SINO-SINGAPORE INTERNATIONAL JOINT RESEARCH INSTITUTE

中新国际联合研究院

Annual Report | 年报 2018

中国 / 新加坡

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中新国际联合研究院是由中国国家主席习近平和新加坡总理李显龙见证签署的两国间的重大科技合作项目。 研究院是由中新广州知识城管理委员会、华南理工大学、南洋理工大学、中新广州知识城投资开发有限公司共同建设，依托中新广州知识城，是汇聚世界一流研发资源的重大国际科技合作平台。

2015 年 11 月 6 日 , 在中新建交 25 周年之际，应新加坡共和国时任总统陈庆炎邀请，中国国家主席习近平对新加坡进行国事访问。作为此次国事访问的重要事项之一，11 月 7 日，在习近平总书记和新加坡总理李显龙的见证下，中新广州知识城管理委员会、华南理工大学、南洋理工大学、中新广州知识城投资开发有限公司在新加坡总统府签署了成立中新国际联合研究院的协议，这是习近平担任中国党和国家最高领导人以来首次访问新加坡，本项协议也是此次中新两国签署的系列合作协议中唯一一项高等学校科技创新国际合作项目，具有里程碑式的重要意义。

Witnessed by the Chinese President Xi Jinping and Singapore's Prime Minister Lee Hsien Loong, the Sino-Singapore International Joint Research Institute is an important technology platform jointly set up by Sino-Singapore Guangzhou Knowledge City Administrative Committee (SSGKC Administrative Committee), South China University of Technology (SCUT), Nanyang Technological University (NTU Singapore), SSGKC Investment and Development Co., Ltd (SSGKC Inv & Dev Co). Located in Guangzhou Knowledge City, the Institute is home to many world-renowned research organisations for global collaboration.

Upon the invitation of then President Tony Tan Keng Yam of the Republic of Singapore, Chinese President Xi Jinping paid a state visit to Singapore to mark the 25th anniversary for the establishment of diplomatic relationship between China and Singapore. One of the highlights of this visit was a four-party agreement signed on 7 Nov 2015 at the Istana, Singapore witnessed by Chinese President Xi Jinping and Singapore's Prime Minister Lee Hsien Loong. This was the first official state visit of President Xi to Singapore since His Excellency became the top leader of China. Among all the signings on that day, this is the sole agreement signed between the two Institutes of higher learning, which marked the milestone of international cooperation in Technology and Innovation between the two countries.

中新国际联合研究院是由中国国家主席习近平和新加坡总理李显龙见证签署的两国间的重大科技合作项目

Witnessed by the Chinese President Xi Jinping and Singapore's Prime Minister Lee Hsien Loong, the Sino-Singapore International Joint Research Institute is an important platform for technological cooperation

愿景与使命
Vision and Mission

成为引领中新技术合作和科技创新的研究机构，跻身具有世界影响力的研究机构之列

To be the leading Institute for Sino-Singapore technological cooperation and to become one of the most influential research institutions in the world

以需求为导向，通过技术创新和机制创新，创建开放、多元、动态、高效的研究模式

To adopt a demand-driven approach to build an "open, multidisciplinary, dynamic and high performance" innovation model, through technological and institutional innovations

进行世界最前沿的尖端科学研究，促进科技成果的转化和应用，扶持科技企业，培养技术人才，在区域乃至世界发挥影响力

To conduct world-class cutting-edge R&D, drive technology transfer and nurture technopreneurial talents for the region and beyond

理事寄语
Messages from Council Members

吴业春博士
中新国际联合研究院理事会联席主席
华南理工大学副校长

Dr Wu Yechun
Governing Council Co-Chair, Sino-Singapore International Joint Research Institute
Vice President, South China University of Technology

研究院共建四方通力协作，着力引进新加坡南洋理工大学和华南理工大学的优势科技成果，成立一年多来已取得可喜成绩，呈现良好的发展势头。当前，国家正在推动粤港澳大湾区建设，中新广州知识城已上升为国家级双边合作项目，华南理工大学也正在大力推进“双一流”建设和广州国际校区建设。研究院要抓住难得的历史机遇，紧密结合国家和区域的发展需求，在人才引进、科学研究、成果转化上继续发力，服务于粤港澳大湾区国际科技创新中心的建设，为中新两国科技合作做出重要贡献。

SSIJIR, since its official opening in 2017, has achieved gratifying results by bringing in leading technologies from both Nanyang Technological University, Singapore and South China University of Technology. The good momentum that SSIJRI has shown so far would not be possible without the joint efforts from all four founding members.

I am glad to see that there are many opportunities for SSIJRI at present, such as the Guangdong-Hongkong-Macau Greater Bay Area scheme, the recent upgrade of Sino-Singapore Guangzhou Knowledge City project to a state-level cooperation, SCUT's strive in building a Double First Class University in China and its international campus in Guangzhou.

I hope SSIJRI could make good use of such opportunities to further progress in talent recruitment, R&D and commercialization so that it can play its role in the bigger plan to build an international technology innovation centre in the Greater Bay Area and contribute to the scientific and technological collaboration between China and Singapore.

蓝钦扬教授

中新国际联合研究院理事会联席主席
新加坡南洋理工大学副校长（研究）

Professor Lam Khin Yong
Governing Council Co-Chair, Sino-Singapore International Joint Research Institute
Vice President (Research), Nanyang Technological University, Singapore

距 2015 年我们签署成立中新国际联合研究院的合作协议，不过短短的几年时间，研究院从无到有，取得了多方面的进步和成绩，我为研究院的良好发展势头由衷地感到高兴。

在中新国际联合研究院，我们致力于推进科技成果转化，只有通过可转化型研究，才能将实验室基础研究和创新成果与产业应用和市场对接。在过去的一年，我们坚持以可转化型研究为重点，见证了两个成功案例，那就是研究院孵化的、由曾少华教授成立的新向氢能（广州）有限公司，以及即将成立的人工智能中心。不久前，研究院理事会批准了南洋理工大学和华南理工大学的共计 20 个新项目的立项申请。同时，研究院也被广东省科技厅认定为省级新型研发机构，这是对研究院发展目标的肯定，我很高兴我们的研究和工作获得了赞同。

在此，我也想表达对我们的合作伙伴的诚挚谢意，感谢华南理工大学、中新广州知识城管理委员会以及中新广州知识城投资开发有限公司对研究院的支持和贡献。同时，也感谢在研究院开展工作的每一位同仁，没有大家的努力，我们不可能取得今天的成绩。

在研究院新大楼的建设工作展开之际，我们也要明确未来的工作重点，我们将一如既往地对我们的研究人员提供支持，我坚信，我们会取得更大的发展和进步。

SSIJRI has come a long way since we first signed the collaboration agreement in 2015. Over the past few years, we have made tremendous progress and I am very pleased with our achievements thus far.

At SSIJRI, we focus on translational research which allows for pull-through of basic research from the lab into applicable and marketable solutions for society. With translational research as our focus, we have seen two success stories over the past one year– the establishment of Xin-Xiang Hydrogen Technologies Co., Ltd by Prof Chan Siew Hwa and the potential AI centre with Nanyang International Club Pte Ltd. 20 new projects from both NTU and SCUT have also recently been approved for funding support by the Governing Council, and SSIJRI has also been recognised as the "new-type R&D institution" by the Guangdong Science and Technology Department. This is testament to the vision we had for SSIJRI and I am very happy that the research and work conducted at SSIJRI have been recognised.

I would like to thank our partners, SCUT, the SSGKC Administrative Committee and the SSGKC Investment & Development Co for the support and contribution. In addition, the achievements we see today would not have been possible without the researchers and the management and support team at SSIJRI.

While SSIJRI is awaiting its new building, it is also important for us to set our priorities for the coming years. We will continue to support our researchers in achieving success in their research and I have no doubt that we will see greater growth in the next few years.

徐晖先生

中新国际联合研究院理事
中新广州知识城开发建设办公室副主任

Mr Xu Hui Cheston
Governing Council Member, Sino-Singapore International Joint Research Institute
Deputy Director General, SSGKC Development and Construction Office

根之茂者其实遂，膏之沃者其光晔。过去一年，我们同心同向、和合共进，坚持以全球视野谋划和推动中新国际科技合作，研究院在平台建设、人才引进、制度完善等方面实现量质齐升、亮点纷呈，在省新型研发机构评选中名列前茅，永久大楼破土动工，研究院正朝着科学的海洋扬帆起航。

浩渺行无极，扬帆但信风。在新的一年里，我们将以更积极、更开放的姿态对接全球科技资源，在互利共赢的路上走出高质量，跑出加速度。我相信，在各方理事和管理团队的精诚合作下，研究院一定能够成为中新合作、聚力创新的成功典范！

An ancient Chinese poet once wrote, 'Good roots make good fruits; ample oil makes a brighter lamp.' In 2018, all four parties of SSIJRI worked together to promote the science and technology collaboration between China and Singapore with a global perspective. SSIJRI has made good progress in setting up its research platforms, recruiting international talents and improving its management system in the past year. It is heartening to see that SSIJRI is rated as one of the top "new-type R&D institutions" in Guangdong Province and its permanent building has also started construction at the end of 2018.

In the coming new year, we will tap on the technological resources from worldwide with a more positive and open mind and create win-win results for all parties. I believe SSIJRI will become a model innovation project in the collaboration between China and Singapore with the joint efforts from all council members and the management team.

翁文炳先生

中新国际联合研究院理事
中新广州知识城投资开发有限公司战略合作总监

Mr Ang Boon Peng
Governing Council Member, Sino-Singapore International Joint Research Institute
Vice President (Strategic Collaboration), Sino-Singapore Guangzhou Knowledge City Investment and Development Co., Ltd

中新国际联合研究院的建立和发展有赖于研究院的发起单位、管理团队以及各个合作方史无前例的投入与付出。各方都秉持着共同的信念，希望通过华南理工大学及南洋理工大学的科研力量的结合，加上本地政府的扶持及知识城合资公司的资源，把研究院打造成一个国际科技成果转化的典范。自 2013 年，我们大家一同为实现这愿景而努力，每个里程碑的奠定都离不开多方不遗余力的付出与协作，意义至深价值至大。

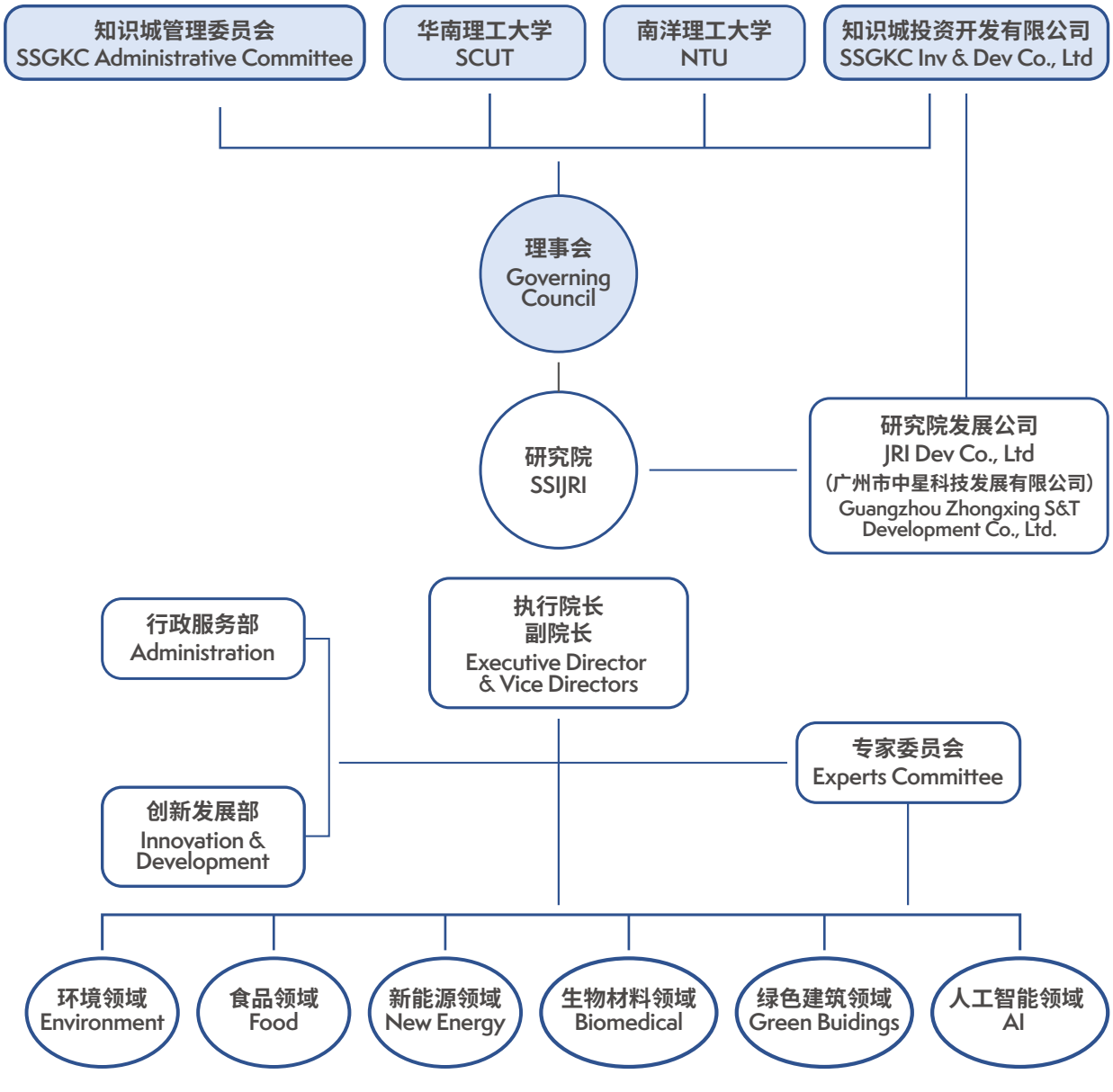
作为理事会单位的代表，我有幸从一开始就与一群为研究院的建立和发展无私奉献的朋友共事。我为大家共同创造了这段历史喝彩，但你我都知道这只是开始，未来还有许多需要我们去努力打造的。最后，我想衷心地祝贺研究院的管理团队带领研究院迈向了这第一个周年。感谢你们这些日子以来的付出，祝愿中新国际联合研究院年年收获丰硕的成果！

The birth and success of SSIJRI lies on unprecedented joint commitment and dedication of its founding members, the management and its various stakeholders. We share a common vision to develop SSIJRI as a model for international technological transfer leveraging the expertise of NTU and SCUT, under the blessings of the local government and GKC JV Co. Since 2013, we have been working towards realizing this vision and it has kept the team moving. Every milestone attained was built upon various dedicated joint efforts which made it so ever meaningful and significant.

I have the privilege of working with a group of highly selfless individuals who devoted so much to the birth and growth of this institution since day 1. My heartiest congratulation to everyone who plays a part in this history making. This is just the beginning, as we all know there are much more to be accomplished going forward. Lastly, I would like to offer my heartfelt appreciation to the current management for bringing SSIJRI to this first anniversary! Thank you for your commitment all this while, and we look forward to many more good years for SSIJRI!

管理架构

Governance Structure



管理团队
Management Team

余龙教授
执行院长

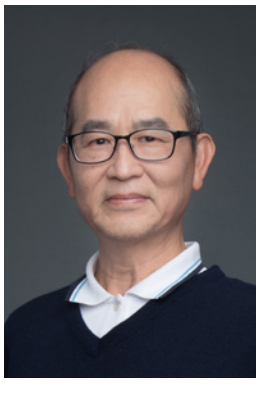
Professor Yu Long
Executive Director

曾少华教授
副院长

Professor Chan Siew Hwa
Vice Director

谢兴华
副院长（行政）

Mr Xie Xinghua
Vice Director (Administration)



王毅华博士
科研主任

Dr Wong Ee Hua
Research Director

大事记
Calendar of Events

大事记
Calendar of Events

2014.4

在中央政治局常委，时任广东省委书记胡春华的见证下，华南理工大学和南洋理工大学在新加坡签署共同成立联合研究院的谅解备忘录

Witnessed by Mr Hu Chunhua, a member of the CPC Central Committee and the then Secretary of the CPC Guangdong Provincial Committee, a collaboration agreement between South China University of Technology and Nanyang Technological University, Singapore was signed in Singapore.

