

# @NTU

ISSUE 71 MAY/JUN 2008

# LET THERE BE LIGHT

New visions of research at NTU

Attracting the best

Learning through  
empowerment

The creator of  
virtual worlds

## Road to discovery

Senior professors on teaching  
and research excellence



# Attracting the Best

A pioneering group of faculty members looks set to make its mark at NTU via the **Nanyang Assistant Professorship** scheme and the **National Research Foundation (NRF) Fellowship**.

BY JEAN QINGWEN LOO

**A** pioneering group of international researchers looks set to bring new ideas to an already vibrant research community. In 2007, NTU launched the Nanyang Assistant Professorship initiative to nurture outstanding faculty members in engineering, science, business and the humanities. Besides providing a grant of \$1 million over three years to fund cutting-edge work, this rigorous programme will enhance the university's next wave of cross-disciplinary projects.

According to NTU's Research Support Office, the initiative has received an excellent response from a global pool of candidates – a testament to the university's strengths as a centre of research. The initial call garnered more than 300 applications from leading universities across North America, Europe and Asia.

In 2008, Singapore's research scene got another boost with the awarding of the inaugural NRF Fellowships. This comprehensive programme brings exceptional scientists to Singapore for independent research, with grants of up to US\$1.5 million over a three-year period. NRF Fellows will also comprise the nucleus for research groups of the future.

For those looking to join a premier research university on the move, the time has never been better. We caught up with several of the Nanyang Assistant Professorship recipients and NRF Fellows to learn more about their work and plans for the future.

## ■ NANYANG ASSISTANT PROFESSORSHIP

A supportive environment in which to expand the frontiers of research



PHOTO: AJAI VYAS

**Dr Ajai Vyas**

School of Biological Sciences

Research area: Neurobiology

**AS A RESEARCHER** in the neurobiological field of fatal attractions, much of Dr Ajai Vyas' work is centred on the parasitic protozoa *Toxoplasma gondii*, which can invade a rodent's brain and remove deep-seated fears from its psyche.

Using the example of a cat eating a rat that has been infected with *Toxoplasma*, Dr Vyas explains that: "In this way, the parasite manages to enter the cat's intestines and to reproduce there." According to Dr Vyas, this paradigm allows us to understand how fear is generated in the first place, and how we may reduce it: "This is important because many psychiatric disorders are characterised by an abnormally high amount of fear," he says.

*Toxoplasma* also infects humans with remarkable frequency, and its effects range from mild personality changes to schizophrenia. After having conducted his research at Stanford University in California for the past four years, Dr Vyas has recently been accepted into the Nanyang Assistant Professorship programme.

"I think one of the most attractive aspects for me in coming to NTU has been the motivated and talented faculty members here," he says. "Their expertise is complementary to my professional needs, and their enthusiasm very high."

As for his goals at NTU's School of Biological Sciences, Dr Vyas hopes to embark on a research programme that will be productive and also broaden the imagination of students. "Working at a university like NTU brings together exciting aspects of both teaching and research," he explains. "It is the best of both worlds, with opportunities that are not readily available at those institutes that are only geared towards research."

**DR FAN HONGJIN'S** research pursuits first brought him to Singapore seven years ago as a PhD student. So it will be a homecoming of sorts when he returns from Cambridge University in July to join NTU's School of Physical & Mathematical Sciences.

"I have many unforgettable memories of Singapore from my time here," says Dr Fan, "and my family is also looking forward to coming here after having stayed in Europe."

In his work at the Max Planck Institute in Leipzig and Cambridge University, Dr Fan has been successful in fabricating large-scale ordered nanowire arrays to investigate their properties. He is enthusiastic about semiconductor nanowires and nanotubes and their future role in applications like memory components and energy conversion devices.

Coming to NTU holds many attractions for Dr Fan. "I visited the university earlier this year and was impressed by the facilities and achievements of the advanced laboratories here and at the Research TechnoPlaza," he says. "NTU has everything I can think of to help in my research."

Among Dr Fan's priorities will be cross-disciplinary collaborations with researchers of different specialisations. "This is essential as we may not know as much about other fields in the fast-changing world of science," he says.

As a member of NTU's first group of Nanyang Assistant Professorship recipients, Dr Fan feels especially honoured and wants to improve his research and teaching at the university. "By combining the latest technologies and working with an international network of researchers," he explains, "I hope to establish a world-class group here that can push nanomaterials out of the laboratory to benefit society."



