PRESS RELEASE

13 February 2010

10 RESEARCH PROJECTS RECEIVE S$2.5 MILLION GRANTS FROM NRF TO COMMERCIALISE THEIR RESULTS

- *10 projects receive up to S$250,000 each in this third proof-of-concept grant call*
- *Awarded projects are in the areas of engineering,* bio-engineering and materials, biomedical sciences, *info-comm technologies.*

1. The National Research Foundation (NRF), on the recommendation of an expert evaluation panel (see **Annex A**), announced today the award of the Proof-of-Concept (POC) grant to 10 projects from the institutes of higher learning (IHLs). S$75 million has been set aside for this purpose under the NRF's Proof-of-Concept Scheme[1]. The 10 project teams will each receive up to S$250,000 to develop their inventions into prototypes, bringing them closer to commercialisation.

2. The POC grant to researchers from the universities and polytechnics provides funding to enable them to carry out further development on their inventions or ideas that are technically feasible, with the aim of coming out with products or commercial applications. The resulting product or application could then be licensed to interested companies or lead to formation of new enterprises. A successful proof-of-concept demonstrates not just technical viability but also a high degree of commercial readiness. It would help move research output and inventions into the market place, contributing to our economy and society.

3. This third POC grant call received 72 proposals submitted by Singapore-based researchers from the local universities and polytechnics. The proposals span a wide spectrum of science and technology areas. Twenty-five proposals were shortlisted by the POC panel for presentation, out of which 10 were recommended for award.

4. Of the 10 awarded projects, 4 were in engineering, 3 in bio-engineering and materials, 2 in biomedical sciences and 1 in info-comm technologies (see **Annex B**). 8 proposals came from National University of Singapore, 1 from Nanyang Technological University and 1 from Nanyang Polytechnic.

[1] S$25 million of this S$75 million is administered by SPRING Singapore through its Technology Enterprise Commercialisation Scheme, or TECS.

5. Dr Francis Yeoh, Chief Executive Officer of NRF, said: "There is often a gap between an R&D outcome or invention and demonstrating that they would work in practice. The POC scheme bridges this gap so researchers could have the resources to build prototypes of their innovative ideas and inventions to prove that they work and to validate the viability. In this way, the probability of the research output and inventions being implemented in practice would be raised, hence benefiting the society and the economy."

6. Douglas Abrams, Chief Executive Officer of Expara and a member of NRF's POC evaluation panel said: "As with previous calls, we received many innovative and highly-competitive proposals submitted to the POC scheme. After putting them through a rigorous evaluation process, we are confident of the technical and commercial feasibility of these selected proposals."

7. Dr Anindya Datta, Associate Professor at the School of Computing and the Principal Investigator of the awarded project on "Creating a Comprehensive Lexical Web Index" said: "The NRF POC award offers a great opportunity to start the process of thinking beyond the lab and into the real-world. I look forward to embarking on this journey and cannot wait to observe the market's reaction to my scientific ideas."

8. The POC scheme is part of the National Framework for Innovation and Enterprise (NFIE) [2] announced by the Prime Minister at the 3rd Research, Innovation and Enterprise Council (RIEC) meeting in March 2008. Its objective is to facilitate the commercialisation of technologies developed in the IHLs (see **Annex C**). The NFIE is a comprehensive national programme to grow innovation and entrepreneurship in Singapore, especially through the formation of start-up companies to commercialise cutting-edge technologies developed out of R&D laboratories.

9. With this third POC grant call, a total of 35 proposals have been awarded the POC grant. (see **Annex D**) The next POC grant call will open in April 2010. NRF aims to make two POC grant calls per year.

The National Research Foundation (NRF)

The National Research Foundation (NRF), set up on 1 January 2006, is a department within the Prime Minister's Office.

The NRF sets the national direction for research and development (R&D) by developing policies, plans and strategies for research, innovation and enterprise, funds strategic initiatives, builds up R&D capabilities and capacities through nurturing our own and attracting foreign talent, and coordinates the research agenda of different agencies to transform Singapore into a knowledge-intensive, innovative and entrepreneurial economy. It provides secretariat support to the Research, Innovation and Enterprise Council (RIEC), chaired by the Prime Minister. A five-year budget of S$5 billion has been allocated to the NRF in 2006 to achieve this mission.