2015.11

中国国家主席习近平和新加坡总理李显龙共同见证中新国际联合研究院合作协议签订

China's President Xi Jinping and Singapore's Prime Minister Lee Hsien Loong witnessed the signing of the agreement to jointly set up the Sino-Singapore International Joint Research Institute (SSIJRI)

2015. 12

中新国际联合研究院授牌仪式

SSIJRI Plaque Award Ceremony

2017. 3

中新国际联合研究院注册成立，第一次理事会召开

SSIJRI registration completed & 1st Council Meeting

新加坡前副总理、星桥腾飞集团董事长黄根成考察了研究院

Mr Wong Kan Seng, former Deputy Prime Minister of Singapore and Chairman of Ascendas-Singbridge visited SSIJRI on 23 March 2017

2017. 7

研究院启动首批 24 个产业化项目

SSIJRI launched its first batch of 24 R&D projects

2017. 8

新加坡教育部长王乙康率领新加坡政府和企业代表团出席研究院科研大楼正式启用仪式

Mr Ong Ye Kung, the then Minister for Education (Higher Education and Skills) of Singapore and delegation attended the official opening of SSIJRI R&D Building on 21 August 2017

2017.9

研究院孵化企业广州绿发材料科技有限公司荣获第四届“创青春”中国青年创新创业大赛现代农业初创组铜奖

SSIJRI-incubated Guangzhou GreenF Materials Technology Co., Ltd. was awarded the Bronze Prize (Modern Agricultural Start-ups) of the Fourth China Youth Innovation and Entrepreneurship Competition

2018.1

研究院第二次理事会在广州召开

The second Governing Council Meeting of SSIJRI was held in Guangzhou on 15 January 2018

2018.2

新加坡驻华大使罗家良在广州开发区党工委副书记、中新广州知识城开发建设办公室主任谭明鹤的陪同下考察了研究院

Mr Stanley Loh Ka Leung, Singapore's Ambassador to China, visited SSIJRI accompanied by Mr Tan Minghe, SSGKC Deputy Party Secretary

广州市驻硅谷办事处首席代表李文勇、广州市驻波士顿代表处首席代表吴晓玲来访研究院

Mr Li Wenyong, Head Representative of Guangzhou Liaison Office in Silicon Valley and Ms Wu Xiaoling, Head Representative of Guangzhou Liaison Office in Boston visited SSIJRI

2018.3

由中新国际联合研究院主办、中新广州知识城开发建设办公室协办的人工智能专题讲座，在中新广州知识城举行。新加坡工程院院士、南洋理工大学葛治中教授就新时代人工智能技术的发展现状开展了专题讲座

Supported by SSGKC Development and Construction Office, SSIJRI hosted a series of public lectures on Artificial Intelligence. NTU Professor Alex Kot Chichung, Fellow of Academy of Engineering Singapore elaborated on the current research progress in AI and collaborations with industry partners

研究院孵化企业广州绿发材料科技有限公司主要技术骨干孟令晗博士荣获广州市黄埔区、广州开发区“创业英才”称号

Dr Meng Linghan, a key member from SSIJRI-incubated Guangzhou GreenF Materials Technology Co., Ltd, won the “Entrepreneurial Talents” award by Guangzhou Huangpu District and Guangzhou Development District

广东省外事办公室副主任仓峰一行考察了研究院

Mr Cang Feng, Deputy Director of Foreign Affairs Office, Guangdong Province and delegation visited SSIJRI

2018.4

由中国电子学会通信学分会、北京电子技术应用研究所联合主办，华南理工大学承办，中新国际联合研究院共同协办的第十四届全国信息隐藏暨多媒体信息安全学术大会（CIHW2018）在广州召开

The 14th China Information Hiding Workshop (CIHW2018), jointly organized by Chinese Institute of Electronics on Communication Society, Beijing Institute of Electronic Technology and Application, SCUT and SSIJRI, was held in Guangzhou

2018.5

我院孵化企业“广州华建工智慧科技有限公司”正式揭牌

SSIJRI's incubated company - Guangzhou Smart Technology Co., Ltd, held its plaque unveiling ceremony on 11 May 2018

由华南理工大学食品科学与工程学院和研究院共同举办的食品加工新技术产学研交流会在广州举行

Seminar on New Food Processing Technology, Research and Commercialisation, jointly organized by SCUT's School of Food Science and Engineering and SSIJRI, was held in Guangzhou on 22 May 2018

广州市科创委主任王桂林来研究院调研

Mr Wang Guilin, Director of Guangzhou Science, Technology and Innovation Commission visited SSIJRI

2018.6

研究院第三次理事会召开

The 3rd Governing Council Meeting of SSIJRI was held on 25 June 2018

2018.7

研究院余龙教授登上广州日报推出的《广州创新英雄》栏目

Professor Yu Long, SSIJRI Executive Director, was featured by Guangzhou Daily for his innovative new material projects at SSIJRI

研究院孵化企业 - 新向（广州）氢能科技有限公司注册成立，注册资金为 2000 万元人民币

A spin-off company, namely Xin-Xiang (Guangzhou) Hydrogen Technologies Co., Ltd, incubated at SSIJRI was incorporated in July 2018 with registered capital of RMB 20 million

2018.7

研究院顺利通过广州市科技创新委员会组织的专家团队的中期评估

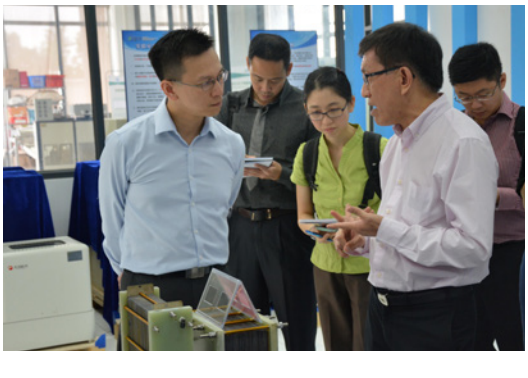
Expert Committee from Guangzhou Science and Technology Innovation Commission conducted mid-term review on SSIJRI projects

广东省省长马兴瑞考察研究院

Mr Ma Xingrui, Governor of Guangdong Province, visited SSIJRI on 7 August 2018

新加坡教育部第二常任秘书兼内政部第二常任秘书黎忠汉一行来访研究院。

Mr Lai Chung Han, Second Permanent Secretary (Education), Ministry of Education and Second Permanent Secretary, Ministry of Home Affairs, Singapore visited SSIJRI on 22 August 2018



2018.9

研究院登上广东卫视“丝路汇客厅”节目

SSIJRI was featured on “Interview Room on the Silk Road” on Guangdong Satellite TV on 27 September 2018

2018.10

研究院第四次理事会召开

The 4th Governing Council Meeting of SSIJRI was held on 25 October 2018.

研究院与南洋国际俱乐部有限公司签署了共同成立“人工智能创新中心”的合作备忘录，并举行“生物材料联合实验室”揭牌仪式

SSIJRI signed an MOU with Nanyang International Club (NIC) to set up AI Centre and unveiled the plaque of “Joint Biomaterials Lab”

研究院启动第二批 21 个产业化项目

SSIJRI launched second batch of 21 R&D projects

2018.11

研究院获广东省科技厅 2018 年新型研发机构认定和专项资金支持

SSIJRI was recognised as the “new-type R&D institution” by Guangdong Science and S&T Department

研究院注册成立广州市中星科技发展有限公司，助力产业化发展

SSIJRI set up its commercial arm – Guangzhou Zhongxing S&T Development Co., Ltd. to support the sustainable development of the Institute

2018.11

新加坡知识产权局副局长陈绍恩访问研究院

On 12 November 2018, Mr Tan Shau En, Assistant Chief Executive (Commercialisation) of Intellectual Property Office of Singapore visited SSIJRI

2018.12

位于广州知识城南起步区核心位置的研究院永久大楼所在园区中新国际智慧产业园在广州正式动工

The China-Singapore International Smart Industrial Park, where SSIJRI permanent building of SSIJRI is located, held the ground breaking ceremony on 6 December 2018

新加坡南洋理工大学教务长兼副校长（学术）林杉教授在副校长（研究）、研究院理事会联席主席蓝钦扬教授的陪同下来研究院访问

Professor Ling San, Provost and Vice President (Academic), NTU Singapore visited SSIJRI accompanied by Professor Lam Khin Yong, NTU's Vice President (Research) and SSIJRI Council Co-Chair

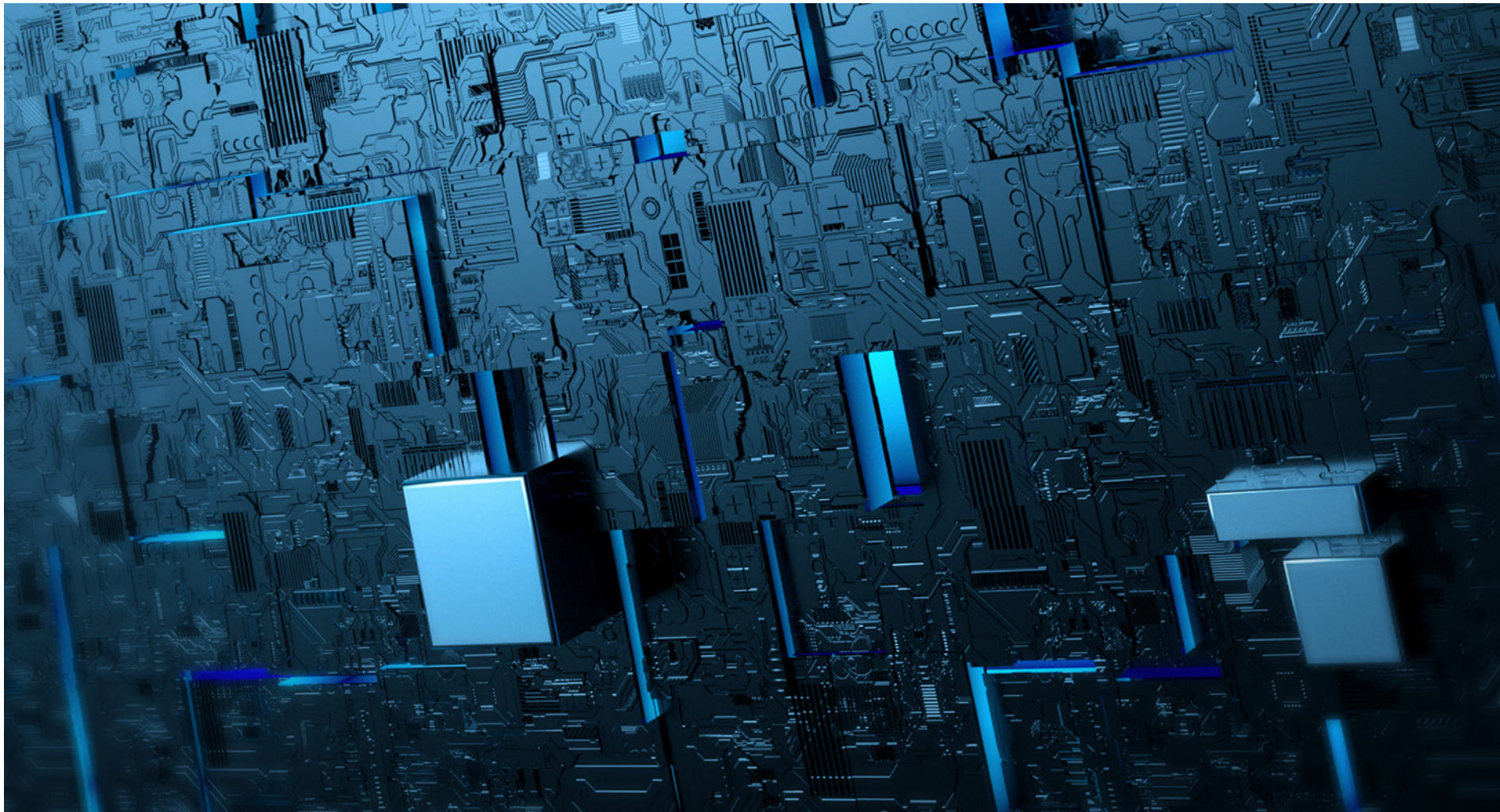
研究院“抗病毒多肽的表面化以及生物医学应用”项目获得广东省科技厅 2018-2019 年省创新战略专项资金（国际科技合作领域“一带一路”专题）立项支持

SSIJRI's project Antiviral Polypeptides Surfacing and Its Biomedical Applications, won the Strategic Innovation funding support under Belt and Road Intiative (International S&T Collaboration) by Guangdong Science and Technology Department

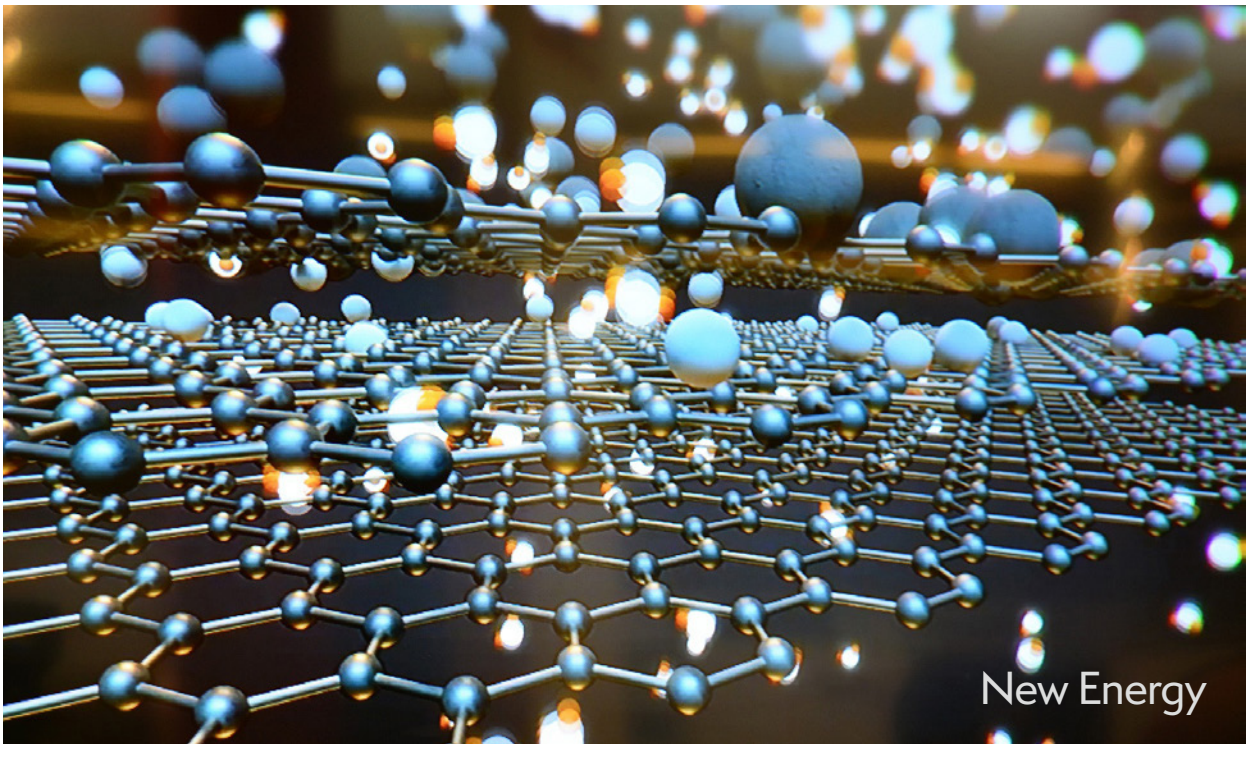
我院入驻项目负责人、华南理工大学教授许勇携区块链应用技术参与 2018 年度粤港澳大湾区创意创新盛典的路演活动

Professor Xu Yong from SCUT presented on his SSIJRI-funded project - the Property Rights Trading Platform Based on Blockchain at the 2018 Delta Creativity & Innovation Celebration (DCIC) Roadshow

创新项目
Innovative Projects



新能源
New Energy



以华南理工大学广东省先进储能材料重点实验室和南洋理工大学能源研究所等科研机构为依托。围绕燃料电池、智能电网和清洁能源等，致力于新型能源产能、储能、转换和网络系统自动化产业发展。平台将为广东省能源产业发展提供技术支持；为本省能源领域新型能源装置产业化过程中产业链形成提供技术架构；推出新一代的能源产能、储能、用能及其他们智能化、信息化和微型化的新产品。

Leveraging the strength of SCUT's Key Laboratory of Advanced Energy Storage Materials of Guangdong Province and Energy Research Institute @ NTU, this platform focuses on research and innovation in fuel cell, smart grid and clean energy, etc. covering energy generation, storage, conversion and grid system automation. It is anticipated that such technology development would benefit various applications including electric vehicles, energy storage for renewable energy to mitigate weak grid and peak shaving purposes and smart grids for green building in the digital era, etc.

