CHAIRMAN'S MESSAGE

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Professor Tan Eng Chye
President, National University of Singapore

2024 AT A GLANCE

RESEARCH FUNDING
SGD **2.5 MILLION** (RMB 13 million)

STARTUPS INCUBATED
17

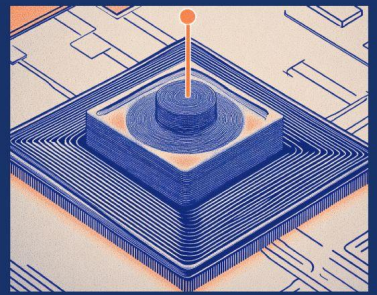
45 PATENT APPLICATIONS

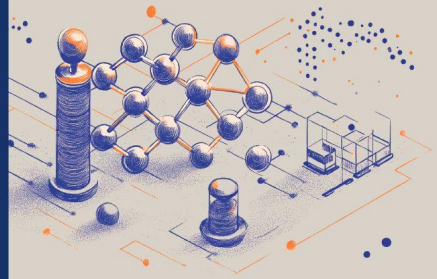
PAPERS PUBLISHED IN INTERNATIONAL JOURNALS
565

Pg 02-03_Chairman Message

At Fuzhou RI, **Dr Gou Jian**, together with his colleagues, discovered ferroelectricity in a new single-element material known as two-dimensional black phosphorus-like bismuth. Dr Gou, who is the lead author of the paper published in the journal ***Nature***, observed an inversion symmetry-breaking structure in the bismuth monolayer, demonstrating charge redistribution and buckling at the atomic level. This finding is significant because it shows that ionic polarisation is possible within a single-element substance, turning on its head the conventional wisdom that ferroelectricity requires compounds composed of cations and anions.

The team's breakthrough has far-reaching implications, particularly for the development of non-volatile memory devices and electronic sensors. The ability to induce and manipulate electric polarisation in a single-element layer brings new opportunities for integrating ferroelectric properties into nanoscale devices — catalysing future advances in electronics and materials science.



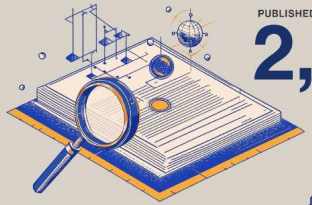


Understanding how catalysts behave during chemical reactions is key to improving their efficiency. One major facet is dynamic reconstruction — a process where catalysts undergo structural changes while expediting reactions. This often enhances catalytic performance. However, how defects or minor flaws in the catalyst structure influence this reconstruction has remained unclear until now.

Dr Zhang Rongrong and her colleagues at Fuzhou RI unravelled the mechanisms through which cobalt oxide catalysts undergo reconstruction during the oxygen evolution reaction (OER), the oxygen-generating process in water splitting. They found that oxygen and cobalt vacancies play distinct roles during the reconstruction process. In particular, oxygen defects promote stronger *OH adsorption, driving structural changes, while cobalt vacancies facilitate dehydrogenation, which puts the brakes on the rate of reconstruction. Interestingly, both defect types lead to the formation of highly active bridge Co sites, with cobalt-defected catalysts showing the best OER performance.

Dr Zhang's work, published in the ***Journal of the American Chemical Society***, highlights the potential of tailoring defect types to control catalyst reconstruction, introducing a new approach to designing efficient electrocatalysts for energy-related applications.

OVER THE YEARS, NUSRI CHINA HAS...



PUBLISHED
2,758
PAPERS
IN INTERNATIONAL JOURNALS

APPLIED FOR
236
PATENTS

*All figures are cumulative as at December 2024

Pg 20-21_Trailblazing Research to Shape a Better Future

GROWING THE SEEDS OF TALENT AND ENTREPRENEURSHIP

In producing the next generation of creators and innovators, cultivating talent and fostering entrepreneurship are essential. At NUSRI China, this remains our focus as we aim to create a positive impact on society through the talent and enterprises we nurture.

OVER THE YEARS, NUSRI CHINA HAS...

ENROLLED

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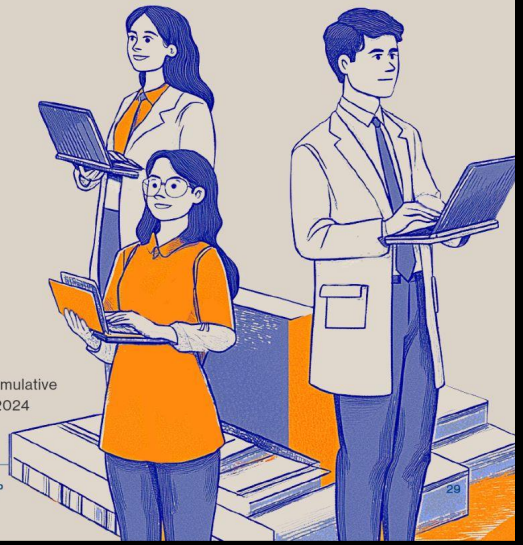
STUDENTS

IN THE

"3+1+1"

JOINT PROGRAMME AND NUSRI-AFFILIATED PHD PROGRAMME.