[2] For more information on the National Framework for Innovation and Enterprise, refer to: http://www.nrf.gov.sg/nrf/uploadedFiles/News_and_Events/RIEC%20Press%20Release%20%20(FINAL).pdf

The NRF aims to:

- Transform Singapore into a vibrant R&D hub that contributes towards a knowledge-intensive, innovative and entrepreneurial economy; and
- Make Singapore a talent magnet for scientific and innovation excellence.

For more information, please visit www.nrf.gov.sg.

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Annex A

PROOF-OF-CONCEPT SCHEME EVALUATION PANEL

	Name	Designation
1	Dr Lawrence Koe	Director (Projects), NRF
2	Mr Douglas Abrams	Chief Executive Officer, Expara
3	Mr Damien Lim	General Partner, BioVeda Capital
4	Mr Eric Chan	General Manager, ST Electronics (Training & Simulation Systems)
5	Mr Chow Yen-Lu	Managing Director, WholeTree Technologies
6	Mr Tan Peng Yam	Deputy Chief Executive (Operations), Defence Science & Technology Agency (DSTA)
7	Mr Fong Saik Hay	Chief Technology Officer, ST Engineering
8	Mr Viktor Cheng	Deputy Director-General, Intellectual Property Office of Singapore (IPOS)
9	Dr Casey Chan	Chief Executive Officer & Co-Founder, WizPatent
10	Dr Lionel Lee	Director, Defence Medical & Environmental Research Institute (DMERI)
11	Dr Lerwen Liu	Business Development Manager, NanoStart Singapore; Founder, NanoGlobe Pte Ltd
12	Dr Ting Choon Ming	Chairman & Chief Executive Officer, HealthStats International Pte Ltd
13	Mr Rahul Harkawat	Consultant, Mobitila

Annex B

POC 3rd CALL: RESEARCH PROGRAMMES AWARDED FUNDING

S/N	Awarded Proposals	PI	Institute of Higher Learning
1.	Partial breast reconstruction using a nanofibrous scaffold following breast-conserving surgery.	Dr CHAN Ching Wan	National University of Singapore
2.	Improvement in Yield of Haemotopoietic Stem Cells (HSCs) via Automation and Optimization of the Umbilical Cord Blood (UCB) Collection Process with Further Stem Cells' Characterization	Dr TANG Kok Zuea	National University of Singapore
3.	CDH17 Marker as a Novel Target for Liver and Stomach Cancer Therapies	Professor LUK John	National University of Singapore
4.	Fluorescent Tagged Antimalarials as Commercial Molecular Probes to Diagnose Drug Resistance and to Study Diseases	Dr TAN Kevin	National University of Singapore
5.	Development of a Novel Bioabsorbable Drug-Eluting Ventilation Tube for Chonic Middle Ear Infection	Dr LIM Lynne	National University of Singapore
6.	3-Dimensional Micro/Nano-Structures for Energy Harvesting	Dr GARDNER Hannah	Nanyang Polytechnic
7.	Development of efficient methods for the production of biodiesel from grease	Professor LI Zhi	National University of Singapore
8.	Development of a Highly Energy Efficient Revolving Vane Expander	Professor OOI Kim Tiow	Nanyang Technological University
9.	High frequency graphene transistors	Professor YANG Hyunsoo	National University of Singapore
10.	Creating A Comprehensive Lexical Index of documents from the World Wide Web (WWW)	Dr DATTA Anindya	National University of Singapore

Title of Project: Partial Breast Reconstruction using a Nanofibrous Scaffold Following Breast-Conserving Surgery

Project Summary

Breast cancer is the most common cancer affecting women today. The aim of breast conservation surgery is not only to remove the cancer in its entirety, but also to preserve the shape of the remaining breast. However not all women are suitable candidates due to insufficient residual breast volume after resection.

The availability of a volume-filler may extend the role of breast conservation, as compensating for the loss of volume after surgery is no longer dependent solely on the residual breast tissue. This is especially pertinent in Asians, who are not as well endowed as their Western contemporaries.

Our bioartificial graft is a 3D nanofibrous scaffold seeded with fat tissue and this combination is hypothesized to encourage the formation of blood vessels. The scaffold is biodegradable and we expect the fat transplanted onto the scaffold will engraft, vascularise (i.e. new blood vessel formation), and become robust fat tissue that will fill out the tissue defect.

