being peer-reviewed journal papers including 30 invited/review articles. He has also won numerous research awards including highly cited paper and highly cited author awards, and best paper awards in international conferences.

Professor Lim is entrepreneurial, having co-founded three companies to exploit the technologies developed in his lab. His latest invention of a micro biochip that uses cell mechanics principles to detect and retrieve live rare cancer cells from blood has received much international attention. This demonstrates his ingenuity in using his knowledge on human disease mechanics to develop a technology and translate it for clinical application. This biochip has since been commercialised and is being clinically tested both locally and overseas which include some of the top cancer centres in the US and Europe. For this invention, his team has won the Tan Kah Kee Young Inventors' Award in 2009. He was also honoured with the IES Prestigious Engineering Achievement Award as well as the Faculty Research Award in 2011 for his outstanding research work.

Professor Lim currently holds the position of Professor at the Department of Bioengineering and Department of Mechanical Engineering and is also a Principal Investigator at the Mechanobiology Institute at the National University of Singapore.

For his outstanding contributions in developing novel micro biochips in the detection and diagnosis of human diseases, and in bringing them from bench to market and bedside, Professor Lim Chwee Teck from the National University of Singapore, is awarded the 2011 President's Technology Award.

ANNEX C

FACTSHEET ON PRESIDENT'S SCIENCE AND TECHNOLOGY AWARD SELECTION COMMITTEES

Judging Process

Nominations for the awards start from January every year, and ends with judging and endorsement of the awards in August. The nominations undergo a rigorous process of selection before being short listed for judging.

Award Selection Committees

The award selection panels comprised key representatives from the industry, academia, defence and research institutes. The main selection committee was chaired by Mrs Ow Foong Pheng, Permanent Secretary, Ministry of Trade and Industry.

Professor Ranga Krishnan, Dean, Duke-NUS Graduate Medical School, and Mr. Jen Kwong Hwa, Managing Director, Micron Semiconductor Asia Pte Ltd, chaired the selection committees for the Presidential Science Award and Presidential Technology Award respectively.

ANNEX D

INFORMATION SHEET ON YOUNG SCIENTIST AWARD

List of Young Scientist Award Winners

- **Assistant Professor Uttamchandani Mahesh**
  DSO National Laboratories and National University of Singapore (NUS)

- **Assistant Professor Yan Shuicheng**
  Department of Electrical and Computer Engineering,
  National University of Singapore (NUS)

- **Associate Professor Chen Yuan**
  School of Chemical and Biomedical Engineering,
  Nanyang Technological University (NTU)

Young Scientist Award

The Young Scientist Awards recognise young researchers, aged 35 years and below, who are actively engaged in R&D in Singapore, and who have shown great potential to be world-class researchers in their fields of expertise. This award is organised by the Singapore National Academy of Science and supported by A*STAR. Recipients will receive a trophy, a certificate of commendation and a prize of $10,000.

Young Scientist Award Selection Committee

The judging committee for the Young Scientist Awards, which is organised and administered by the Singapore National Academy of Science (SNAS), is chaired by its President, Prof Leo Tan.

ANNEX E

CITATIONS OF YOUNG SCIENTIST AWARD WINNERS

Young Scientist Award 2011

Biological and Biomedical Science

Assistant Professor Uttamchandani Mahesh
DSO National Laboratories and National University of Singapore

"For significant interdisciplinary research that bridges chemistry, biology and medicine."

Dr Uttamchandani's research focuses on the development of platforms for drug discovery, point-of-care DNA detection, as well as technologies for genetic screening and proteomic profiling. Through these novel high-throughput tools and platforms, Dr Uttamchandani's team has developed unique ways with which to dissect the molecular complexity of biological systems. His team has also successfully applied split DNAzymes (DNA sequences with catalytic activity) towards visual DNA detection, thus bringing sophisticated DNA analysis capabilities to the point-of-need.

Dr Uttamchandani has spearheaded a multi-centred clinical trial in collaboration with cardiologists from the National Heart Centre, SGH and the National University Heart Centre, NUH. This study profiled local cases of cardiac arrhythmias, specifically Long QT and Brugada syndromes, with the objective of better identifying individuals at risk and reducing incidences of sudden cardiac deaths.