铂族金属催化剂制备的“交钥匙”成套技术 – 高品质、低成本、快捷节能的制备方法

A Turnkey Technology for Platinum-Group Metal (PGM) Catalyst Manufacturing – High Quality, Low Cost, Fast and Energy-saving Process

项目负责人 Principal Investigator:
Professor Chan Siew Hwa
新加坡南洋理工大学 Nanyang Technological University, Singapore

联合负责人 Co-Principal Investigator:
廖世军教授 Professor Liao Shijun
华南理工大学 South China University of Technology

研究目标：

本项目主要目的是将一项催化剂制备技术进一步成熟化，放大并快速生产燃料电池所需要的高载量贵金属催化剂，考察催化剂制备过程中影响质量的关键因素，并拓展催化剂制备工艺的应用范围，最终将成熟的催化剂生产工艺转让给工业合作伙伴。

Objectives:

The goals of this project are firstly to further improve and perfect a catalyst production technology to realize the facile and continuous mass-production of electro-catalysts containing high loading of noble metal; and secondly to investigate the critical factors affecting the catalyst production quality; and to extend the applications of the production technique with the ultimate goal of transferring the production technique to industrial partner.

项目进展与成果：

• 本项目专门设计了一种可用于快速连续制备催化剂的反应体系，提高了催化剂制备效率，降低了成本，可以实现快速大规模生产用于燃料电池的高价值的贵金属电极催化剂；
• 使用新型反应器和反应系统，在高铂载量的情况下可生成超小纳米粒径，实现贵金属的高利用率和高活性；
• 三项相关专利正在申请中。

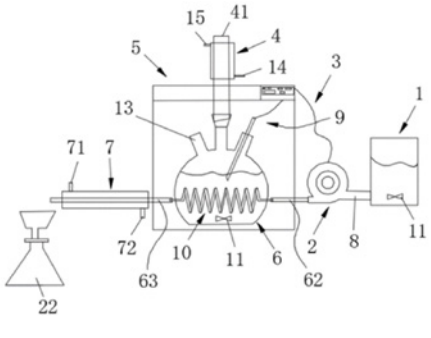


图 1. 本项目进一步完善的连续化批量生产催化剂的反应系统（已申请专利）。

Figure 1. Specially designed reaction system for facile and continuous mass production of catalysts.

Progress and Achievements:

• With proprietary home-designed reactor system, mass production of supported catalysts can be easily realized with decreased production time and energy consumption;
• The metal nanoparticles produced with the specially designed reactor and reaction system have lower average size in presence of high platinum loading, which is essential and helpful to realize the high utilization and activity of PGM catalysts;
• Three patent applications have been filed in China.

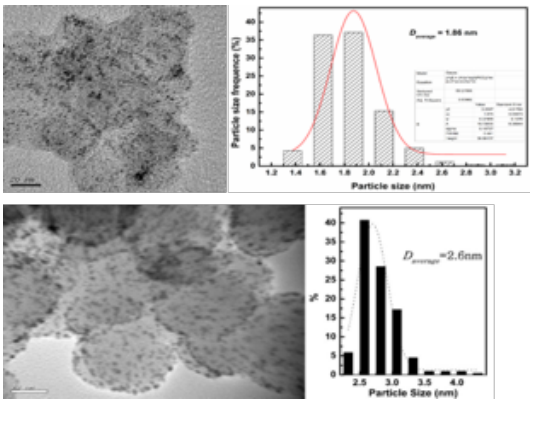


图 2. 本工艺（上）与传统工艺（下）制备的等载量铂 / 碳催化剂的粒径对比。

Figure 2. The TEM images and histogram Pt/C (20%wt) sample synthesized novel procedure (above) and conventional procedure (below).

应用于电动汽车与消费类电子产品的高能量密度快速充电储能装置

High Energy Density, Fast Charging Energy Storage Devices for Electric Vehicles and Consumer Electronics

项目负责人 Principal Investigator:
Professor Shen Zexiang
新加坡南洋理工大学 Nanyang Technological University

联合负责人 Co-Principal Investigator:
胡仁宗教授 Professor Hu Renzong
华南理工大学 South China University of Technology

研究目标：

本项目重点发展石墨烯在超级电容器以及动力电池中的应用技术，包括开发用于合成石墨烯的超临界二氧化碳辅助液相剥离技术，制备应用于锂离子电池正极涂覆层的高导电性散热和防腐涂层及石墨烯基超级电容器，实现具备更快充放电能力和更长循环寿命的储能装置。

Objectives:

This project focuses on the development of the future generation of graphene-based energy storage systems, including synthesis of few-layered graphene by liquid-phase and electrochemical exfoliation and its application as highly conductive and anti-corrosion coating for high performance Li-ion batteries and supercapacitor electrodes; and application of such electrodes for the next-generation energy storage systems.

项目进展与成果：

• 项目组使用超临界二氧化碳插层生产方法制得层数为 10 层以内的高质量石墨烯水分散液及经球形化后的石墨烯粉体。制得的石墨烯具有纯度高、层数少且分布均匀、导电导热性能好及分散性好等特点，成本仅为目前主流生产法的十分之一，产率高且绿色环保。目前已实现日产量 1 千克生产线的设计及试运行；

• 项目组的石墨烯基超级电容器电极制备技术容易生产及放大，能量密度高，成本低，低温性能好。该技术现已实现日产 2 千克生产线的设计及试运行；原型器件的测试验收以及商业生产计划的制定；

• 项目组的石墨烯涂层集流体技术已经实现卷对卷量产。此技术运用到动力锂电池及超级电容器中可以较好的控制电池动态内阻，保护集流体不受侵蚀，增加储能设备的功率密度及循环寿命。

Progress and Achievements:

• Achieved production of graphene by a supercritical exfoliation method with 10% of the cost of the current mainstream method; established a prototype production line with a capacity of 1kg/day; produced graphene and graphene nanospheres (Fig 1) with less than 10 layers and of high purity, high thermal and electrical conductivity

• Established prototype production line of graphene-based supercapacitor materials (Fig 2) with capability of 2kg/day; completed assembly and testing of prototype cells

• Demonstrated roll-to-roll manufacturing of graphene-coated current collectors have been achieved

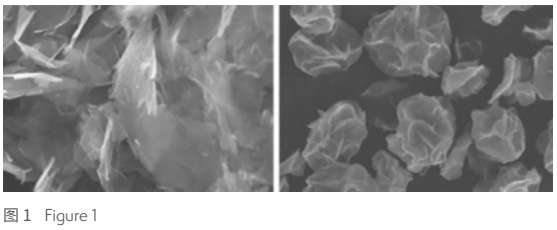


图 1 Figure 1

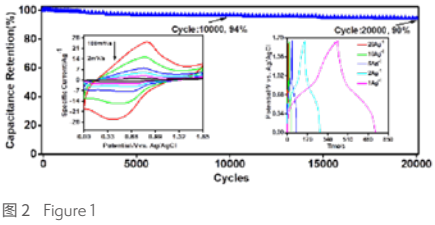


图 2 Figure 1

项目未来计划：

• 全面建成工业规模绿色生产石墨烯生产线、石墨烯复合材料生产线以及建设石墨烯涂覆铜箔 / 铝箔耐腐蚀集流体生产线

• 继续水系石墨烯基超级电容器以及使用耐腐蚀集流体锂离子电池的研究及产业化，加大市场开拓，对生产线及产品根据市场情况进行二次开发完善

• 寻求国内合作商，撰写相关专利

Future Plans:

• Further scale-up production lines to industrial production levels
• Further optimiza tion of production and market development
• Filing of patents and expanding collaborations

生物医用材料
Biomedical Materials

以华南理工大学国家人体组织功能重建工程研究中心，广东省生物医学工程重点实验室和南洋理工大学的卓越生物先进材料和器件研发为依托，致力于发展新一代面向组织修复的生物医学材料和病损组织功能重建前沿技术，汇聚国际顶尖科研团队的资源，促进新型生物医学材料基础研究；培育核心技术，带动和提升生物医用材料及医疗器械行业创新能力，打造成为生物医学基地，提升与优化广东省医疗产业结构，促进两国中高端医疗器械的发展。

Leveraging SCUT's National Engineering Research Center for Tissue Restoration and Reconstruction, Guangdong Biomedical Engineering Key Lab and NTU's research and innovation in biomaterials and devices, this platform focuses on the development of new generation of biomedical materials for tissue repairing, advanced treatment technology for functional reconstruction of lesioned tissues, etc., harnessing the resource competencies in partnering universities to advance fundamental research in new biomedical materials, cultivating key technology for commercialisation, driving and enhancing innovation in biomedical materials and medical instruments.

基于聚集诱导发光（AIE）技术的细菌内毒素检测试剂的研发

Development of Bacterial Endotoxin Detection Reagent Based on Aggregation-Induced Emission (AIE) Technology

项目负责人 Principle Investigator:
唐本忠（中国科学院院士，华南理工大学教授）
Professor Ben Zhong TANG
Academician of Chinese Academy of Sciences
South China University of Technology

研究目标：

基于 AIE 技术，开发一种细菌内毒素检测试剂，实现对常用注射液内毒素含量的定性检测。

Objectives:

Develop a kind of bacterial endotoxin detection reagent based on AIE technology for the qualitative determination of endotoxin content in commonly used injections.

背景介绍：

细菌内毒素测试在药品监测和临床诊断上具有广泛的应用，当前最常用的内毒素检测试剂是鲎试剂。然而，鲎试剂内毒素检测法（BET）严重依赖对鲎血的采集，其检测准确性易受鲎血品质的影响，且操作十分复杂，近几十年来都没有明显的改进。近期，我们发现某些 AIE 材料具有选择性识别并点亮细菌内毒素的特性。与现有 BET 技术相比，AIE 技术具有操作简单、响应迅速、无需采集鲎血的优点，因此，AIE 细菌内毒素检测材料有望实现对鲎试剂的取代。

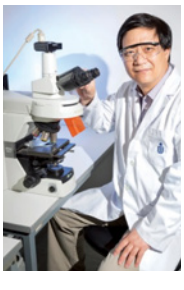


图 1 唐本忠院士在实验室

Figure 1. Prof. Ben Zhong TANG in the lab.

Background:

Bacterial endotoxin detection has been widely used in drug quality test and clinical diagnosis. At present, Tachypleus Amebocyte Lysate (TAL) is the most commonly used bacterial endotoxin detection reagent. This technology relies heavily on the blood of horseshoe crab which is a kind of national protected marine organism. Moreover, its operation process is relatively complex, and it has no significant improvement in recent decades. Recently, we found that certain AIE materials have the property of selective identification and illumination of bacterial endotoxin. Compared with TAL method, our AIE technology has advantages of simple operation procedure and quick response, and is independent of TAL. Therefore, we believe that AIE materials have great industrial prospect in the area of bacterial endotoxin detection.

图 2 AIE 细菌内毒素快速检测试剂产品示意图

Figure 2. Photograph of the AIE endotoxin rapid detection reagent.

项目进展与成果：

截至目前，我们从 AIE 材料数据库中筛选出了性能优异的细菌内毒素检测探针，将其溶解于特殊的内毒素检测用水中，即可制成 AIE 细菌内毒素快速检测试剂。该产品的检测极限可达 0.05EU/mL，检测时间一般在 10 秒之内，远远短于鲎试剂技术的检测时间（30-60 分钟）。研究结果表明，我们的产品可用于 0.9% 氯化钠注射液、5% 葡萄糖注射液、奥美拉唑钠注射液、盐酸氨溴索注射液等常用注射液中内毒素的定性或半定量检测。该项技术已申请中国发明专利。

Progress and Achievements:

Up to now, we have screened out an AIE probe with perfect endotoxin detection performance from the AIEgen database. This AIE probe was simply dissolved in special endotoxin test water to produce the AIE bacterial endotoxin rapid detection reagent. The detection limit of our product can reach 0.05 EU/mL and the detection time is usually less than 10s which is much faster than TAL technique (30-60 min). At present, we have verified that our product can be applied in the qualitative or semi-quantitative detection of endotoxin content in common injections such as 0.9% sodium chloride injection, 5% glucose injection, omeprazole sodium injection, ambroxol hydrochloride injection, etc. A Chinese invent patent has been submitted for further examination.

项目规划：

当前我们正在积极寻求社会投资，期望能建立生物技术公司，将该技术成果孵化成产品，造福社会。

Future Plan:

Currently, we are attracting venture investment and expecting to establish a company based on this project.

可植入生物医用材料
Implantable Biomedical Materials

项目负责人 Principal Investigator:
Professor Subbu Venkatraman
新加坡南洋理工大学 Nanyang Technological University, Singapore

联合负责人 Co-Principal Investigator:
任力教授 Professor Ren Li
华南理工大学 South China University of Technology

研究目标：

我们的目标是解决当前泌尿系统疾病治疗的局限性，特别是尿道和输尿管狭窄以及肾和输尿管癌症。为了治疗上述慢性尿路疾病，我们的支架可持续释放抗增殖药物，以最小有效药物释放浓度，局部给药，抑制人体基质成纤维细胞增殖。同时通过可膨胀水凝胶专利技术，实现与尿道内皮的紧密贴合，增加药物在目标区段的停留时间，进而增强药物对输尿管内皮细胞的渗透浓度，继而抑制术后疤痕和狭窄的形成。该技术也可用于针对导管或支架植入引发的并发症，如尿生物膜，皮壳生成，尿路感染，疼痛等等。

Objectives:

The team aims to overcome the limitations in the treatment of urological disorders, in particular: ureteric and urethral stricture and urothelial carcinoma. The team has developed a novel bilayer swellable drug-eluting ureteric stent as an alternative to the invasive open surgery. The stent is expected to deliver drugs over a sustained period of time to inhibit the fibroblast proliferation. The hydrogel is able to expand upon contacting with urine to achieve a close apposition with the highly drug-impermeable urothelial barrier membrane thus increasing the drug residence time on the ureteric site and augmenting the drug penetration capability.