PHOTO: FAN HONGJIN

**Dr Fan Hongjin**

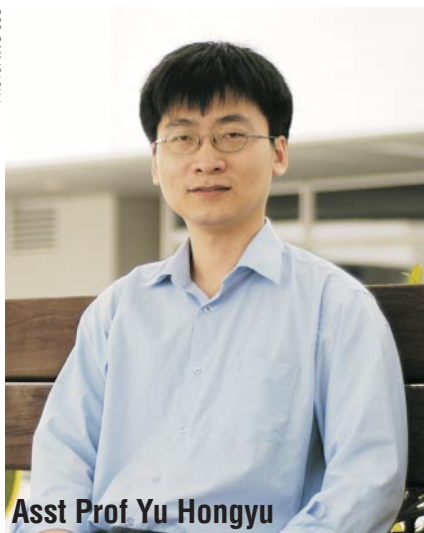
**School of Physical & Mathematical Sciences**

**Research area: Nanomaterials**

NTU has everything I can think of to help in my research.

We hope to contribute to the study of silicon-based devices, which will play a strategic role in Singapore's economic growth.

PHOTO: NTU CCO



**Asst Prof Yu Hongyu**

**School of Electrical & Electronic Engineering**

**Research area: Microelectronics**

**SINCE JOINING NTU** in February this year, Asst Prof Yu Hongyu has been busy teaching about semiconductor device physics and further pursuing his research.

Asst Prof Yu's interest lies in the field of silicon-based nanoscale electronic devices, with applications in CMOS chips, non-volatile memory, solar cells and photonic fields. He has previously worked at the IMEC in Belgium, one of Europe's leading research centres in the field of microelectronics and nanoelectronics.

During his four years there as a senior researcher, Asst Prof Yu worked on industrial issues, collaborating with leading global semiconductor manufacturers such as Texas Instruments and Panasonic. He has also been active in pursuing patents that have come out of this research.

Asst Prof Yu chose to come to NTU for its supportive research environment. "Not only do the excellent facilities here give me a solid foundation to carry out my work, I also get to teach others through my research projects," he says. "In this way, we hope to contribute to the study of silicon-based devices, which will play a strategic role in Singapore's economic growth."

## NATIONAL RESEARCH FOUNDATION FELLOWSHIP

International talents, groundbreaking discoveries

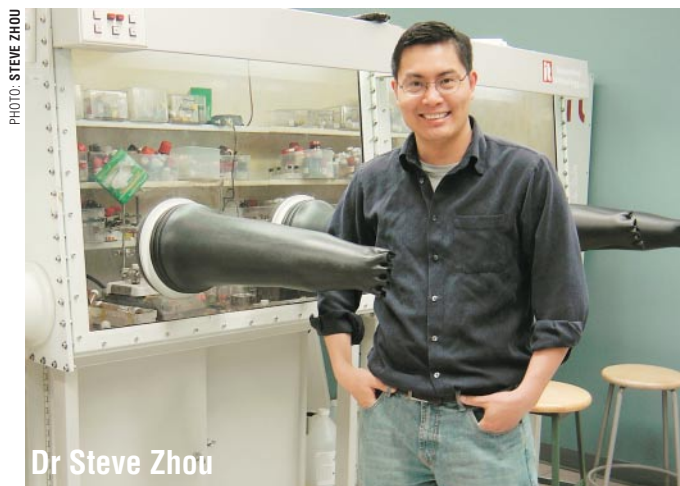


PHOTO: STEVE ZHOU

Dr Steve Zhou

School of Physical & Mathematical Sciences

Research area: Organic synthesis and asymmetric catalysis

WITH EXTENSIVE TRAINING in asymmetric synthesis and method development, Dr Steve Zhou is looking forward to joining NTU in August.

“NTU’s chemistry division is new and I feel that I can make a contribution to its growth,” says Dr Zhou. “And of course, the tremendous support from the government is another key factor in my coming to Singapore.”

Dr Zhou is among 10 young scientists who received the inaugural NRF Fellowship this year. This will allow him to build up his research group quickly. After receiving his PhD at the Massachusetts Institute of Technology in 2005, Dr Zhou underwent post-doctoral training at Yale University and the University of Illinois at Urbana-Champaign. His achievements include the development of new cross-coupling reactions of alkyl halides and the discovery of asymmetric, intermolecular hydroaminations of aliphatic olefins, both of which were considered to be great challenges in organic chemistry.

Dr Zhou’s research interests include discovery and development of industrially important reactions and related mechanistic studies. “I am really excited about starting my independent research career in Singapore soon,” he says. “I hope my group can quickly establish a reputation in the international arena.”



PHOTO: CHRISTOS PANAGOPOULOS

Dr Christos Panagopoulos

School of Physical & Mathematical Sciences

Research area: Solid state physics

FOR DR CHRISTOS PANAGOPOULOS, the beauty of science lies in the simple explanations that it can give to complicated observations.

Dr Panagopoulos’ research is driven by innovations in materials science and engineering, and concerns the understanding of local structures and associated electronic states in functional materials. “The intense global interest in this field makes it a frontline field of research,” he says.