In this study, tissue resection will be performed in a pig's mammary glands to create a tissue defect. Subsequently, the defect will be filled with our novel bioartificial tissue versus control material, both of which will be assessed at various time points for graft survival and adipogenesis.

NRF funding will be used to purchase materials, build scaffolds for the animal studies, and obtain animal proof-of-concept by way of using multi-parous pigs with enlarged mammary glands.

Dr Chan Ching Wan
Department of General Surgery (Breast Service)
National University Hospital

Dr Chan Ching Wan is a Consultant in the Department of General Surgery (Breast Service). She qualified from the Univeristy of Edinburgh Medical School in 1995, and became a Fellow of the Royal College of Surgeons of Edinburgh in 1999. She obtained a PhD (University of Bristol) in 2004 and completed her advanced surgical training in 2007.

Following this, she spent a fellowship year in the Nottingham Breast Institute, UK training in oncoplastic breast surgery and reconstruction. Her research interests include breast reconstruction, breast carcinogenesis and metastasis. She would like to set up a national database comprising all breast cancer cases in Singapore, in order to facilitate the monitoring of treatment outcomes and survival in Singapore.

Title of Project: Improvement in Yield of Haemotopoietic Stem Cells (HSCs) via Automation and Optimization of the Umbilical Cord Blood (UCB) Collection Process with Further Stem Cells' Characterization

Project Summary

One of the current limitations for UCB collections lies with the high numbers (up to 30%) of collections with inadequate harvest of UCB volume and hence HSC numbers, and hence not useful for even use in paediatric patients. Moreover, the success of HSC transplantations is directly proportional to the cell dose transplanted. The main goal is to develop an effective UCB collection system to improve the yield (in terms of quality and quantity) of HSCs from the placenta. To enable this system for ready deployment in the hospitals and cord blood banks, the system components and its disposable accessories have to be carefully designed and tested.

Cord blood banks in Singapore have indicated to us that a novel device that complements their collection procedure for incremental harvest of HSC will be greatly desired. In this regard, the deployment of this proposed system, which supports multiple perfusions and minimum human handling, can improve the yield of stem cells from placentas for public cord blood banks (even with those cases with private cord banking). This would create more opportunities for finding the right match for transplantation purposes. The current reported collection methods do not support these novel functions.

In this study, our hypothesis is that more primitive HSCs may be liberated from the placenta using our proposed device, as compared to the current reported collection methods. There should be an increased expression of stem cell markers in the blood collected from the placenta, as the placenta is purportedly a stem cell niche. In this study, there is a need to characterize the primitive stem cells. This phase is critical for storage and transplantation purposes. To the best of our knowledge, such information on the primitive stem cells is not available yet. Further cell characterization and culture related work can thus be initiated from this project.

Dr. Tang Kok-Zuea
Department of Electrical and Computer Engineering
National University of Singapore

Dr. Tang received his B.Eng. (in 1998), M.Eng. (in 2000) and Ph.D. (in 2006) from the National University of Singapore. He is currently a research staff here. His research interests include new control, diagnostic and instrumentation methods for intelligent mechatronics, precision motion systems and biomedical systems, and new methodologies for adaptive neural control for the above mentioned systems.

Title of Project: CDH17 Marker as a Novel Target for Liver and Stomach Cancer Therapies

Project Summary

Liver and stomach cancers are among the most common and lethal malignancies in Singapore, China and Asia. These cancers are often asymptomatic in the early stages and so many patients are diagnosed at the very advanced stages at presentation, for which there are no effective therapies. To address such unmet medical needs, our team has employed cutting-edge genomic and proteomic methods to search for new biomarkers and drugs to target these tumors. CDH17 is a prominent cancer biomarker overexpressed in both cancer types but not in normal adult liver and stomach tissues. RNA interference targeting CDH17 marker is able to inhibit tumor growth and prevent metastasis. Since gene therapies are still experimental, our team is developing antibodies/phage peptides against CDH17 that can be used in biomarker assays to detect cancer earlier, and clinically as therapeutic agent to treat cancer patients. This is a collaborative effort involving dedicated clinicians, scientist and pharmacologist between NUS and NUH, and a potential joint venture with pharmaceutical companies. The ability to detect cancer at its early stage and to deliver targeted drugs to kill cancer cells can save many lives and enhance the quality of life of cancer patients.