项目进展与成果：

- 成功定制设计图案并开发支架涂层配方，用于制作体内研究的工作原型
- 对 2 只雄性比格犬和 2 只雌性比格犬进行动物研究试验，探讨使用中线剖腹手术插入支架的可行性
- 对雌性活体比格犬进行动物研究试验，采用静脉肾盂造影（IVP）测量输尿管内径，以定制 OEM 输尿管支架和水凝胶涂层反应器（仰卧位犬）

Progress and Achievements:

- Successfully customized design-patterning and developed formulations of stent coating for the fabrication of working prototype for in-vivo study
- Carried out animal study trials on 2 male and 2 female beagle dogs to investigate the feasibility of stent insertion using midline laparotomy
- Carried out animal study trial on a female live beagle dog to investigate using intravenous pyelogram (IVP) to measure internal diameter of ureters for the customization of OEM ureteric stents and reactor for hydrogel coating

图 1　Figure 1

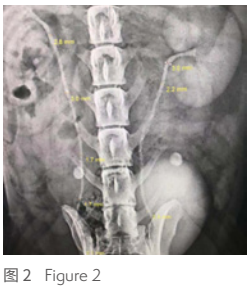


图 2　Figure 2

项目未来计划：

- 在决定定制支架的长度之前，再进行一次动物试验以确定输尿管的长度
- 再开展一轮 IVP，但碘海醇注射和 IVP 图像摄取之间的时间缩短，以确定是否可以清楚地显示两个输尿管。必要时，如果暗段持续存在，可以牺牲狗以评估是否有任何器官位于可能阻塞 IVP 成像的图像上变暗的输尿管段附近
- 动物研究中的设备安全评估。在动物研究中提供证据，证明在大约 1-3 个月的长期留置持续时间内没有全身毒性和肾积水，并且易于插入和移除装置

Future Plans:

- Carry out one more animal trial to determine the length of ureters
- Carry out one more round of IVP but with reduced time between iohexol injection and IVP image taking to determine the visibility of both ureters
- Assessment of device safety in animal studies. Provide evidence in animal studies that demonstrates the absence of systemic toxicity and hydronephrosis over indwelling duration of 1 - 3 months

生物活性胶原基眼科修复材料

Bioactive Collagen-based Ophthalmic Repair Material

项目负责人 Principal Investigator:
任力教授 **Professor Ren Li**
华南理工大学 South China University of Technology

联合负责人 Co-Principal Investigator:
Professor Subbu Venkatraman
新加坡南洋理工大学 Nanyang Technological University, Singapore

项目背景：

角膜病也是世界范围内主要致盲眼病。目前全球共有角膜盲患者约6000 万人，中国约占 500 多万人，每年新增 10 余万病例。目前临床上主要采取角膜移植术治疗，然而由于捐赠角膜供体来源匮乏，国内每年完成不超过万例。

Background:

Keratopathy is the leading cause of blindness worldwide. At present, there are about 60 million people with corneal blindness in the world, and China has more than 5 million people, adding more than 100,000 cases every year. The only treatment method is a transplantation with a human donor cornea; however, there is a shortage of high quality donor corneal tissues. On the other hand, corneal regenerative materials prepared by direct extraction of collagen based on recombinant collagen or animal are inferior in mechanical strength and toughness, and are unable to tolerate surgical suture fixation; thus, limiting its clinical application.

研究目标：

本项目针对角膜供体缺乏、现有脱细胞猪角膜基质适应症窄、胶原基角膜再生性材料力学等性能不佳的现状，从成分 - 结构 - 功能仿生设计原理出发，研发新型适应临床移植需求的角膜再生性材料。旨在改变我国当前角膜供体匮乏的现状，帮助数百万计角膜盲患者复明，助力 WHO“视觉 2020”的全球性行动和“实施健康中国战略”，提升我国在角膜再生性材料研发的创新力和国际竞争力。

Objective:

This project aims at the lack of corneal donors, the narrow indication of existing acellular porcine corneal stroma, and the poor performance of collagen-based corneal regenerative materials. Based on the principle of composition-structure-function bionic design, the project will develop new corneal regenerative materials that meet the needs of clinical transplantation.

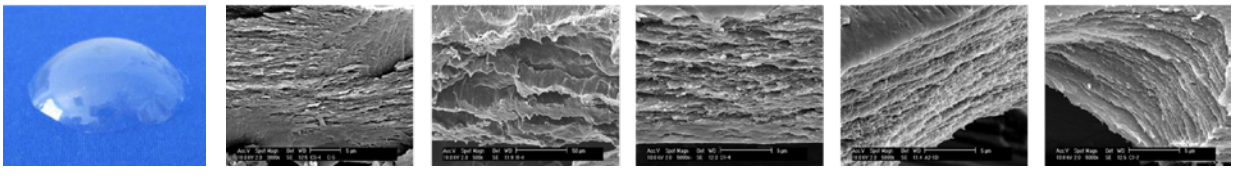
项目进展与成果：

- 根据不同的胶原改性方法和处理手段，可以获得具有天然仿生层状结构的角膜修复材料。其力学耐缝合、含水率、透光性、组织再生等性能均满足临床要求
- 开发了具有抗菌功能 / 抗感染的胶原基角膜修复材料
- 完成新工艺：仿生材料的功能化构建与细胞调控

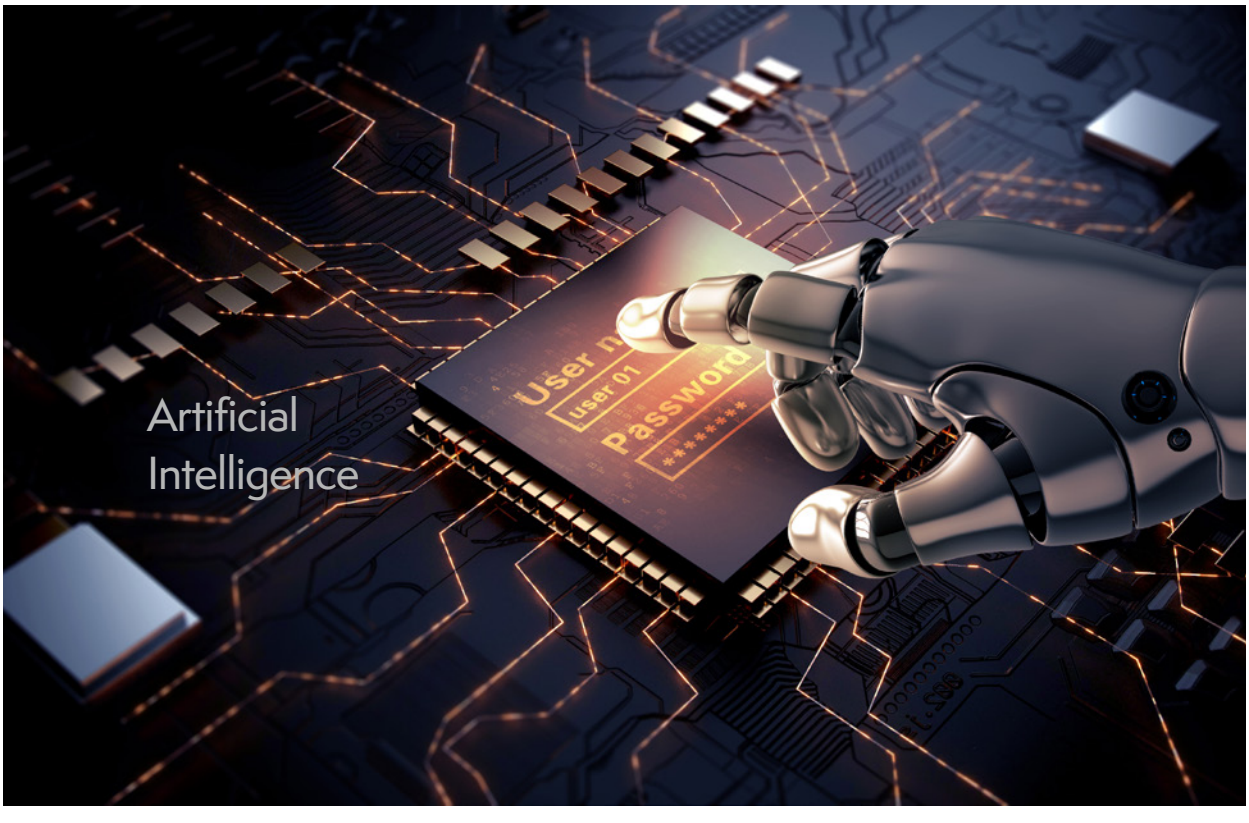
Progress and Achievements:

Applying innovative modification and treatment methods, a corneal repair material having a natural biomimetic layer structure has been obtained. It can Tolerate suture; and the water content, light transmission, tissue regeneration and other properties meet the clinical requirements.

无层状结构 → **层状结构**



人工智能
Artificial Intelligence



以华南理工大学和南洋理工大学在计算机、软件工程、自动化、信息与通信技术等领域的学科优势，对大数据预处理、机器学习、图像和语音识别、多媒体信息安全、云计算平台等人工智能核心技术进行深入研究，将研究成果应用到智慧金融、智能交通、平安城市、生物信息识别等领域，充分发挥产学研合作的优势，促进广东省人工智能产业的快速发展。

Leveraging the strength and the significant research accomplishments of both SCUT and NTU in computer science, software engineering, automation, information and communication technologies, and etc., the Artificial Intelligence Plus (AI +) platform concentrates on the research of key AI technologies such as big data pre-processing, machine learning, image and speech recognition, multimedia information security and cloud computing platform. These technologies will be applied to the real-world applications like intelligent Fintech, smart transformation, construction of safe city, and bioinformatics. The Artificial Intelligence Plus (AI +) platform takes the Academia-Industry research pattern and has an obvious advantage. The technologies obtained on this platform is expected to make significant contribution to the rapid development of the AI industry of Guangdong province.

面向金融服务的用户生物特征身份认证关键技术研究

Research on Key Technologies of Biometric Identity Authentication for Financial Services

项目负责人 Principal Investigator:
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联合负责人 Co-Principal Investigator:
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项目目标：

- 研究电子商务应用中的高可靠性生物特征认证技术
- 研究具有高扩展性的人脸欺骗检测方法
- 研究针对低质量手指静脉图像的预处理技术以及对手指姿势鲁棒的高速手指静脉识别技术等

Objectives:

This project explores biometric authentication techniques with high reliability in E-commerce. In particular, we have investigated three techniques: a face spoofing detection method that is easily expandable, a pre-processing method for low quality finger vein images, and a high speed finger vein recognition technique that is robust to finger gestures.

项目进展与成果：

- 完成指静图像脉预处理技术研究。申请一项有关指静脉去噪增强的发明专利：“一种用于低质量指静脉图像的手指上下边缘检测方法”指静脉检测的相关软硬件技术已在产业合作伙伴企业中试用 (图 1)；
- 完成人脸反欺骗检测数据库的构建。利用多台拍摄设备，在各种不同场景下进行人脸数据采集，并利用两种攻击方法生成欺骗样本，构建人脸反欺骗检测数据库，以弥补现有公开数据库数据量不足的问题（图 2）；
- 完成智慧银行的相关研究，取得多项研究成果，包括申请专利 4 项，发表国际会议论文一篇。其中，行人检测系统已在中新国际联合研究院研发大楼进行试运行（图 3）。

Progress and Achievements:

- Based on the research on finger vein image pre-processing technique, we have applied for one patent: a method for upper and lower finger edges detection in low quality finger vein images. Software and hardware test are underway to integrate the invention into current devices by our industrial partner;
- For the face spoofing detection problem, we have built a test dataset. We have captured large amount of face pictures using different cameras in different environments. Fake samples are generated by two face spoofing methods. Since the research of face spoofing detection severely suffers from the lack of training data, our dataset can provide an extra test platform;
- We have made four patent applications in the area of smart bank. For example, we have developed a real-time pedestrian detection technique which has been set up in the main building of SSIJRI as a field application exhibition.

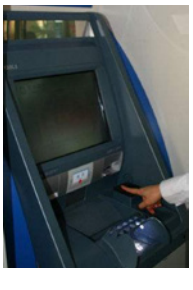

图 1 指静脉检测成果示例。（左）专利申请文件；（右）指静脉检测设备。

Figure 1 Achievements of finger vein detection research. (Left) Patent application document, (Right) finger vein detection device.

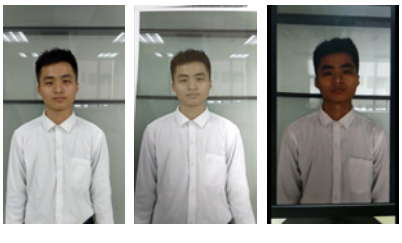

图 2 人脸反欺骗检测数据库样本示例。（左）原始样本；（中）照片攻击样本；（右）视频攻击样本。

Figure 2 Samples in the face spoofing detection database. (Left) Real sample, (Middle) photo attack sample, (Right) video attack sample.

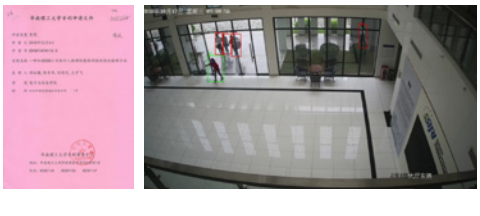

图 3 行人检测成果示例。（左）专利申请文件；（右）现场效果。

Figure 3 Achievements of pedestrian detection research. (Left) Patent application document, (Right) The detection example in SSIJRI.

人工智能 + 健康养老技术研究
AI+ Health and Ageing

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联合负责人 Co-Principal Investigator:
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研究目标：

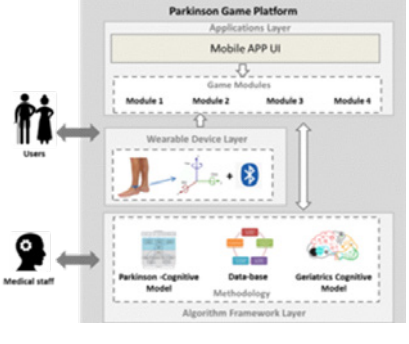
本项目的主要目的是帮助乐龄人群的医师及家人及早地发现帕金森等老年病症前期症状。帕金森病是全球第二大老年神经退化性疾病，目前帕金森病不可治愈，已有研究结果表明及早诊断帕金森病可以有效的延缓病情发展。因此本项目在全球老龄化的大趋势下具有良好的应用前景和经济价值。另一方面，本项目所采集的用户行为数据也可供研究人员进一步分析和学习，帮助尽早发现相关神经退化疾病的症状模式识别能力。项目未来还将融入人本计算的框架，以汇聚全球医学专家的建议搭建人工智能 + 专家平台，从而能更准确有效地进行相关疾病的早期诊断。同时，本项目还有助于帮助年长者了解慢性神经退化性疾病症状，推广健康身体和认知锻炼，以及研发基于物联网技术的穿戴式预测典型症状与康复应用。

Objectives:

This project uses state-of-the-art Artificial Intelligence to detect the early onset of Parkinson's disease (PD). PD is one of the most common neurodegenerative disorders associated with the rapidly aging global population. Whilst there is currently no cure for PD, research has shown that early detection can reduce the rate of degeneration and a system that can detect the early onset of PD will have significant societal and economic impact. The project will also incorporate an AI+ talent collaboration platform that will facilitate collaboration with worldwide medical experts on the early detection of other neurodegenerative disorders. Community outreach programmes will be developed to help elderlies to learn about the symptoms of typical chronic neurodegenerative disorders, and to take up exercises that will aid their physical and cognitive health. Research on disease diagnosis and rehabilitation based on Internet of Things (IoT) and wearable devices will also be conducted.

