

New centre explores atomically thin materials

NUS has established the Centre for Advanced 2D Materials to study and develop applications for materials that are atomically thin with a S\$50-million grant from the National Research Foundation (NRF). The Centre builds on the success of the Graphene Research Centre (GRC), which will have its activities folded into the new Centre.

"NUS has established a high reputation in this area. We want to stay ahead and expand the scope, and the investment from NRF is allowing us to do it," explained NUS Deputy President (Research and Technology) Professor Barry Halliwell.

One of the Centre's roles is to engage the industry and spin off more companies. At the same time, it will develop the fundamental science and technology behind 2D materials such as the synthesis of high-quality crystalline

materials, characterisation with latest experimental techniques, and the design and development of disruptive advanced devices. The work of the new Centre will have direct impact in several high-tech industrial sectors that are fundamental to Singapore's economy such as energy, water, sensors, electronics and data storage.

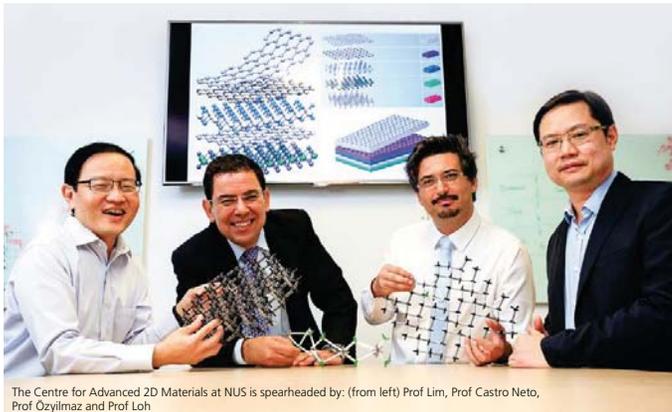
"What we hope to do is to reduce the time between the discovery of a new material and its application," said the Centre's Director Professor Antonio Castro Neto, who explained that it takes, on average, 20 to 30 years from the discovery of a new material before it has industrial impact.

Prof Castro Neto, who was the GRC's Director, will assume directorship of the new Centre. Activities at the Centre will fall under the

following areas: graphene; 2D materials beyond graphene; devices based on 2D materials; theory and simulations; and entrepreneurship, innovation and industrial development. Physics Professor Barbaros Özyilmaz, Chemistry Professor Loh Kian Ping and Biomedical Engineering Professor Lim Chwee Teck will be leading the first three areas, respectively.

A defining feature of this Centre will be the interdisciplinary collaboration between about 100 scientists and engineers to produce translational research.

The Centre's Scientific and Industrial Advisory Board features world-renowned researchers such as Professor Andre Geim and Professor Kostya Novoselov, who were awarded the 2010 Nobel Prize in Physics for graphene; and Professor Albert Fert, who was awarded the 2007 Nobel Prize in Physics for giant magnetoresistance.



The Centre for Advanced 2D Materials at NUS is spearheaded by: (from left) Prof Lim, Prof Castro Neto, Prof Özyilmaz and Prof Loh

Darwin's nautical library sails online

Charles Darwin made his landmark scientific expedition around the world on HMS *Beagle*



When Charles Darwin made his landmark expedition around the world on HMS *Beagle* in the 1830s, he was accompanied by the ship's onboard research library. However, the library was dispersed after the famous voyage and remained lost for 180 years.

Now a NUS historian has electronically recreated the rare treasure trove in its entirety and made it freely available online. Dr John van Wyhe, a Senior Lecturer from the University's Departments of History and Biological Sciences, led the project to reconstruct the library that the eminent naturalist used during his momentous expedition between 1831 and 1836.

Dr van Wyhe, who has published nine books and many articles on Darwin, Alfred Russel Wallace and the history of science, said: "The *Beagle* library reveals the sources

and inspirations that Darwin read day after day as he swung in his hammock during long sea crossings, or as he worked on his specimens at the chart table or under the microscope. For a long time this was lost to us, but this reconstructed library gives us an unprecedented insight into the



Dr van Wyhe reconstructed the *Beagle* library, which is now available online

journey that changed science and our understanding of the world."

A big part of the original *Beagle* library covered books on travel, voyages and natural history. It also included books on geology, history, literature, as well as atlases and nautical maps.

Dr van Wyhe and his assistant Dr Kees Rookmaaker managed to rebuild the library after much painstaking historical investigation, piecing together clues and information from Darwin's notes and other sources. The online *Beagle* library comprises 404 volumes with more than 195,000 pages displaying over 5,000 illustrations. At least a third is in foreign languages such as French, Spanish, German, Latin and Greek.

The *Beagle* library can now be viewed and accessed at the Darwin Online website (<http://darwin-online.org.uk>), of which Dr van Wyhe is the Founder and Director.

Earlier heart failure in Asians

Asians are more vulnerable to heart failure than their Western counterparts, suffering from the condition at least 10 years earlier.

According to preliminary results of a multinational research led by NUS, the average age of Asian patients with heart failure is 60 years, compared to patients from other studies in the US (72 years), and in Europe (70 years). This study, the first such investigation in Asia, examined heart failure patients from 11 Asian regions including China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand.

Data from the first 2,094 heart failure patients enrolled in the first year of study also showed a very high rate of diabetes and hypertension among subjects in Singapore and Malaysia. The figures are almost 60 per cent and 50 per cent of the patients in the two nations, respectively, in contrast to only 33 per cent in Europe.

Principal investigator of the study, NUS Yong Loo Lin School of Medicine Associate Professor Carolyn Lam, shared these findings at the European Society of Cardiology Heart Failure Congress in Athens, Greece earlier this year.

Assoc Prof Lam, who is also a Consultant at the National University Heart Centre, Singapore, said: "The frightening finding is that heart failure, which is a highly morbid and deadly condition, affects Asian patients at a much younger age than in Western countries. We need to recognise that Asian characteristics can be different from those of Western counterparts, and within Asia itself there is tremendous diversity in disease characteristics." She highlighted that the information gained has important implications for risk factor control, and treatment for the prevention of heart failure.

Heart failure is a major global public health issue. The growing prevalence of cardiovascular disease, which progresses to chronic heart failure in surviving patients, places a heavy burden on many countries. The World Health Organization has projected that Asia is experiencing the largest increases in cardiovascular disease due to rapidly rising rates of smoking, obesity, lipids in the blood and diabetes.

The NUS study will provide an understanding on what causes the deaths of Asian patients with heart failure and if some of these could be prevented. The long-term objective is to improve outcomes for such patients in the region.