Associate Professor John Luk
Department of Surgery and Department of Pharmacology
National University of Singapore

John Luk received B.Sc.(Hon) at Hong Kong University and doctoral degree in Clinical Microbiology at Karolinska in Stockholm. His postdoctoral fellowship was done at Harvard Medical School in Tim Springer's lab on cell adhesion molecules. He was assistant professor at Case Western Reserve University and associate professor at Hong Kong University before joining the National University of Singapore, where he leads a cancer pharmacology program with special focus on targeting the oncogenic signalling pathways in liver and stomach cancers. He received fellowships from EMBO, NATO, and Merck, filed 4 US patents on his discoveries and inventions, and published 130 papers including Cell, Nature Genetics, Gastroenterology, and Hepatology. Dr. Luk has mentored 16 PhD students and 8 postdoctoral fellows, and also appointed as honorary professor or advisor at top universities like Harvard, Peking, and Fudan.

Title of Project: Fluorescent-tagged Antimalarials as Commercial Molecular Probes to Diagnose Drug Resistance and to Study Diseases

Project Summary

A child dies from malaria every 30 seconds in Africa. Globally, this infectious disease claims 1-2 million lives every year, and drives a vicious cycle of disease and poverty in many national economies. It has resurged in the last 2 decades, primarily due to drug resistance. Even artemisinin, our last line of defence against the prime killer, *Plasmodium falciparum*, is starting to fail in the control of the malaria parasite. The debilitating and wide-spread malaria species, *Plasmodium vivax*, which predominates here in Asia, is rapidly developing resistance to chloroquine. Swift, reliable and accurate screening probes that facilitate the characterisation of drug resistance are urgently needed. Current methods to detect and study resistance are laborious, protracted, imprecise and bio-hazardous. We have synthesized a fluorescent-labelled chloroquine molecule with the unique ability to rapidly differentiate drug-sensitive from drug-resistant malaria strains with high specificity and sensitivity. We are also witnessing a global resurgence in the use of chloroquine to treat cancers, autoimmune diseases, viral (HIV, SARS, flu) and bacterial infections. We thus envisage an enormous demand by research and clinical laboratories for tools that allow visualization of chloroquine within cells. Multiple needs and opportunities in the domains of drug resistance detection and chemotherapy are clear. *To meet such growing needs in the pharmaceutical, biotechnological, scientific and clinical sectors, we are developing fluorescent-labelled probes of the antimalarial drug, chloroquine, that will serve as invaluable diagnostic and research tools applied to a wide variety of diseases.*

Dr. Kevin SW TAN
Assistant Professor
Department of Microbiology
National University of Singapore

Dr. Martin J LEAR
Assistant Professor
Department of Chemistry
National University of Singapore

Dr. Kevin Tan pursued his PhD at the Department of Microbiology NUS and his postdoctoral studies at the Laboratory of Molecular Parasitology, The Rockefeller University, under the supervision of Professor George Cross. Upon his return to Singapore in 2003, he began his research on protozoan cell death focusing on PCD pathways in the enteric parasite *Blastocystis* and the malaria parasite *Plasmodium falciparum*. He also administers the national proficiency testing for malaria diagnosis in his capacity as the Director of the National Malaria Reference Centre. He is a member of the Singapore MIT-Alliance for Research and Technology's Interdisciplinary Research Group on Infectious Diseases (SMART IRG ID), and his

project is aimed at investigating the biomechanical aspects of malaria cell death. His other research interests include host-pathogen interactions, molecular mimicry and nanotechnological tools. More details on his research interests can be found at: http://www.med.nus.edu.sg/mbio/staff-k_tan.html

Dr. Martin J. Lear received his PhD in Scotland under the guidance of David J. Robins at the University of Glasgow, UK. During 1995-2000, he won several post-doctoral fellowships (pharmaceutical, JSPS, CREST) and globe-trotted from the UK (Parke-Davis, Cambridge) to France (ISCN-CNRS natural products institute, Gif-sur-Yvette) and Japan (Tohoku University, Sendai). After four years as an Assistant Professor with Masahiro Hirama, he joined the Department of Chemistry and Medicinal Chemistry Program at the National University of Singapore in January 2005. His research interests focus on the chemical synthesis, molecular imaging and manipulation of natural products, glycolipids and drugs in our fight against malaria, tuberculosis, and cancer. For more details see http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/lear.htm