项目进展与成果：

- 帕金森康复游戏平台的总体方案设计
- 针对帕金森症疾病康复练习的严肃游戏设计与原型化
- 完成用于采集用户日常活动行为数据和用于康复游戏交互的可穿戴设备硬件设计
- 帕金森早期识别算法的设计
- 项目组已与新加坡南洋国际俱乐部有限公司和中新广州联合研究院签署合作备忘录，结合本项目研发成果及南洋理工大学百合卓越研究中心相关成果，建设、展示和商用化 AI+ 健康监测小屋旗舰项目



Progress and Achievements:

- Completed overall architecture design for the PD rehabilitation game platform
- Designed and prototyped the PD rehabilitation (serious) game
- Completed wearable device design for the collection of user daily living data and the interaction data between users and the rehabilitation game
- Completed algorithm for the early detection of PD
- An MOU was signed by Nanyang International Club (NIC), the SSIJRI, and the project team to build, demonstrate and commercialise future AI+ Health Screening Studio leveraging on the outcome of this project and the background IPs from NTU LILY Research Centre

项目未来计划：

- 可穿戴设备的生产测试
- 康复游戏开发与测试
- 模式识别算法的迭代优化与验证
- 系统整合整体测试

Future Plans:

- Trial production of the designed wearable device
- Implementation and testing of the designed rehabilitation game
- Optimization and verification of the designed pattern recognition algorithm
- System integration and testing

绿色建筑和智慧城市
Green Buildings and Smart Cities

以国内唯一的建筑科学国家重点实验室——亚热带建筑科学实验室为平台，以国内排名前列的建筑与土木学科为基础，联合新加坡南洋理工大学，通过高端国际合作与项目交流，建立国际顶级建筑与土木专家的紧密合作关系。借鉴新加坡的先进经验，结合广东的地方特色与亚热带地区的特征，不断解决复杂技术难题，形成先进工艺流程，着力推进建筑业绿色发展，循环发展、低碳发展和可持续发展。

Leveraging the National Key Lab in Building Science – the State Key Laboratory of Subtropical Building Science, the nationally renowned Building and Civil Engineering in SCUT and the research and innovation strength of NTU, this platform is to establish an international collaboration in Building and Sustainable Urban Development. By referring to the advanced experience of Singapore in green buildings and sustainable urban development, and integrating the local feature of Guangdong and its subtropical characteristic, this platform will provide solutions to complex technical challenges; develop advanced technical procedures, and focus on promoting green, recyclable, low-carbon and sustainable development in construction industry.

建筑全生命周期建筑信息管理平台开发与应用

Development and Application of Building Information Management (BIM) Platform in Building Life Cycle

项目负责人 Principal Investigator:
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联合负责人 Co-Principal Investigator:
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项目目标：

• 开发与主流 BIM 软件（Autodesk Revit, Bentley Systems, 国内的 PKPM 等）进行数据互通的连接器，平台与 BIM 软件的数据互通准确率达到 95% 以上
• 开发基于网页和移动操作系统的建筑模型浏览器，支持几何信息查看、语义信息查询等功能，平台能够在 iOS 和 Android 系统上使用;
• 引入专家系统、人工智能模型，辅助施工现场决策，开发自动工程量计算、派工单生成、网络计划优化等核心功能

Objectives:

• Develop connectors for data interoperability with mainstream BIM software, targeting above 95% interoperability
• Develop a building model browser based on webpage and mobile operating system that supports geometric information viewing and semantic information query
• Introduce expert systems and artificial intelligence models to assist construction site decision-making

项目背景：

建筑的设计、施工和运维过程工序繁多，工程量大，需要统一的流程和标准。本研究整合工程管理的流程和标准，融入到基于云的网络平台，为建设各参与方所用。

Background:

There are many processes in the design, construction and operation and maintenance of the building. The amount of work is huge and requires standardized methods and processes. This study integrates the processes and standards of engineering management into a cloud-based network platform for multiple parties.

项目进展与成果：

• 本研究整合工程管理的流程和标准，融入到基于云的网络平台，为建设各参与方所用。本项目的用户需求调研、架构设计和移动端软件已经初步完成（图 1）。
• 为减少人力成本及误差，我们在研发工程量计算工具时，以模板工程量的计算工具为开发的重点。本项目的工程量计算工具基于主流的 BIM 软件 Autodesk Revit 开发，软件的启动 UI（图 2）。目前，该软件的计算准确率超过 99%，已经开始在合作企业进行使用。

Progress and Achievements:

The engineering quantity calculation tool of this project is developed based on the Autodesk Revit. The startup UI of the software is shown in Figure 1. At present, the software has a calculation accuracy of more than 99% and has begun to be used in cooperative enterprises.

图 1 移动端协同管理平台
Figure 1 Mobile collaborative management platform

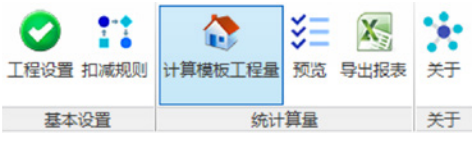

图 2 插件 UI
Figure 2 plugin UI

珠江三角洲地区自然灾害影响及后果评估

Evaluation of Natural Catastrophe Impact on the Pearl River Delta (PRD) Region

项目负责人 Principal Investigator:
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联合负责人 Co-Principal Investigator:
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• 研究目标：

- 对珠江三角洲地区城市进行基于情景的自然灾害风险评估
- 对珠江三角洲地区城市进行考虑地震、洪水、风暴潮等灾害的风险等级排名
- 对广州中新知识城进行多灾害影响综合评价

Objectives:

- Scenario-based evaluation of Natural Catastrophe (Nat Cat) risk for Pearl River Delta (PRD) cities
- Risk ranking of PRD cities for hazards covering earthquake, flood and storm surge
- Assessment of impact for the Sino-Singapore Guangzhou Knowledge City

• 项目进展与成果：

- 依据基于地理信息系统（GIS）的模糊综合评估方法，以及气象特征和流域特征等相关指标，项目组由目前已收集并处理的涵盖气象、地形、空间和社会经济等多方面的数据，初步开发研制出珠三角地区 1-km 精度的水灾危害等级分布图（图 1）；
- 在珠三角地区地震风险评估方面，项目组正致力于基于情景和概率的地震危害图开发。根据收集到的数据，包括历史地震记录的收集、地震台站分布信息、近期记录的地震动时程序列和本区域地质 / 断层信息，已经初步分析了珠三角地区在确定性的 1918 汕头大地震 (7.3 级) 情景下造成的地震危害分布（图 2）。

Progress and Achievements:

- Engaging the Geographic Information System (GIS) based fuzzy comprehension evaluation method and key indices addressing the meteorological and catchment characteristics, extensive databases covering the meteorological, topographic, spatial and socio-economic data have been collected and processed, and a preliminary inland flood hazard map over 1-km grids in the PRD region has been developed (Figure 1);
- In terms of earthquake risk assessment of the PRD region, the team works on the development of seismic hazard maps. Based on the data collected including historical earthquake catalogue, seismic stations information, recorded ground motion time histories, and geological/geotechnical information, preliminary analyses have been conducted to generate deterministic seismic hazard maps in PRD region for the 1918 Shantou (Mw=7.3) earthquake (Figure 2).

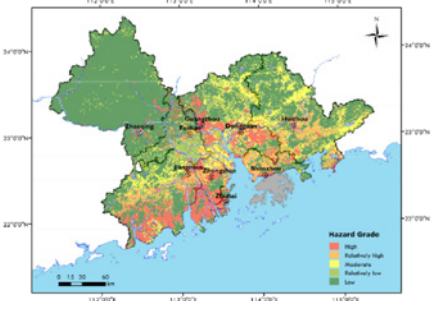

图 1. 珠三角地区水灾危害等级分图
Figure 1 Preliminary inland flood hazard map of the PRD region

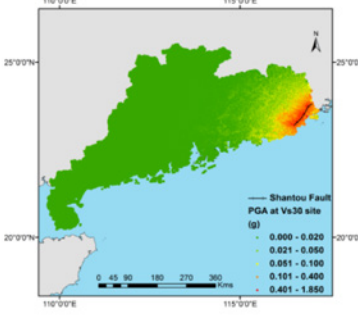

图 2. 基于 1918 年汕头 7.3 级地震生产的广东省地表峰值加速度分布图
Figure 2 Surface peak ground acceleration map of Guangdong Province with site condition for the 1918 Shantou (Mw=7.3) earthquake

• 项目未来计划：

- 实现地震和风暴潮危害性概率评估
- 制定有关经济和人群暴露的风险指标
- 制定针对珠三角主要城市的综合风险评估方法和风险等级排名

Future Plans:

- Completion of earthquake and storm surge hazard assessment
- Development of economic and human exposure indicators
- Development of risk evaluation methodology and ranking indicators for the PRD major cities

食品营养与安全

Nutritious and Safe Food Development

以国内排名第一的轻工技术与工程、排名前三的食品科学与工程为基础，联合南洋理工大学雄厚的研发团队，依托小麦与玉米深加工国家工程实验中心等国家级科研平台，通过高端国际合作，围绕现代食品生物技术、非热加工等新型食品加工技术研发等方向进行产业化研究。平台将服务于广东地方食品经济发展，为保障食品安全和健康提供重要的技术支持和科学依据；将有效带动广东地方特色食品资源开发的力度。

In the category of the Light-Industry Technology & Engineering and Food Science & Technology, SCUT has been ranked first and third in China, respectively. Leveraging the research and innovation strength of NTU in Food Sciences and the National Engineering Laboratory for Wheat & Corn Further Processing, this platform is aimed to pursue research in modern food sciences based on bio-technology, non-heating food processing technology, etc., which serves the industries in Guangdong and beyond.

基于定量风险和可持续性评估的高效水产养殖解决方案

New, Science-based Solutions for Efficient Aquaculture Production Based on Quantitative Risk and Sustainability Assessments

项目负责人 Principal Investigator:
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联合负责人 Co-Principal Investigator:
闫鹤教授 **Associate Professor Yan He**
华南理工大学 South China University of Technology

研究目标：

该项目旨在建立基于渔业生产的耐药性分析和可持续性评估管理系统，以此建立绿色，健康和高效的水产养殖模式。主要研究包括对比不同的养殖模式来建立环境可持续模型；引入新的微生物分析平台 - 新一代高通量测序 - 进行细菌耐药性的风向评估；以及通过整合可持续以及风险评估模型对环境、人类健康、以及经济发展进行全面的分析评估。

Objectives:

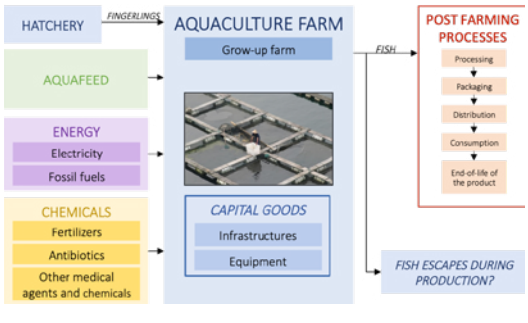
This project aims to develop a conceptual framework for antimicrobial resistance analysis and sustainability assessment based on fishery production to build a green, healthy and efficient aquaculture model. Studies include comparing different feeding and effluent treatment regimes in relation to environmental impact; introducing new microbiological analytical platforms, specifically next generation sequencing for the detailed risk analysis of antimicrobial resistance; and integrating sustainability and risk assessment to environment, human health and economic development.

项目进展与成果：

- 基于设计的调查问卷，项目已经收集分析了 12 家渔场的信息，主要包括基本渔场信息、生产过程跟踪、疾病预防及治疗、 益生菌鱼饲料使用、抗生素使用、以及细菌耐药性风险等；
- 多家公司表达了浓厚的合作兴趣。项目组为此在准备商业企划书和进行相关专利申请。

Progress and Achievements:

- 12 fishery farms' data has been collected and analyzed based on the designed questionnaire including background checks, production process monitoring, disease outbreak investigations, probiotic fish feed, antibiotic use, and AMR, etc;
- With strong interests expressed by several companies, the team is working on the business proposals and patent applications for potential collaborations.



项目未来计划：

- 为得到更全面的分析，将针对选择更多渔场和其他品种的鱼类进行调研
- 针对细菌耐药性的风险评估的鱼类采样
- 针对成都通威集团的益生菌饲料项目，以及上海山恒集团的绿色评估项目进行深入合作讨论。

Future Plans:

- Finish the whole questionnaire with more fishery farms and more fish species, and propose the solutions for efficient aquaculture production after the complete assessment
- Collect fish samples for the AMR risk analysis
- Collaborate with industry partners for evaluation system and green probiotic fish feed

果蔬绿色加工技术与产品

Technology and Products of Processing of Green Fruit and Vegetable

项目负责人 Principal Investigator:
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联合负责人 Co-Principal Investigator:
Professor Chen Wei Ning, William
新加坡南洋理工大学 Nanyang Technological University, Singapore

研究目标：

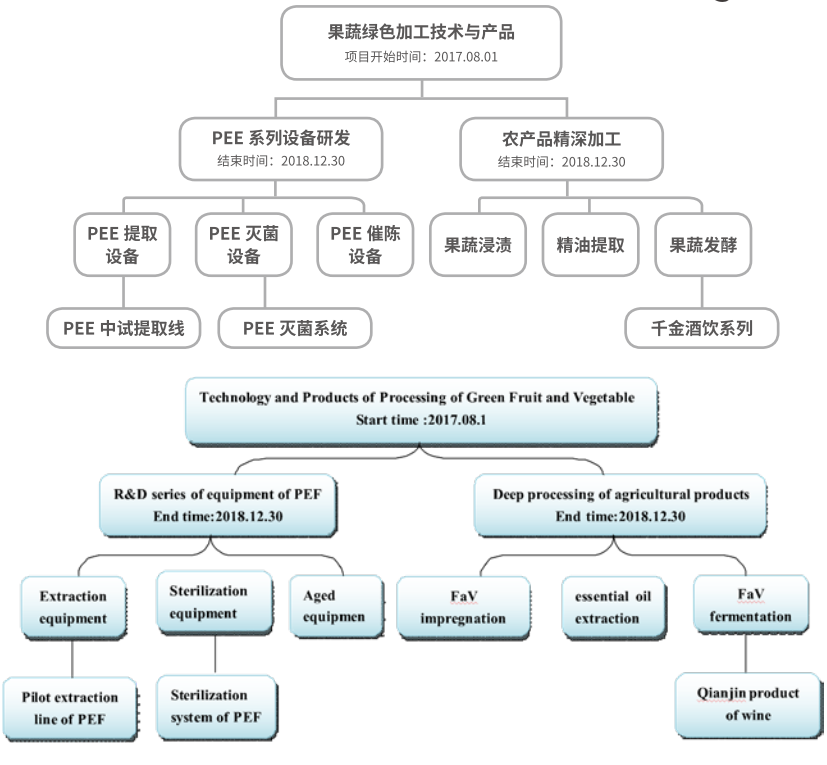
- 研发脉冲电场强化农产品植物细胞破壁提取设备，实现与工业生产线的高度契合
- 针对传统柚皮精油提取过程所利用有机溶剂及高耗能，采用脉冲电场破壁辅助水溶液提取柚皮精油，实现全流程绿色无污染
- 实现柑橘类水果果皮及囊衣等副产物的综合利用，大幅提高原料利用率和企业经济效益
- 开发女性保健酒系列，弥补市场女性酒饮空缺，丰富企业产品模式，提高盈利能力

Objectives:

- Development of high voltage pulsed electric field extraction equipment and its production line
- Non-thermal, green extraction of pomelo peel oil by high-voltage pulsed electric field
- Achieve high utilization of citrus peel and improve economic efficiency
- Develop women's wine and beverage products, enrich corporate product categories

项目进展与成果：

Progress and Achievements:



项目未来计划：

- PEF 设备产业化
- 果蔬综合加工
- 车间改造及检测手段智能化
- 食品平台的综合拓展

Future Plans:

- Industrialization of PEF Equipment
- Strengthening research on the processing of functional substances and by-products in fruits and vegetables
- Breakthrough in the fermentation of fruits and vegetables, development of health fruit vinegar

改善痛风系列健康产品的产业化研究

Industrialisation Research of Health Product Series to Improve Gout

项目负责人 Principal Investigator:
任娇艳教授 Professor Ren Jiaoyan
华南理工大学 South China University of Technology

研究目标：

- 天然降尿酸食品功能因子的筛选及相关健康产品的开发和产业化研究
- 中草药活性物质项目研究，制备活性物质并探究其功能和作用机理
- 特医食品研发，开发具有特殊医学用途的食品（产品研发、申请特医许可证）
- 基因技术检测服务，医学遗传学精准分子诊断（申请创业英才项目）

Objectives:

- Screening of natural uric acid-lowering food functional factors; development and industrialization of related health products
- Research on active substances in traditional Chinese medicines; preparation of active substances; and exploration of their functions and mechanisms
- Special medical food research and development; development of foods with special medical uses (product development, application for special medical food licenses)
- Gene Technology Testing Services; Medical and Genetics Accurate Molecular Diagnostics (Application for Entrepreneurial Talents Program)

项目成就：

研发 2 种新产品，发表 9 篇论文，申请 4 项专利

Achievements:

Developed 2 new products, published 9 articles, and filed 4 patents in China

项目未来计划：

- 运用生物可控酶解技术、集成分离纯化技术及质量控制技术，制备出分子量分布明确、功效显著的蛋白活性肽，辅以天然产物活性因子交互作用，在此基础上进一步开发功能因子明确、效果显著的降尿酸产品
- 开展中草药活性物质相关方面研究，功效评价，结构解析，作用机理，产业化应用评估等
- 特医食品研发及生产许可
- 创立第三方基因检测公司，医学遗传学精准分子诊断

Future Plans:

- Continue to integrate product industrialization projects; and R&D and industrialization go hand in hand to accelerate the development of the project
- Carry out research on related aspects of active substances in Chinese herbal medicine, evaluation of efficacy, structural analysis, mechanism of action, evaluation of industrial application, etc
- Special medical food research and development and production license applications
- Creation of third-party genetic testing companies, Medical and Genetics Accurate Molecular Diagnostics

反应挤出改性技术在淀粉功能材料产业化研究中的应用

Application of Reaction Extrusion Modification Technology in Industrialization of Starch-based Functional Materials

项目负责人 Principal Investigator:
刘宏生博士 Dr Liu Hongsheng
华南理工大学 South China University of Technology

项目背景：

反应挤出改性使淀粉改性 / 加工同步进行，具有生产连续，无污染、低能耗等优点，是一种高效、环保加工技术。

Background:

Chemically modified starches with improved properties for non-food applications have seen increasing industrial applications. Among the fabrication processes, reactive extrusion gives rise to improved properties besides advantages such as clean processing, low energy and simple craft.