*All figures are cumulative as of December 2024

Pg 28-29_Growing the Seeds of Talent and Entrepreneurship

NUS-GRTII-affiliated PhD Scholarship

4 For a four-year programme based in NUS, Singapore

40 scholarships available every year, including 2024

Sponsored by the China-Singapore Guangzhou Knowledge City Administrative Committee

Scholars will conduct research based on the China-Singapore Guangzhou Knowledge City's strategic areas:

- Smart City
- Information and Communication
- Electronic Science and Technology
- Advanced Manufacturing
- Artificial Intelligence
- Biomedical Technology
- Financial Technology

Scholars are required to fulfil a two-year service obligation in Huangpu District of Guangzhou City upon graduation

The first scholarship programme information session was held on 24 May 2024 at the Zhongxin Guangzhou Intellectual City, Huangpu District

A welcome session for the first batch of students was held on 12 August 2024

In June 2024, 54 NUS students went on a Study Trips for Engagement and EnRichment (STEER) trip to Chongqing and Chengdu, jointly organised by NUSRI Chongqing and the NUS Global Relations Office. The two-week programme was led by Emeritus Professor Seah Kar Heng and Associate Professor Loh Wai Lam, both from the College of Design and Engineering, NUS.

STEER programmes are designed to expose students to the diverse sociocultural environments of emerging regions through a mix of thematic classroom-based learning, experiential site visits and immersive interactions with various local communities.

The STEER Chongqing and Chengdu trip yielded a unique experience where classroom learning was complemented by outdoor and cultural exposure.

Renewable energy was the theme of this trip. Ten classroom sessions held at NUSRI Chongqing gave the students an understanding of the socio-cultural-economic context of renewable energy and its evolving role in China and other countries. In particular, students gained insights into the challenges of weaning the world off oil and gas, even as renewables such as solar, hydro and wind power take up an increasingly larger share of the energy market. They also had the opportunity to visit HG Group, a leading photovoltaic (PV) cell manufacturer in China, where they witnessed the

In addition to classroom sessions, students also embraced experiential learning through industry visits to companies such as the HG Group, a leading photovoltaic (PV) cell manufacturer in China.

production of PV cells, learnt about how discarded solar panels are recycled and interacted with scientists working on the latest and greatest solar technologies.

The trip was also a treat for the students' senses. They enjoyed various activities from a Sichuan hotpot feast and a live opera performance to a visit to Chengdu's *Dujiangyan* Panda Valley and the ancient *Dujiangyan* irrigation system, where they stood in awe of the engineering marvel built around 256 BC as an irrigation and flood control project.

NUS students posing for a group photo with performers from the Chongqing Sichuan Opera Theatre, after watching their thrilling Sichuan opera performance.

Pg 32-33_Growing the Seeds of Talent and Entrepreneurship

NUS Graduate Research Innovation Programme (GRIP)

A programme that enables researchers and postgraduate students to transform research into deep technology startups

AREAS OF FOCUS:

- Advanced manufacturing
- Agrifood
- Sustainability
- Health & biomed

TRACK RECORD SINCE 2018:

12 Runs | **167** Teams

504 Participants

99 Spinoffs

$64m+ external funding raised

BACK TO CONTENTS

Suzhou Liloss Biotechnology Co., Ltd. is another startup cooking up its success story with the support of BLOCK71 Suzhou — making waves in the health and wellness space.

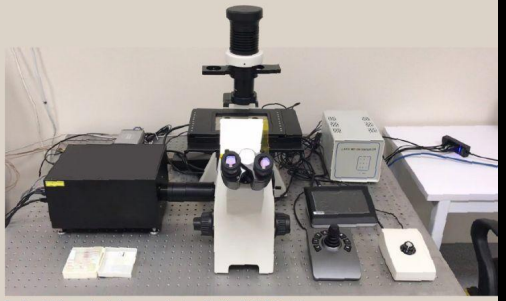
Founded in Singapore in 2022, Liloss specialises in natural health supplements derived from fruits and vegetables. The minds behind the startup developed a sweet potato resin glycoside with anti-obesity properties — an innovation that earned them a slice of NUS GRIP's (Run 7) seed funding. Since joining BLOCK71 Suzhou this year, Liloss has gained access to office space, research facilities and business connections that have fuelled their entry into the Chinese market.

Liloss offers a high-quality sweet potato extract that addresses consumer concerns about the safety of weight-loss supplements. This naturally-derived ingredient helps regulate lipid digestion and reduce calorie absorption — letting consumers have their cake and eat it too. Produced on a pilot scale in China, the extract is already gaining traction in both China and Singapore, supported by positive user feedback and promising animal test results. With the backing of BLOCK71 Suzhou, Liloss is now refining its supply chain and expanding its footprint in China.

Founded by NUS alumni with a mission to supercharge robotics, **Vilota** is a startup at NUSRI Chongqing (BLOCK71) that specialises in visual positioning systems (VPS). Responding to the growing need for precise localisation in complex environments like drone navigation and warehouse optimisation, Vilota's VPS combines computer vision and deep neural network algorithms to provide pseudo-GPS positioning.

Incubated under NUS GRIP in 2021, Vilota's technology excels where traditional global navigation satellite systems fall short, such as indoors and underground. The startup's VPS integrates object recognition, visual-inertial odometry and depth sensing to ensure accurate positioning and autonomous navigation. Its flagship product, Depth Pilot 180, offers precise localisation in obstacle-laden settings — boosting efficiency and safety across sectors like mining, construction, robotics and mobility.

Among the first batch of startups incubated at NUS GRTII (BLOCK71), **MicroVeNUS Pte. Ltd.** specialises in developing advanced optical imaging technologies, including super-resolution confocal microscopes and light sheet microscopes. Founded in March 2024 by Professor Chen Nanguang from the Department of Biomedical Engineering, College of Design and Engineering, NUS, the startup zooms in on the demanding needs of life sciences and medical research. It offers superior imaging solutions that measure up to international standards while maintaining competitive pricing and providing the advantage of local service support.
It has since successfully developed several prototypes with independent intellectual property rights.



Focal modulation confocal microscope developed by MicroVeNUS Pte. Ltd.

Pg 36-37_Growing the Seeds of Talent and Entrepreneurship