Title of Project: Development of a Novel Bioabsorbable Drug-Eluting Ventilation Tube for Chronic Middle Ear Infection

Project Summary

Otitis media, in which the middle ear traps fluid, is the single most common diagnosis for pediatricians. Annual costs approximate $5 billion for USA alone. In chronic otitis media (COM), problems include chronic hearing loss, language, academic and behavior problems, reduced quality of life, and impaired balance. Ventilation tube (VT) insertion for COM is the most common surgery performed in children by Ear Nose Throat specialists, with 2 million VTs placed in USA alone each year. Current VTs are made of plastic. Problems include clogged tubes, infected tubes, and residual perforation of the ear drum. The duration before the VT self-extrudes is also unpredictable, often resulting in the need for further surgeries for removal or insertion of new tubes under general anaesthesia, with their attendant anesthetic, surgical risks and costs. Post VT, patients need to avoid water getting into the ears whilst bathing or swimming.

This study aims to develop and patent a new ventilation tube for chronic middle ear infection with features to circumvent current problems: 1) **Bioabsorbable** - self absorbing predictably, with reduced clogging, tissue reaction, infection and ear drum perforation; 2) **Drug-eluting** to reduce infections; 3) **One-way flow** mechanism – to allow swimming and bathing without ear plugs; 4) **Easily deployed** in the clinic without general anesthesia.

Associate Professor Lynne Lim, Senior Consultant
Otolaryngology Head Neck Surgery Department
National University Singapore, National University Hospital

Dr Lynne Lim is currently Associate Professor at NUS and Senior Consultant at NUH. She is the Director of the Centre of Hearing Intervention and Language Development at the Ear Nose Throat Department at NUH. She graduated from NUS Medical School in 1992, completed ENT specialisation in 2001, and sub-specialised in Cincinnati, America between 2001-2003 for Pediatric ENT and an NMRC Fellowship for Hearing Research. She completed her Master of Public Health Degree at the Harvard School of Public Health in 2005. Her current research focuses are in hearing loss and restoration, airway and novel biomedical products. This is the 2nd POC project she is working on with her co-PI, Prof Subbu Venkatraman, from NTU, with the 1st being a novel trachea stent.

Title of Project: 3 Dimensional Micro/Nano Structures for Energy Harvesting

Project Summary

This project aims to create higher efficiency solar cells to harvest more of the sun's energy. The project will develop a novel electrode technology with an innovative architecture and nanomaterial morphology. The project will develop a prototype 3-dimensional nano/micro-structured electrode system and incorporate the electrode into a dye sensitized solar cell. The electrode features both nano- and micro-structured components to provide a large surface area and an interconnected network for accelerated electron transport.

Dr Hannah Gardner
Lecturer
School of Engineering Manufacturing
Nanyang Polytechnic

Dr Hannah Gardner has been a lecturer at Nanyang Polytechnic for the last 2 years. She teaches on the Diploma in Nanotechnology and Materials Science course. Her research interests lie in the areas nanostructured materials and their application in photovoltaics. She is currently working on collaborative projects with several Singaporean SMEs and international research organisations.

Before moving to Singapore, Hannah carried out research at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australia. With a background in Chemistry, Hannah holds a MCHEM (Hons) from the University of Sheffield, UK and a PhD in nanotechnology and advanced materials from Cranfield University, UK.

When not working, Hannah enjoys traveling around South East Asia and sampling Singaporean cuisine.

Title of Project: Development of Efficient Methods for the Production of Biodiesel from Grease

Project Summary
Biodiesel refers to a *non*-petroleum-based diesel fuel consisting of short chain alkyl esters and is currently made by transesterification of vegetable oil. Great attention has been focused on the production of biodiesel from cheaper waste feedstock to reduce the cost, utilize the waste, and increase bioenergy capacity. This project aims to develop efficient methods for the production of biodiesel from grease, a low-cost waste collected worldwide in a large amount (e.g. brown grease is collected in Singapore at 800-1000 tons per year). Thus far, the efficient conversion of grease to biodiesel has been a technical challenge due to the high free fatty acid content in grease. This project will tackle the challenge by developing novel and efficient catalysts and catalytic systems such as magnetic nanoparticles-based acid catalysts and dual enzyme systems. The technologies and catalysts developed from the project could be utilized by our industrial collaborator Alpha Synovate for further development of industrial process.