研究目标：

本项目以自主开发的反应加工体系为核心，利用反应挤出改性技术，构建原料来源及加工方法绿色化的发泡工艺，实现全降解发泡材料的精确控制及高新技术制造。

Objectives:

In this project, basing on the previous systematical study of the phase transitions and rheological of starches, starch-based foam packing material is designed and produced using reactive extrusion supported by the new technology for starch modification.

项目进展与成果：

- 已搭建具有知识产权的淀粉发泡材料示范生产线
- 获第十一届“挑战杯·创青春”全国大学生创业大赛金奖、第三届中国“互联网 +”大学生创新创业大赛银奖、“第五届金博奖创新典范奖”、第四届“创青春”中国青年创新创业大赛三等奖等多项荣誉（图 1），相关淀粉发泡设备和产品受邀参加菜鸟 2018 全球智慧物流峰会 (图 2)
- 发表 SCI 收录学术论文 5 篇，申请国家发明专利 1 项

图 1 获奖证书

Figure 1: Award Certificates

Progress and Achievements:

Our group has developed a new approach for foam product design with natural polymers and established a production line with 1200 tons annual production capacity. The innovation has won several national awards.

图 2 相关淀粉发泡设备和产品受邀参加菜鸟 2018 全球智慧物流峰会

Figure 2: Roadshow at Global Smart Logisitics Summit 2018

利用红酵母经济生产天然类胡萝卜素

A Cost Effective Process for Natural Carotenoids Production from Red Yeast

项目负责人 Principal Investigator:
Professor Chen Wei Ning, William
新加坡南洋理工大学 Nanyang Technological University, Singapore

联合负责人 Co-Principal Investigator:
魏东教授 Professor Wei Dong
华南理工大学 South China University of Technology

研究目标：

本研究的目的是通过使用一种能够生产高含量类胡萝卜素的酵母生产类胡萝卜素，该酵母能够分泌类胡萝卜素，并且能够利用低成本底物和下游酶来生产天然类胡萝卜素。

Objectives:

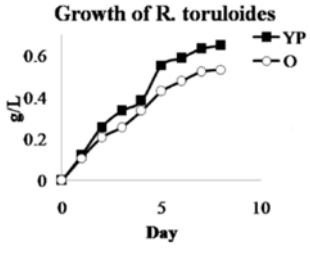
In this study, the goal is to produce natural carotenoids by using a high carotenoids producing yeast which is also capable of secreting carotenoids, a low cost substrate, and a downstream enzymatic step to harvest the carotenoids.

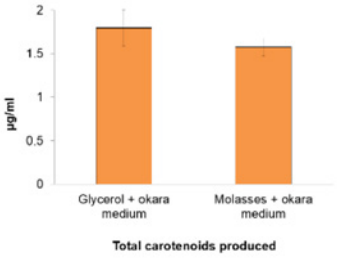
项目进展与成果：

• 开始在废糖蜜和豆渣培养基中培养红酵母来生产类胡萝卜素。在这种培养基下酵母能够生长，这表明酵母利用这些低成本的食品副产品作为培养基是可行的。转运蛋白基因已成功整合到红酵母的基因组中;
• 开始测试红酵母的各种应激条件以提高类胡萝卜素的产量并开始对类胡萝卜素酶反应提取系统进行初步研究；
• 与新加坡一家养鸡场合作测试类胡萝卜素油溶液。开始准备类胡萝卜素油样品，以测试其在鸡饲料中的潜在用途。

Progress and Achievements:

• When using molasses as a carbon source and to bioconvert okara into a nitrogen source, red yeast started growing in molasses and okara media. Yeast growth has shown viability of use of these food byproducts as low cost media. Transporter gene has been successfully integrated into the genome of the red yeast strain;
• The team has begun testing of various stress conditions for red yeast to increase carotenoids production and preliminary studies on enzyme addition for carotenoid extraction system;
• For the in vitro quantitation and analysis of antioxidant and anti-cancer activities of carotenoids, the team has managed to partner with a Singaporean chicken farm to testing of carotenoids oil and began preparing carotenoids oil samples for testing of potential use in chicken feed.





Carbon source	Nitrogen source	Intracellular (μg/ml)	Secreted (μg/ml)	**Total carotenoids** (μg/ml)
Glycerol	Okara	0.4	0.7	**1.8**
Molasses	Okara	1.2	0.2	**1.6**

项目未来计划：

• 进一步优化用于类胡萝卜素生产的废糖蜜和豆渣培养基浓度；酶添加量和提取时间和红酵母的各种应激条件将进行进一步优化培养参数
• 改良红酵母菌株的稳定性和生长试验
• 开始进行体外试验以定量分析类胡萝卜素对癌细胞的抗癌和抗氧化活性

Future Plans:

• Further optimization of media concentrations for carotenoid production, enzyme addition amount and time and culture parameters is in progress
• Testing of stability and growth of modified red yeast strain
• In-vitro testing for quantitation and analysis of anti-cancer and antioxidant properties of carotenoids on cancer cells

一种新型保健食品剂型“被膜功能巧克力”的开发

Development of a New Health Food Dosage Form “Coated Functional Chocolate”

项目负责人 Principal Investigator:
黄强教授 Professor Huang Qiang
华南理工大学 South China University of Technology

研究目标：

- 解决传统巧克力中功能活性成分易受破坏，如鱼油、维生素 E、虾青素等功能成分易被氧化，降低活性，甚至产生变质；多不饱和脂肪酸含量高的功能油脂如鱼油 DHA 在常温下不凝固，无法自成稳定的形状。使产品具有较长的货架期，满足作为保健品的销售周期
- 解决传统糖衣和明胶膜与功能巧克力的健康诉求的矛盾，糖衣主要成分是蔗糖，导致高热量致龋齿的不健康影响，明胶膜咀嚼性差，为此，研究一种特别的被膜，以解决以上的不利影响

Objectives:

- To address the issues that (i) functional active components in traditional chocolate are easily damaged, and (ii) functional fats with high levels of polyunsaturated fatty acids fails to form a stable shape at room temperature so as toincrease the shelf life of these products
- To solve the contradiction between traditional icing and gelatine film and the health demands of functional chocolate

项目进展与成果：

技术方面：

- 研发了具有抗疲劳功效的玛咖巧克力以及维生素 C 含量丰富的刺梨巧克力
- 通过变性淀粉和卡拉胶复配，采用一种新工艺制备一种新型被膜，改善了被膜的咀嚼性增加其可接受性，并申请了一项专利

产业化方面：

- 完成 GMP 洁净食品生产车间装修
- 完成产业化设备购置和生产线整体调试，运行良好
- 与国内保健品龙头企业建立了合作，中试产品得到客户认可

Progress and Achievements:

Technological:

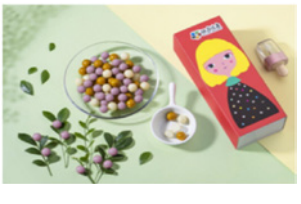
- Incorporated anti-fatigue effect of maca and rich vitamin C into chocolate
- Developed a new coating with improved chewability and filing a patent for it

Commercial:

- Renovated a GMP clean food production workshop
- Completed the industrialization of the production line
- Established cooperation with Infinitus

椰乳钙巧克力
Calcium chocolate

瓜拉纳巧克力
Guarana chocolate



刺梨巧克力
Roxburgh rose chocolate

白芸豆巧克力
White kidney bean chocolate

项目未来计划：

- 扩大生产并优化中试样品
- 完善孵化企业的人员招聘和管理制度
- 增大产品的市场推广力度等

Future Plans:

- Expand production and optimize pilot samples
- Increase staff recruitment for the incubated enterprise
- Increase product marketing efforts

风味良好的功能性水解蛋白的产业化技术研究项目目标

Researches on the Industrial Application of Functional Protein Hydrolysate with Better Flavour

项目负责人 Principal Investigator:
李理教授 Professor Li Li
华南理工大学 South China University of Technology

项目目标：

获得以下 3 种产品的生产技术并实现产业化：
① 无苦味、低过敏原的深度水解大豆蛋白肽
② 高分散性、低过敏原的深度水解乳清蛋白
③ 高分散性、无不良风味的（水解）植物蛋白

Objectives:

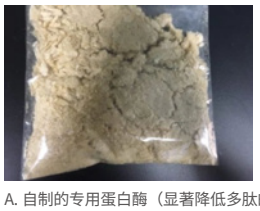
Establish manufacture technology of 3 peptide products that shall have the following characteristics: ① deeply hydrolyzed soy protein peptides without bitterness and allergen reaction; ② hydrolyzed milk whey protein with better dispersibility in water and without allergen reaction; ③ hydrolyzed vegetable protein peptides without bitterness and allergen reaction.

项目进展与成果：

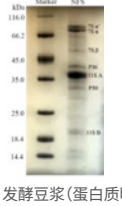
- 获得了一种从腐乳中提取制备大豆多肽的方法，该多肽产品分子量在 3000D 以下，具有抗氧化和抑制肝癌细胞、乳腺癌细胞生长的活性，没有苦味等特点；
- 制备了一种具有脱苦作用的专用蛋白酶制剂，用这种复合蛋白酶制备的多肽苦味值明显降低；
- 分离、鉴定并保存了 70 多株乳酸菌和酵母菌，可用于水解蛋白专用功能菌种筛选。其中哈尔滨乳杆菌 M1 能深度水解大豆蛋白，并具有潜在的降低多肽苦味的能力；
- 正在注册公司。公司名：广州理格致生物科技有限公司，注册资金 200 万元。其中，中新国际联合研究院将持有 5% 的股份。

Progress and Achievements

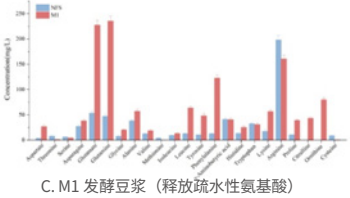
- A method for the preparation of soybean peptides from sufu, a traditional Chinese fermented soybean curd, was developed. The peptide product, with the molecular distribution of 500D-3000D, without bitterness, possesses the antioxidant activities and the function of inhibiting the growth of liver cancer and breast cancer cells;
- A kind of special protease preparation with the function of removing bitterness was prepared;
- More than 70 strains of lactic acidic acid bacteria and yeast were isolated, identified and preserved, which could be used as functional strain resource for the special culture screening. The special culture has the ability to hydrolyze protein to small peptides without bitterness taste;
- Registering a company, named"Guangzhou Ligers Biotechnology Co., Ltd", for industrial production.



A. 自制的专用蛋白酶（显著降低多肽的苦味）
A.Self-made special protease.
(Reduce bitterness of peptides)



B. M1 发酵豆浆（蛋白质明显降解）
B. Fermented soy milk by M1.
(Hydrolyze soy protein)



C. M1 发酵豆浆（释放疏水性氨基酸）
C. Fermented soy milk by M1
(Free hydrophobic amino acid)

项目未来计划：

- 改进专用酶制剂的制备方法，并实现深度水解大豆多肽产品的产业化
- 进一步筛选具有催化蛋白质降解和降低多肽苦味的菌种，获得 1-3 个专用菌株及其生产技术
- 以专用酶制剂和专用菌种为工具，以大豆蛋白、乳清蛋白和玉米蛋白为底物，制备风味好、分散性好的功能性多肽产品。其中，多肽功能性包括低过敏性和降血脂

Future Plans:

- Improve the preparation method of special enzyme preparation, and realize the industrialization of deeply hydrolyzed soybean peptides product without bitterness
- Further screening strains with catalytic protein degradation and peptide bitterness reduction
- Prepare functional peptides, including hypoallergenic and lipid-lowering, with special enzyme and strain as tool, and soy protein, whey protein and corn protein as substrates

食品与生物行业用酶制剂开发

R&D and Production of Enzyme Products for Food and Biological Processing Objective

项目负责人 Principal Investigator:
胡松青教授 Professor Hu Songqing
华南理工大学 South China University of Technology

联合负责人 Co-Principal Investigator:
Dr Yonggui Gao
新加坡南洋理工大学 Nanyang Technological University, Singapore

研究目标：

- 创建食品与生物工业酶制剂研究开发平台
- 开发一批食品与生物行业用高端酶制剂及配套产业化技术
- 培养一批相关领域的专业技术人才
- 孵化一个制造和销售食品与生物行业用酶制剂的科技型企业，具备一定的盈利能力

Objectives:

- To establish a platform for the R&D and production of industrial enzyme products
- To develop a series of high-end enzymes for food and biological processing and the corresponding production technologies
- To cultivate a group of professional talents
- To incubate a profitable technology-based enterprise in manufacturing and selling of enzymes for food and biological processing

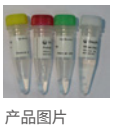
项目进展与成果：

- 一种降血压活性酵母酶解产物。体内外试验证明，酵母酶解产物具有明显的降血压活性，对正常血压无显著影响；
- 一种核酸扩增酶制剂。(i) 检测灵敏度高，对比测试试验证明，qPCR 荧光值和扩增效率优于进口主流知名品牌；(ii) 贮藏稳定性高，酶活保质期为 2 年，达到国际标准；
- 开发了一款高性能的耐热型高保真 DNA 聚合酶。产品耐受抑制剂的能力强，可在抗凝血或常规滤纸收集的血液中直接扩增 DNA，适用于基因型疾病诊断和亲子鉴定分析；
- 开发了一系列 microRNA 定量检测相关酶制剂。microRNA 定量检测可为疾病筛查、预防、诊断及治疗提供参考。

Progress and Achievements:

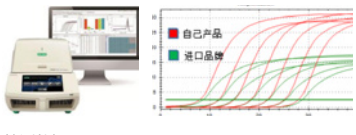
- A yeast enzymatic product with antihypertensive activity;
- A nucleic acid amplification enzyme with the following characteristics: (i) comparative test have shown the fluorescence value and amplification efficiency of qPCR were better than those of imported mainstream brands; (ii) shelf life of enzyme activity is 2 years, reaching the international standard;
- A heat-resistant high-fidelity DNA polymerase. It has strong ability to tolerate PCR inhibitors, and can directly amplify DNA in blood collected by anticoagulation or conventional filter paper;
- A series of enzyme preparations related to microRNA quantitative detection, which can provide a reference for screening, prevention, diagnosis and treatment of disease.