Having received his PhD from Cambridge University, Dr Panagopoulos has a list of accomplishments to his name – besides being the group leader of a European Excellence Team, he has served as a visiting professor

or scientist at institutions such as the Chinese Academy of Sciences, the Foundation of Research and Technology Hellas, and the Universities of British Columbia, Crete, Tohoku and Kyoto. His research honours also include the European Young Investigators Award, the European Excellence Grant and his election as Research Fellow of Trinity College, Cambridge, and University Research Fellow of the Royal Society.

As an NRF Fellow, Dr Panagopoulos’ goal is to establish a laboratory of fundamental interest and technological relevance, one that can cross the disciplinary boundaries of science. He believes the Fellowship will make a major difference to his efforts, providing, “the seed for the creation of a laboratory that can attract and produce the finest”.

Dr Panagopoulos’ group will study materials driven by the prospect of controlling charges and spins by applied magnetic fields, voltages, pressure and chemical doping, using this to build new miniaturised, multi-functional devices. He also wants to create a place where researchers and students can

share knowledge and skills from various fields. “This versatility creates scientists who are driven by curiosity and who are capable of addressing problems in condensed matter physics,” he says.

And the basis for this remains strong institutional support. “To have the fruits of one’s efforts reach the public, we need a long-term commitment to basic science and technology,” he explains. “I believe Singapore has all the necessary ingredients to make this happen. The fun is about to begin!”

To have the fruits of one’s efforts reach the public, we need a long-term commitment to basic science and technology.



**Dr Hong Soon Hyeok**

**School of Physical & Mathematical Sciences**

**Research area: Organometallic and organic chemistry**

AS ENVIRONMENTAL ISSUES continue to dominate the headlines, Dr Hong Soon Hyeok's long-term research goal is to develop dream catalysts that can serve as a solution to these urgent problems. He specialises in the field of olefin metathesis, which provides efficient and environmentally-friendly approaches to organic and materials chemistry.

Dr Hong completed his PhD at Caltech in 2007 and has received awards such as the Outstanding Student Award at Seoul National University, the Rotary Foundation Ambassador Scholarship and the Kwanjeong Educational Foundation Fellowship. His research contributions include developing industrial processes that suppress side reactions, as well as highly active water-soluble catalysts.

Dr Hong will be coming to NTU in September as an NRF Fellow; a privilege, he believes. "It is exciting to be able to plan my independent research at the university with such wonderful support," he says.

Dr Hong's laboratory will focus on developing efficient and green catalysts, as well as the synthesis of fine chemicals from renewable sources and its application to materials and biological chemistry. "NTU's dynamism is very attractive, and its laboratories will be fantastic to work in," he says. "I look forward to building a constructive relationship with my students from around the world, and to forming a world-leading research group and competitive educational programme."

## Dr Eugene Makeyev

**School of Biological Sciences**

**Research area: Post-transcriptional RNA-based processes**

HAVING ARRIVED in early June at NTU's School of Biological Sciences (SBS), Dr Eugene Makeyev is eager to start work at his research home. "I like the fact that SBS has faculty members and students from diverse cultural and scientific backgrounds," he says. "The school also boasts amazing research facilities that rival those of the best research institutions."

Dr Makeyev received his PhD in 2001 from the University of Helsinki. His awards and fellowships include the Leukemia and Lymphoma Society Post-doctoral Fellowship, the Academia Europaea Prize for Young Scientists, the Russian State Prize, the Graduate Fellowship for International Students (from the Centre for International Mobility in Finland) and the Helsinki Biocenter Prize (for the best PhD thesis).

Dr Makeyev's research interest lies in understanding the significance of post-transcriptional RNA-based processes for cell differentiation, particularly in neuronal differentiation. During his post-doctoral studies at Harvard University, he identified a link between these two pathways by showing that a brain-specific microRNA called miR-124 reduces the levels of a

protein inhibitor of alternative splicing called PTBP1.

It was an honour to have received the NRF Fellowship, says Dr Makeyev. "Many scientists who are just beginning independent careers in research have to spend a lot of time and energy raising funds for their newly established laboratories," he explains. "What the NRF grant provides is a unique opportunity to immediately focus on research rather than administrative issues."

During his time here, Dr Makeyev wants to develop a strong research programme that is focused on gene expression regulation in the nervous system. "I hope to expand our understanding of the mechanisms underlying nervous system development," he says, "and to contribute to developing novel biomedical technologies that can be applied to the treatment of neurodegenerative diseases and cancer."

Keen to take on the challenges, Dr Makeyev says: "SBS reflects what Singapore is trying to achieve in the field of life sciences, which is to create a globally competitive research environment that can make a difference in medicine and biotechnology. I am up for one of the most exciting experiences of my life." ■



I like the fact that SBS has faculty members and students from diverse cultural and scientific backgrounds.