Assoc. Prof. Li Zhi
Department of Chemical & Biomolecular Engineering
National University of Singapore

Dr. Li Zhi has been an associate Professor at Department of Chemical & Biomolecular Engineering, National University of Singapore, since 2006. He received Ph.D. in Organic Chemistry from University of Vienna, Austria in 1991. After doing postdoctoral research at University of Oslo, Norway and ETH Zurich, Switzerland, he begun his independent research in biocatalysis in 1997 at the ETH Institute of Biotechnology and was promoted to a group leader in 1999. His current research focuses on biocatalysis and biotransformation for chemical and pharmaceutical syntheses, synthetic and microbial polymers for medical application, and biofuel production.

Title of Project: **Development of a Highly Energy Efficient Revolving Vane Expander**

Project Summary

The main objective of this project is to achieve energy saving on the global scale by significantly reduce the energy consumption of air-conditioning, refrigeration and heating systems. This is done by recovering energy from the losses occurring during the expansion of the refrigerant at the conventional expansion valve by replacing the valve with an expander. An expander expands the refrigerant slowly and converts the expansion process into useful energy that can be channeled back to the system to reduce energy consumption. For a conventional system, up to 20% of energy saving can be resulted, while for the future systems using natural refrigerant, a significant 40% energy saving can be expected.

Recently, we have invented an expander mechanism that promises to be the most energy efficient of all, namely the Revolving Vane expander. The theoretical results indicate that this new mechanism is capable of achieving a breakthrough level of energy efficiency as compared to the existing expander mechanisms.

The main novelty of the concept is its rotating cylinder feature. All of the existing expander mechanisms use a stationary cylinder which rubs against the moving rotor, which has been found to cause significant friction losses. By having a cylinder that moves together with the rotor, the frictional losses are now almost completely eliminated, resulting in a highly energy efficient expander mechanism. In this project, a prototype expander will be designed, fabricated and tested to prove the working concept experimentally.

Dr Ooi Kim Tiow
School of Mechanical and Aerospace Engineering
Nanyang Technological University, Singapore

Dr Ooi Kim Tiow is an Associate Professor in Thermal and Fluids Division, School of Mechanical & Aerospace Engineering, Nanyang Technological University, Singapore. He obtained BEng (1st Class) and PhD in Mechanical Engineering from University of Strathclyde, Scotland, U.K. in 1986 and 1990. He has been bestowed thrice Teacher of the Year Award, and once The Nanyang Award for Excellence in Teaching. His research interest is in the areas of flow and heat transfer study of refrigeration components and systems, in particular the refrigeration compressor. Detail mathematical simulation and measurement of compressor performance. Microchannel flow and heat transfer. Optimisation design of refrigeration components and systems.

He publishes more than 100 research papers in international conferences and journals and has been invited to be Editorial Board Member, Guest Editor and Reviewer of International Journals. He is an International Advisory Committee Member for IMechE's International Conference on Compressors and Their Systems,

United Kingdom, he is also a Scientific Committee Member in International Conference on compressors and coolants, by International Institute of Refrigeration and Slovak ARAE, Slovakia and the Vice Chairman of Academic Committee for International Compressor Techniques Conference, China. He is the holder of eight patents, a co-author of a book and chapters of encyclopaedias. He is widely consulted by engineering companies both locally and internationally. He is a member of ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers).

Title of Project: High Frequency Graphene Transistors

Project Summary

Typical high frequency transistors are made from Si or more expensive semiconductors such as GaAs or InP. Due to high transit velocity graphene transistors can be 10-100 times faster which will revolutionize the future electronic world. In addition, the transit velocity of charge carriers in graphene is relatively independent of temperature, making it extremely attractive for high frequency and high temperature applications and systems. Moreover, graphene transistors will have low power consumption due to low voltage and the low resistivity of this material. We aim to develop graphene high frequency transistors which are significantly faster, consume less power and cheaper than those made from conventional semiconductors and will be the future dominant RF transistors.