产品图片
Product pictures

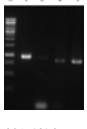


产品图片
Product pictures

产品图片
Product pictures



检测数据
Test data



检测数据
Test data

产品图片
Product pictures

项目未来计划：

- 科技开发方面：以市场为导向开发涉及食品安全检测、动物源性检测、转基因检测和生物医学检测等领域新型酶制剂产品和技术；积极完成降血压酵母酶解产物制备技术的中试；建立现有酶制剂产品的生产体系及质检质控体系
- 技术推广方面：面向国内外推广降血压酵母酶解产物制备技术，实现技术转化
- 技术服务方面：在原有技术服务基础上，开展 mRNA、microRNA 及长链非编码 RNA 的定量检测、T7 体外转录合成 RNA、肠道微生物菌群分析等技术服务
- 产品推广方面：加大资金及人员投入，建立品牌效应；建立销售系统网；拓展销售渠道
- 企业融资方面：积极寻求融资渠道，扩大生产和销售规模

Future Plans:

- Science and technology development: Market-oriented development of new enzyme preparation products and technologies; complete the pilot test of preparation techniques for antihypertensive yeast enzymatic products; establish a production system and quality control system for existing enzyme preparation products
- Technology promotion: Promote the production technology of antihypertensive yeast hydrolysate products at home and abroad to realize technology transformation
- Technical service: Extending the current technical services to cover quantitative detection of mRNA, microRNA and long-chain non-coding RNA, T7 transcription synthesis of RNA in vitro, and analysis of intestinal microflora., etc
- Product Promotion: increase capital and personnel input; effective promotion of products and technical services to establish brand effect
- Enterprise Financing: actively seek financing channels to expand the scale of production and sales

污染控制与环境修复

Pollution Control and Environmental Restoration

以华南理工大学挥发性有机物污染治理技术与装备国家工程实验室和南洋理工大学环境与水源研究院、新加坡环境生物工程中心雄厚的科研力量为依托。建设多学科融合、多技术集成的重大研发与应用平台。平台将有效整合创新资源，加强产学研用结合，共同突破一批关键共性技术。显著提升国家环境污染控制装备标准规范体系建立和技术与装备系统标准化水平，为培育和发展战略性新兴产业提供科技支撑。

Leveraging the strength of the National Engineering Laboratory for VOCs Pollution Control Technology and Instrumentation, Nanyang Environment & Water Research Institute (NEWRI) and Singapore Centre on Environmental Life Sciences Engineering (SCELSE), this platform is to establish a multi-disciplinary and multi-technology platform for research, development and applications. The platform will integrate various resources to strengthen tri-helix collaboration model involving industries, academics and research institutions in an innovative manner with the objectives to solve technical challenges with disruptive technologies, hence promoting the sustainable clean environments.

VOCs 回收的吸附浓缩 - 冷凝 - 提纯技术与成套装备

Adsorption Concentration-Condensation-Purification Technology and Equipment of VOCs Recovery

项目负责人 Principal Investigator:
叶代启教授 Professor Ye Daiqi
华南理工大学 South China University of Technology

联合负责人 Co-Principal Investigator:
Professor Hu Xiao
新加坡南洋理工大学 Nanyang Technological University, Singapore

研究目标：

- 研发在技术和应用方面具有创新性的系列环境功能材料，以适应不同工况下的有机废气；并进行相应的中试与市场推广
- 研发、设计和制造与各系列的环境功能材料相匹配的有机废气净化装置与设备；并进行相应的调试、运行与市场推广

Objectives:

- Environmental functional materials: Research and development; application to adapt to different operating conditions of VOCs waste gas; pilot test and market promotion
- VOCs waste gas purification facility: Research and development; design and manufacture and matching with various series of environmental functional materials; test and market promotion

项目进展与成果：

- 基于 环境功能材料、治理装备的开发，结合团队的多年工程服务经验，提出“VOCs 智慧管家”新型治理模式，当前在广东顺德、江西九江、福建莆田等工业园区已有初步合作意向；
- 蜂窝状催化剂已在包装印刷、化工等行业中进行性能测试；
- 疏水复合吸附剂已在部分包装印刷企业进行应用。

Progress and Achievements:

- Introduced a new management mode of "VOCs smart housekeeper" . The company has preliminary cooperation in Shunde(Guangdong), Jiujiang(Jiangxi), Putian(Fujian);
- The honeycomb catalyst has been tested in packaging, printing, and chemical industries;
- Hydrophobic composite absorbent applied in packaging and printing enterprises.

项目未来计划：

- 对不同系列的吸附剂和蜂窝状催化剂进行推广与更大规模的产业化
- 废气净化吸附、催化、冷凝、脱附再生系统优化及其推广与应用
- 园区整体解决方案的推广
- 环境监测服务的推广（国家第二次污染普查、企业污染情况排查摸底等）

Future Plans:

- Popularization and industrialisation of different series of absorbents and honeycomb catalysts on a larger scale
- Optimization, popularization and application of VOCs purifying facility
- Promotion of integrated solution for industrial parks
- Promotion of environmental monitoring services

工业废水高效节能及资源化技术研发与产业化

R&D and Industrialisation of High-efficiency & Energy-saving Treatment and Recycling Technology for Industrial Waste Water

项目负责人 Principal Investigator:
万金泉教授 Professor Wan Jinquan
华南理工大学 South China University of Technology

联合负责人 Co-Principal Investigator:
Assistant Professor Zhou Yan
新加坡南洋理工大学 Nanyang Technological University, Singapore

• 研究目标：

建立三套设备：

- 工业废水厌氧处理技术与装备 1 套，实现维持厌氧颗粒污泥浓度提高 20%，处理有机负荷提高 10-20%，CODCr 降解效率提高 30% 以上
- Fe0 催化活化 PS 高级氧化深度处理工业废水技术与装备 1 套，废水 COD 的去除率超过 80%
- 基于模糊 -BP 神经网络的工业废水处理智能控制系统 1 套，实现废水处理系统出水的最优反馈控制，相对于未使用智能控制系统可节能 30%

Objectives:

Establish three sets of equipment:

- Industrial wastewater anaerobic treatment technology and equipment that is capable of increasing(i) the anaerobic granular sludge concentration by 20%, (ii) the treatment of organic load by 10-20%, (iii) the Dichromate chemical oxygen demand (CODCr) degradation efficiency by more than 30%
- Fe0 catalytic activated persulfate (PS) advanced oxidation depth processing industrial wastewater technology and equipment that has a Chemical Oxygen Demand (COD) removal rate exceeding 80%
- An intelligent wastewater treatment system based on fuzzy- BP neural network that shall lead to 30% saving in energy

• 项目进展与成果：

- 设计了废水处理污水处理智能化实验系统架构图
- 构建了基于自适应模糊神经网络和 BP 神经网络的出水水质预测模型，预测误差小于 5%
- 设计了基于模糊神经网络控制的溶解氧混合控制模型结构图

Progress and Achievements:

- Established an architectural design of the experimental intelligent system for wastewater treatment
- Constructed a water quality prediction model based on Adaptive fuzzy neural network and BP neural network that has a predictive error of less than 5%
- Established an architectural design of dissolved oxygen mixing control model based on fuzzy neural network control

• 项目未来计划：

- 控制及通讯模块连接，环保机器人初步智能化运行
- 环保数据的云计算及人机对话的实现策略
- 产业化

Future Plans:

- Connection of control and communication modules; preliminary operation of the intelligent environment-protection robot
- Cloud computing of environmental data and establishment of implementation strategy of man-machine dialogue
- Commercialisation of the technology

餐厨垃圾的能源 / 资源回收及零固体排放的集成工程系统示范

An Integrated Prototype Engineering System for Food Waste Valorization towards Zero-solid Disposal and Energy/Resource Recovery

项目负责人 Principal Investigator:
Professor Liu Yu
新加坡南洋理工大学 Nanyang Technological University, Singapore

联合负责人 Co-Principal Investigator:
韦朝海教授 Professor Wei Chaohai
华南理工大学 South China University of Technology

研究目标：

- 设计一个餐厨垃圾能源 / 资源回收及零固体排放的集成工程系统
- 优化整个集成工程系统，为工业应用提供设计和运行指导
- 实施经济可行性分析

Objectives:

- To design a pilot integrated engineering system for enhanced energy and resource recovery with zero-solid disposal
- To optimize the pilot integrated engineering system for generating design and operation guidelines for industrial applications
- To conduct economic feasibility analysis

项目进展与成果：

- 餐厨垃圾的能源 / 资源回收及零固体排放的集成工程系统已经建立完毕 (图 1)。系统的固态发酵和水解单元也已进行优化 , 溶解 COD 的浓度能够达到 146.6g/L, 是后续厌氧消化回收甲烷的极好原材料；
- 餐厨垃圾水解产物中剩余固体的各项参数（图 2）显示固体残渣中的氮磷钾和重金属含量满足中国有机肥标准，证明利用此技术处理餐厨垃圾后产生的固体残渣是一种高质量且安全的生物有机肥；
- 目前已有多家企业肯定了本技术的产业化前景。

Progress and Achievements:

- The integrated engineering system for food waste valorization towards zero-solid disposal and energy/resource recovery (Fig.1) is completed. With team's optimization of solid-state fermentation and hydrolysis units, 146.6 g/L of SCOD with excellent potential for subsequent methane production can be produced;
- NPK and heavy metals contents of solid residue from the hydrolysates meet the standard of Chinese Organic Fertilizer (Fig 2), suggesting the produced solid residue could be considered as a high-quality and safe biofertilizer;
- Some companies have affirmed prospects on the industrialization and commercialization of this technology.

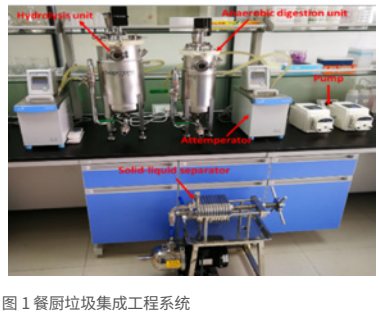


图 1 餐厨垃圾集成工程系统
Figure 1 FW integrated engineering system

指标	NY525 2012 中国国家标准	固态生物有机肥
镉 (mg kg^{-1})	≤3	0.07
汞 (mg kg^{-1})	≤2	-
铅 (mg kg^{-1})	≤50	0.2
铬 (mg kg^{-1})	≤150	0.3
砷 (mg kg^{-1})	≤15	0.1
总有机质 (wt %)	≥45	48.17
总氮 (wt %)	≥5	4.87
总磷 (P_2O_5) (wt %)		2.75
总钾 (K_2O) (wt %)		0.75
pH	5.5-8.5	5.6

图 2 餐厨垃圾制备的固态有机肥的特征
Figure 2 Characteristics of the solid produced from the FW at 8-h pretreatment times with fungal mash

项目未来计划：

- 优化集成工程系统的厌氧消化单元
- 对该餐厨垃圾集成处理系统进行经济可行性分析
- 与相关企业探讨该技术产业化的可能性和进行商业化合作讨论

Future Plans:

- Optimization of anaerobic digestion unit in the integrated engineering system will be conducted in the next stage
- Economic conomic feasibility analysis of the whole integrated engineering system
- Discussion with potential collaborators on the possibility of commercialization of this technology will be conducted

基于新型响应性非氨类汲取液的正渗透零液体排放技术

Zero Liquid Discharge Technology Based on Forward Osmosis with a New Non-Ammonium Responsive Draw Solute

项目负责人 Principal Investigator:
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新加坡南洋理工大学 Nanyang Technological University, Singapore

联合负责人 Co-Principal Investigator:
叶代启教授 Professor Ye Daiqi
华南理工大学 South China University of Technology

• 研究目标：

• 本项目致力于研发与调控非氨类响应性汲取液，研究稳定循环状态下废水浓缩倍数及实现单位体积废水零液体排放的能耗最小化，并将其使用于正渗透技术以处理工农业废水。由于自主开发的响应性汲取液渗透压极高，废水可以被浓缩至接近饱和，而且膜表面的污染层相比于反渗透更易去除。汲取液仅需低品位热能和少量电能再生。正渗透技术大幅降低了废水体积，如需零液体排放，也大幅减少了后续蒸发过程中的能量消耗。

Objectives:

This project aims to develop non-ammonium draw solute for its utilization in forward osmosis (FO) to treat industrial or agricultural wastewater. It involves the study of the waste stream volume-reduction performance at steady-state of FO system, as well as minimization of the unit energy consumption for waste stream zero liquid discharge. With the team's draw solute, almost all the energy requirement for the entire FO process can be met with low grade waste heat source and operation cost is expected to be much lower. Moreover, FO enabled by the draw solute would not encounter problems including highly soluble ammonium salts in water and toxic gas pollution.

• 项目进展与成果：

• 项目主要实验人员已就位，正渗透实验室级别装置在搭建中；
• 项目已开展闭循环正渗透与汲取液再生工艺模拟；
• 项目团队也与几家相关企业与工业伙伴密切洽谈合作。

Progress and Achievements:

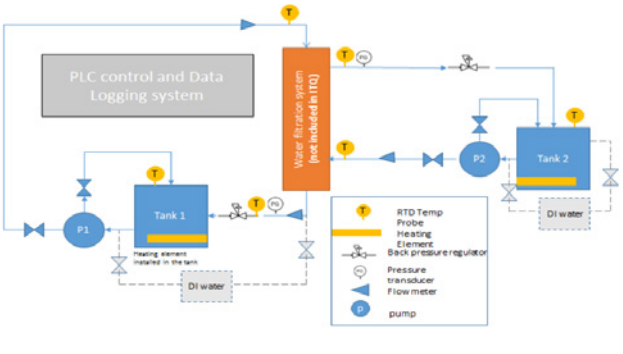
• With key research personnel in place, the project team is establishing the laboratory-scale FO capability;
• Modelling and simulation efforts on closed-loop FO and draw solute regeneration are on-going;
• Several potential collaborative partners have been engaged for subsequent scaling-up and pilot testing of FO process.

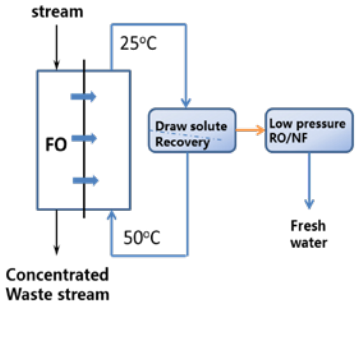
• 项目未来计划：

• 短期内将针对不同废水 / 原料液开发及优化新型非氨类汲取液并且演示整合或半闭循环正渗透与汲取液再生系统；
• 长期目标为寻求与企业或工业伙伴共同搭建中试正渗透系统。

Future Plans:

• In the short term, the team will develop and optimize non-ammonium responsive draw solute for different types of wastewater and feed solutions;
• The team will actively establish collaboration with potential industrial partners for setting up pilot-scale FO system.