He has also made pioneering contributions in the field of small molecule, peptide and protein microarrays, for the last decade since its inception. His work has garnered international acclaim, having been published in many world-class scientific journals and generating close to 1000 citations. He has published over 50 scientific articles in journals and books, and has recently co-edited a book on Small Molecule Microarrays.

Dr Uttamchandani serves as an editor for several international journals. He has presented at numerous scientific meetings and has mentored over 30 university, junior college and secondary school students in projects over the past 4 years at DSO National Laboratories. He teaches undergraduate and graduate courses at NUS on medicinal chemistry and molecular biology. He has also won the Lee Kuan Yew Global Business Plan competition, the Wang Gungwu Medal and Prize, and the Sung Kah Kay Memorial Prize for his entrepreneurial and scientific achievements. He co-organised the Singapore Junior Chemistry Olympiad in 2010 and 2011.

ANNEX E

Young Scientist Award 2011

Physical, Information & Engineering Sciences

Assistant Professor Yan Shuicheng
Department of Electrical and Computer Engineering
National University of Singapore

"For his research on computer vision, multimedia and machine learning"

Dr. Yan's research interest focuses on developing general machine learning theories for solving practical problems in computer vision and multimedia applications.

He has solved a number of fundamental problems and produced ground-breaking results in several high-profile areas in these fields. Two of his highly-cited pioneering papers bridge and unify the research areas of manifold learning and subspace learning, and have resulted in a large number of followers. With more than 200 academic papers to his credit, his research has been cited more than 2300 times, with H-index=18, as reported in Scopus, and cited more than 4200 times, with H-index =30, as reported in Google Scholar.

In 2010, he won two best paper awards at two of the most prestigious multimedia conferences (ACM Multimedia – ACM MM, and International Conference on Multimedia & Expo - ICME) for the research works on assistive multimedia techniques. Also, he was recognised as the individual with the most papers accepted at two highly selective conferences, the 2010 IEEE Conference on Computer Vision and Pattern Recognition (top conference in computer vision community), and 2010 ACM MM (top conference in the multimedia community), thus demonstrating his prolific and substantive research output. His team also won the object classification task in the 2010 PASCAL Visual Object Classes (VOC) challenge.

Dr. Yan serves on the editorial boards of international journals, and won the 2010 Best Associate Editor award of the *IEEE Transactions on Circuits and Systems for Video Technology* (TCSVT). Within 3.5 years of his career at NUS, Dr. Yan has brought in research funds totalling more than $4 million.

ANNEX E

Young Scientist Award 2011

Physical, Information & Engineering Sciences

Associate Professor Chen Yuan
School of Chemical and Biomedical Engineering
Nanyang Technological University

"For his research on carbon nanotube and nanotoxicology of carbon nanomaterials"

Dr Chen's research focuses on carbon nanotubes. He has developed synthesis, purification, and enrichment methods for the economical production of carbon nanotubes with well-defined atomic structures. His research group invented new catalysts to manipulate the chiral structure of carbon nanotubes with increased precision. Novel methods were also developed to purify and enrich chiral nanotubes, which are promising for use as printable semiconductor materials for flexible and printed electronics. He has demonstrated the potential of chiral nanotubes in applications such as energy storage devices, solar energy conversion, enzyme immobilisation, and antibacterial coating. His theoretical study identified two new reaction pathways and a novel role for charge transfer in chirality selective synthesis of nanotubes. He has also elucidated several key causes of antibacterial activity of carbon nanotubes and graphene related nanomaterials, which are important for reducing their environmental and health risks while increasing their application potentials.

Dr. Chen's achievements have gained international recognition in both the carbon nanotube and nanotoxicology communities. He has authored 69 papers in top international journals with more than 1150 citations (H index = 20). Four book chapters have also been authored. His works have been highlighted in *Nature* and other well-known journals. He also serves as a reviewer for 33 international journals. He is also a reviewer for the American Chemical Society Petroleum Research Fund.