Dr. Yang Hyunsoo
Department of Electrical & Computer Engineering
National University of Singapore

Dr. Yang Hyunsoo is an Assistant Professor at the Department of Electrical and Computer Engineering at the National University of Singapore. He earned his M.S. and Ph.D. degrees in the Electrical Engineering department of Stanford University in 2003 and 2006, respectively. From 1988 he worked at a circuit and system design company, earning a patent award, until 2001, when he enrolled in Stanford's graduate school on a scholarship from the Korean Ministry of Information and Communications. He had been working on long-wavelength photonic devices at Stanford University. From 2004 to 2007 he had been at IBM-Stanford Spintronic Science and Applications Center. He was awarded the fellowship in the conference on Magnetism and Magnetic Materials for 2005 and the American Physical Society (GMAG) outstanding dissertation award for 2006. His recent research focuses on the spintronics, carbon electronics, and solar cells.

Title of Project: Creating A Comprehensive Lexical Index of Documents from the World Wide Web (WWW)

Project Summary
We propose to implement the infrastructure necessary to create a database which acts as a lexical index to World Wide Web (WWW) documents and is amenable for extensive semantic analysis. Such an infrastructure consists of two artifacts: (a) a massively parallel crawler capable of efficient on-the-fly lexical analysis of web documents, and (b) a petabyte-scale database system where the crawler writes its output. Our proposed index, as elaborated in the proposal, is lexically and semantically richer that the indexes used by search engines such as Google. It is also required that the logical and physical design properties of the index database allow for simultaneous fast inserts and real-time retrievals.

Dr Anindya Datta
School of Computing
National University of Singapore

Anindya Datta, a highly regarded scientist and technological innovator, has a sustained track record of scientific discovery followed by commercialization of these discoveries though successful ventures introducing disruptive innovations. As a scientist, Anindya is widely recognized as having contributed fundamentally to a few of the key ideas in the areas of databases and the internet. In database systems, Anindya's work has been directly responsible for the creation of an important class of index structures widely available in commercial DBMSs. In the internet space he invented & holds the patent on component-oriented caching and application layer object storage, which are now recognized as core functionalities of any object-oriented application and widely implemented in dynamic web applications. He has published extensively in journals and conferences with over 60 papers to his credit. His papers on internet caching are among the highest cited body of work in that area. Anindya also has a consistent track record of taking his research to the marketplace via highly successful start-up ventures. His work on caching and object storage was commercialized in a venture called *Chutney*, which he ran and eventually exited via an acquisition by Cisco Systems. His recent work has been in the search domain and some of this work is being commercialized by a venture called *Wordster*, regarded as a high-potential Web 2.0 company. Anindya's undergraduate and graduate degrees are from the Indian Institute of Technology (Kharagpur), and University of Maryland (College Park), respectively. Anindya is currently on the faculty of the School of Computing at the National University of Singapore. In the past he has been on the faculty of the University of Arizona, and Georgia Institute of Technology.

Annex C

PROOF-OF-CONCEPT GRANT SCHEME

There are two parts to the POC scheme, both funded by the National Research Foundation. The NRF and SPRING Singapore administer the POC scheme, each addressing a different target group. The NRF administers the POC grant for IHL-linked researchers. SPRING Singapore administers the POC grant for Singapore based SMEs and individuals in the public sector research institutes under its TECS (Technology Enterprise Commercialisation Scheme).

	NRF POC	TECS POC
Funding quantum	Up to S$250,000 per project	
Eligibility for application	• Researchers linked to IHLs	• SMEs incorporated and operating in Singapore • Researchers in public sector research institutions
Frequency of calls	Half-yearly	
Technology areas	All areas of science and technology	The following specific areas: • Electronics, Photonics & Device Technologies • Chemicals, Advanced Materials & Micro/ Nanotechnology • Information and Communications Technology (excluding Interactive Digital Media) • Biomedical Sciences (Excluding Biotechnology)
Evaluation process	• Researchers submit proposals through the technology licensing offices of their IHLs, which will evaluate the technical feasibility and novelty of projects and forward a shortlist to the NRF • An NRF Evaluation Panel will evaluate shortlisted projects and recommend awards based on commercial viability considerations	• Submitted proposals are evaluated by the respective technical panels for technical merit and feasibility • Proposals shortlisted by the technical panels will be evaluated for commercial merit and recommended for funding by a POC Grant Panel

Annex D

List of all awarded POC proposals in the 1st and 2nd call

S/N	Awarded Proposals	PI	Institute of Higher Learning
1.	A Hand-Held Digital Lensless Microscope System for MEMS and Micro-Device Inspection and Characterisation	Professor Anand ASUNDI	Nanyang Technological University
2.	Flexible Pressure Sensors Using Area-Array Nanocomposites	Dr Zuruzi ABU SAMAH	Nanyang Polytechnic
3.	Redesign of SEMs for Parallel Energy Detection	Professor Anjam KHURSHEED	National University of Singapore
4.	DISH: Enabling Cooperative Multi-Channel Communication for Wireless Ad Hoc Networks	Prof Mehul MOTANI	National University of Singapore
5.	Creating, Viewing, Publishing, and Sharing Stereoscopic Images/Videos at Anytime Anywhere	Dr Steven ZHOU	National University of Singapore
6.	An Ultra Low-Power RF Transceiver Chip Towards a New Paradigm of Life Quality	Professor YEO Kiat Seng	Nanyang Technological University
7.	Ultra-Low Cost Bead-Based Microarrays for Biomolecular Diagnostics	Professor Dieter TRAU	National University of Singapore
8.	Novel, Less Invasive Mitral Valve Implantation Method Involving a Bayonet Insertion and Release Mechanism	Professor Theodoros KOFIDIS	National University of Singapore
9.	Multi-Layered Surgical Prosthesis with Drug-Releasing Biodegradable Coating for Hernia Repair	Professor Freddy BOEY	Nanyang Technological University
10.	A Human Monoclonal Biotherapeutic to Target the Dengue NS3 Protein	Dr Subhash Vasudevan	Duke-NUS Graduate Medical School
11.	A Semantics-based and Service-oriented Framework for the Virtualization of Sensor Networks	Dr Lim Hock Beng	Nanyang Technological University
12.	Low Cost High Performance Anti Reflective Coating based on Sinanocrystals Embedded in SiO2 Film	Eunice Goh Shing Mei	Nanyang Technological University
13.	New Grid Array Antennas and their Integration Method for an Innovative Solution to 60-GHz Radio Devices	Dr Zhang Yue Ping	Nanyang Technological University

14.	Development and Demonstration of Silicon Carbide (SiC) Based Power Electric Converter for Motor-Generator Control in Hybrid Electric Vehicles	Dr Tseng King Jet	Nanyang Technological University
15.	High Efficiency Electrogenerated Chemiluminescence with Colloidal Quantum Dot Emitters in Ultrathin Cells for Display Applications	Dr Sun Xiaowei	Nanyang Technological University
16.	Photonic MEMS (Microelectromechanical Systems) Tunable Laser	Associate Professor Liu Ai Qun	Nanyang Technological University
17.	Spin Wave Based Nondestructive Semiconductor Testing Tools	Dr Yang Hyunsoo	National University of Singapore
18.	Single-coil Superconducting Miniundulator – The Next Step Towards High-Brilliance Synchrotron Radiation	Prof Herbert O. Moser	National University of Singapore
19.	New Compact, Fast, Parallel-processing Fourier-transform Interferometer (FPP FTIR) Enabling Short-pulse Spectroscopy	Prof Herbert O. Moser	National University of Singapore
20.	Development of a New and Precise Alignment System for Micromanipulation	Prof Tan Kok Kiong	National University of Singapore
21.	A New Endoluminal Device for Duodenal Exclusion in Treatment of Type 2 Diabetes Mellitis and Obesity	Dr Jimmy So	National University Hospital & NUS Yong Loo Lin School of Medicine
22.	Anti-inflammatory peptide loaded micro emulsion gel formulation as potential therapeutic for post-operative adhesion	Prof Gopalakrishnakone	NUS Yong Loo Lin School of Medicine
23.	Processing Full Range of Waste Grease into Renewable Energy	Song Sin Nee	Republic Polytechnic
24.	Hedge Funds and Structured Products Advisors (HedgeSPA.com)	Dr Bernard Lee	Singapore Management University
25.	Development of a Hand-held Solid Dispenser Using a Motor-Driven Auger	Dr Ken Lee	Singapore Polytechnic

POC 1 awardees: 1-9
POC 2 awardees: 10-25