纳米铬渣中铬的分离回收工艺示范与行业推广

Demonstration and Promotion of Recycling Separation Technology of Chromium from Cr(VI)-containing Nano Residue

项目负责人 Principal Investigator:
林璋教授 Professor Lin Zhang
华南理工大学 South China University of Technology

联合负责人 Co-Principal Investigator:
Professor Xiong Qihua
新加坡南洋理工大学 Nanyang Technological University, Singapore

研究目标：

- 铬赋存关键纳米矿物材料微观鉴别
- 关键纳米矿物快速生长的人工调控
- 晶体生长过程中铬的释放与分离
- 发展纳米晶快速生长分离回收铬的共性科学原理
- 技术推广与规模化工程示范

Objectives:

- Microscopic identification of key nano-mineral materials in chromium deposits
- Artificial manipulation of the growth of key nano-minerals
- Establish the release and separation mechanisms of chromium during crystal growth
- Establish the common scientific principles for the rapid growth of nanocrystals and the separation of chromium
- Technology promotion and large-scale engineering demonstration

项目进展与成果：

- 示范线设计，施工及调试运行，并完成吨级中试
- 开发新材料 2 种（将铬渣脱毒后的粉末形成新产品，同时研发其在农田重金属钝化等行业的应用）、新工艺技术 1 项（形成分离和回收六价铬的成套技术方案）
- 获得技术服务收入 40 万人民币

Progress and Achievements:

- Design, construction and commission of demonstration line and completed medium scale testing
- Developed two new materials (transform the detoxified chromium slag powder into new products), and a set of technological solution (separation and recovery of hexavalent chromium)
- Technological service revenue of RMB 400,000

项目未来计划：

- 制定钠盐行业铬渣资源化处理规范和行业标准
- 在江西兰太、四川岷江雪等氯酸盐企业进行应用推广和多家公司支持
- 扩大研究对象。从氯酸盐铬渣推广到铬盐铬渣、电镀铬渣等

Future Plans:

- Establish the specifications and industry standards for the treatment of chromium slag in the sodium salt industry
- Promote technological adoption and seek support from companies
- Expand the research targets, extending the technology to chromium salt chromium slag and electroplated chromium slag, etc

科研成效
Achievements

产业化成果
Commercialisation

孵化企业
Incubated Companies at SSIJRI

新能源 New Energy

新向 （广州）氢能科技有限公司

Xin-Xiang (Guangzhou) Hydrogen Technologies Co., Ltd.

利用南洋理工大学曾少华教授团队的燃料电池技术，致力于为中国与世界燃料电池市场提供高性能的纳米催化剂，膜电极等燃料电池关键材料与核心部件。

Leveraging the advanced fuel cell technologies of Professor Chan Siew Hwa and his team from NTU Singapore, Xin-Xiang (Guangzhou) Hydrogen Technologies Co., Ltd. is one of the pioneer high-tech spin-offs incubated at Sino-Singapore International Joint Research Institute, which focuses on developing and manufacturing high quality and cost competitive fuel-cell related materials and key products including nano-catalysts, catalyst-coated membrane, etc.

新材料 New Materials

广州绿发材料科技有限公司

Guangzhou GreenF Materials Technology Co., Ltd.

利用华南理工大学余龙教授团队的热塑性淀粉发泡材料技术，解决缓冲包装带来的白色污染问题，打造高效环保包装材料及产品的供应链体系。

Aiming to tackle the white pollution problem in the fast-growing e-commerce business in China, Guangzhou GreenF Materials Technology Co., Ltd. is committed to produce environmental-friendly protection packaging materials and provide product supply chain system based on advanced biomass material technology - thermoplastic starch. The technology was invented by Professor Yu Long and his team from South China University of Technology.

绿色建筑与智慧城市 Green Buildings and Smart Cities

广州华建工智慧科技有限公司

Guangzhou Smart Building Technology Co., Ltd.

由华南理工大学和新加坡南洋理工大学 BIM 中心成员组成的核心技术团队，以”互联网 +” 为驱动，面向房屋建筑，市政建设等工程，提供涵盖设计、施工、运维全过程的 BIM 咨询，产品研发与技术服务，助力建设领域的信息产业化进程。

With high calibre scientists in Building Information Modeling (BIM) from both SCUT and NTU Singapore, Guangzhou Smart Building Technology Co., Ltd. provides BIM consulting services to housing and infrastructure projects in different phases from design, construction to operation.

食品科技 Food Technology

广州心安食品科技有限公司

Guangzhou Xin'an Food Technologies Co., Ltd.

自主研发设计出脉冲电场提取、灭菌和催陈设备，广泛应用各种华南特色水果加工，其果酒方面至今已开发出诺丽、荔枝、桑葚、百香果、五果酒等产品，并于与湖南千金集团等国内知名企业开展广泛的技术合作。

With the patented high voltage pulsed electric field extraction and fermentation equipment from Professor Zeng Xin' an and his team from SCUT, Guangzhou Xin' an Food Technologies Co., Ltd. is now in cooperation with leading industry partners such as Zhuzhou Qianjin Group to jointly develop fruit wines using seasonal fruits in southern China.

环保科技 Environmental Protection

广州双树环保科技有限公司

Guangzhou Ditree Environmental Protection Technology Co., Ltd.

利用具有自主知识产权的一体化高效物化处理器，高效厌氧反应设备，好氧生物处理技术和基于 PS 的高级氧化深度处理等核心技术，为中国十六个省（区）的近百家企业提供环保技术服务和解决方案。

With key technologies such as high efficiency phusical-chemical reactor, high efficiency anaerobic treatment technology, aerobic treatment technology and advanced oxidation treatment technology, Guangzhou Ditree Environmental Protection Technology Co., Ltd. is providing environmental solutions to about 100 companies in 16 provinces in China.

生物科技 Biomedical Technology

广州英赞生物科技有限公司

Guangzhou EnzyValley Biotech Co., Ltd.

专注于高端生物酶制剂的研发和生产，产品涉及分子生物工具酶（科研、检测及诊断用）及配套试剂盒、生物型面粉改良酶制剂、酵母多肽和多糖等酶工程营养健康食品；同时面向生物医药行业开展分子生物学、细胞生物学及结构生物学等领域的技术服务。

Guangzhou EnzyValley Biotech Co., Ltd. focuses on the development and production of high-end enzymes, products related to molecular biological tool sets for research, testing and diagnosis. It also produces other enzyme foods and provides technical services in areas such as molecular biology, cell biology and structural biology to biomedical companies.

广州菲勒生物科技有限公司

Guangzhou Feile BioTechnology Co., Ltd.

广州菲勒生物科技有限公司以水解蛋白、益生菌、保健及特医食品和化妆品新原料开发为核心，集研发、生产、零售、商贸为一体的轻资产型集团企业。

Guangzhou Feile BioTechnology Co., Ltd. specialises in R&D, production and retail of hydrolytic protein, probiotics and other health food.

合作伙伴
Collaboration Partners

1 广州绿发材料科技有限公司
Guangzhou GreenF Materials Technology Co., Ltd.

2 南京大学盐城环保技术与工程研究院
Nanjing University & Yancheng Academy of Environmental Protection Technology and Engineering

3 株洲千金药业股份有限公司
Zhuzhou Qianjin Pharmaceutical Co., Ltd.

4 佛山市海天（高明）调味食品有限公司
Foshan Haitian (Gaoming) Flavouring & Food Co., Ltd.

5 佛山市顺德区恒锐环保设备有限公司
Foshan Shunde Hengrui Environmental Protection Equipment Co., Ltd.

6 广州英赞生物科技有限公司
Guangzhou EnzyValley Biotech Co., Ltd.

7 广州市朴道联信生物科技有限公司
Guangzhou Pudao Lianxin Biotechnology Co., Ltd.

8 南洋国际俱乐部有限公司
Nanyang International Club Pte. Ltd.

9 无限极（中国）有限公司
Infinitus (China) Company Ltd.

10 香港科技大学
Hong Kong University of Science and Technology

11 香港浸会大学
Hong Kong Baptist University

12 内蒙古兰太实业股份有限公司
Inner Mongolia Lantai Industrial Co., Ltd.

13 澳门建信集团
Rockone Group

14 湖南农业大学
Hunan Agricultural University

15 广州医药研究总院有限公司
Guangzhou General Pharmaceutical Research Institute

16 中山大学中山眼科中心
Zhongshan Ophthalmic Center

17 江苏集萃药康生物科技有限公司
GemPharmatech Co., Ltd.

专利
Patents

	专利名称 Patent	申请号 Patent Application No.	发明人 Patent Owner	专利类型 Patent Type	法律状态 Status
1	恒温连续快速微波反应系统 A homothermal continuous and rapid reaction system heated by microwave	201821446744.6	周卫江、曾少华 Dr Zhou Weijiang Prof Chan Siew Hwa	实用新型 Patents for Utility Model	● 已受理 Application accepted
2	一种结合脉冲电场制备红枣酒的生产方法 Method for preparing jujube wine by combining pulse electric field	201811083634.2	曾新安、郑志超、蔡锦林、王强、王琰 Prof Zeng Xin An Mr Zheng Zhi Chao Mr Cai Jin Lin Mr Wang Qiang Ms Wang Yan	发明专利 Patents for Invention	● 初审合格 Passed preliminary examination
3	一种结合脉冲电场协同降低诺尼果酵素中甲醇含量的生产方法 Method for synergistically reducing methanol production in noniguo enzyme by combining pulse electric field	201811083709.7	曾新安、郑志超、蔡锦林、王强、王琰 Prof Zeng Xin An Mr Zheng Zhi Chao Mr Cai Jin Lin Mr Wang Qiang Ms Wang Yan	发明专利 Patents for Invention	● 初审合格 Passed preliminary examination
4	非贵金属催化材料负载的核壳催化剂、制备方法及其应用 The core-shell catalysts supported on non-precious catalytic materials, the synthesis method for the same, and their applications	201811118973.X	周卫江、曾少华、余金礼 Dr Zhou Weijiang Prof Chan Siew Hwa Dr Yu Jinli	发明专利 Patents for Invention	● 初审合格 Passed preliminary examination
5	非贵金属催化电极、膜电极及其制备方法 Non-precious metal catalytic electrodes and the membrane-electrode assembly, and the medod for the same	201811118955.1	周卫江、曾少华、余金礼 Dr Zhou Weijiang Prof Chan Siew Hwa Dr Yu Jinli	发明专利 Patents for Invention	● 初审合格 Passed preliminary examination

已发表论文
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2. *Amjad Ali, Fengwei Xie, Long Yu ,Hongsheng Liu, Linghan Meng, Saud Khalid, Ling Chen, Preparation and characterization of starch-based composite films reinfoced by polysaccharide-based crystals, Composites Part B: Engineering, Volume 133, 15 January 2018, Pages 122-128*

3. *Liang Zhang, Long Yu, Hongsheng Liu, Yanfei Wang, George P. Simon, Zhili Ji, Jianya Qian, Effect of processing conditions on microstructures and properties of hydroxypropyl methylcellulose/hydroxypropyl starch blends, Food Hydrocolloids, Volume 70, September 2017, Pages 251-259*

4. *Meng, L.; Liu, H. ; Yu, L.; Khalid, S.; Chen, L.; Jiang, T.; Li, Q., Elastomeric foam prepared by supercritical carbon dioxide. Journal of Applied Polymer Science 2017, 134 (4).*

5. *Zhili Ji, Long Yu, Hongsheng Liu, Xianyang Bao, Yanfei Wang, Ling Chen, Effect of pressure with shear stress on gelatinization of starches with different amylose/amylopectin ratios, Food Hydrocolloids, Volume 72, November 2017, Pages 331-337*

6. *Xiaoyan Ge , Long Yu , Zengshe Liu , Hongsheng Liu , Ying Chena, Ling Chen, Developing acrylated epoxidized soybean oil coating for improving*
moisture sensitivity and permeability of starch-based film, International Journal of Biological Macromolecules,Volume 125, 15 March 2019, Pages 370-375

7. *Saud Khalid, Long Yu,Mingyue Feng, Linghan Meng, Yuting Bai, Amjad Ali, Hongsheng Liu, Ling Chen, Development and characterization of biodegradable antimicrobial packaging films based on polycaprolactone, starch and pomegranate rind hybrids, Food Packaging and Shelf Life, Volume 18, December 2018, Pages 71-79*

8. *Amjad Ali, Ying Chen, Hongsheng Liu, Long Yu, Zulqarnain Baloch, Saud Khalid, Jian Zhu, Ling Chen, Starch-based antimicrobial films functionalized by pomegranate peel, International Journal of Biological MacromoleculesAvailable online 13 September 2018, In Press, Corrected Proof*

9. *Qingfei Duan, Linghan Meng, Hongsheng Liu, Long Yu, Kai Lu, Saud Khalid, Ling Chen, One-step extrusion to minimize thermal decomposition for processing PLA-based composites, Journal of Polymers and the Environment,January 2019, Volume 27, Issue 1, pp 158–164*

10. *Xianyang Bao, Long Yu, George P. Simon, Shirley Shen, Fengwei Xie, Hongsheng Liu, Ling Chen, Lei Zhong, Rheokinetics of graft copolymerization of acrylamide in concentrated starch and rheological behaviors and microstructures of reaction products, Carbohydrate Polymers, Volume 192, 15 July 2018, Pages 1-9*

11. *Wei Shan Lim, Kenneth Chen, Tsung Wen Chong, Gordon Minru Xiong, William R. Birch, Jisheng Pan, Bae Hoon Lee, Pei Shan Er, Abhijit VijaySalveka, Subbu S.Venkatraman, Yingying Huang, A bilayer swellable drug-eluting ureteric stent: Localized drug delivery to treat urothelial diseases, Biomaterials,Volume 165, May 2018, Pages 25-38*

12. *Ee-Hua Wong, Johan Liu, Design analysis of adhesively bonded structures, Polymers, 2017, 9(12), 664*

13. *熊 犍, 谢丽平, 张 婷, 梁明, 袁尔东, 任娇艳, 改善记忆中草药与核桃肽的相互作用研究. 华南理工大学学报自然科学版, TS201.4*

14. *袁尔东，常博，陈志锋 ，任娇艳 ，酿造酱油储藏期间呈味分子变化研究. 中国调味品, TS264.21*

15. *Xiaoling Lin, Yunjun Lu, Ting Zhang, Ming Liang,Yueyan Cen, Erdong Yuan ,Jiaoyan Ren, Accuracy and precision comparison for molecular weight distribution assay of fish collagen peptides: a methodology study between two gel permeation chromatography columns. Food Analytical Methods, 2019,12(1):246-257.DOI:10.1007/s12161-018-1356-1.*

16. *Xiaoling Lin, Liu Yang, Min Wang, Ting Zhang , Ming Liang, Erdong Yuan , Jiaoyan Ren, Preparation, purification and identification of cadmium-induced osteoporosis-protective peptides from chicken sternal cartilage.Journal of Functional Foods, 2018, 51:130-141. DOI:10.1016/j.jff.2018.09.036.*

17. *Yujuan Li, Xiaoyan Kang, Qingyong Li, Chuanchao Shi, Yingyi Lian, Erdong Yuan, Mao Zhou, Jiaoyan Ren, Anti-hyperuricemic peptides derived from bonito hydrolysates based on in vivo hyperuricemic model and in vitro xanthine oxidase inhibitory activity. Peptides, 2018, 107:45-53. DOI:10.1016/j.peptides.2018.08.001.*

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19. *Fang Xie ,Qiang Huang, Fang Fang, Siqian Chen, Zhigang Wang, Kai Wang, Xiong Fu, Bin Zhang, Effects of tea polyphenols and gluten addition on in vitro wheat starch digestion properties, International Journal of Biological Macromolecules, Volume 126, 1 April 2019, Pages 525-530*

科研设施
R&D Facilities

研发和孵化场地
R&D and Incubation Facilities

- 研发大楼 10000 平方米
  R&D Headquarters at Yonghe (10,000 m²)

- 快能达孵化园 2500 平方米
  Incubation Space at Kuainengda (2,500 m²)

- 腾飞园 2500 平方米
  R&D Space at Ascendas OneHub GKC (2,500 m²)

- 研究院永久大楼 （在建）
  SSIJRI Permanent Building (Under Construction)

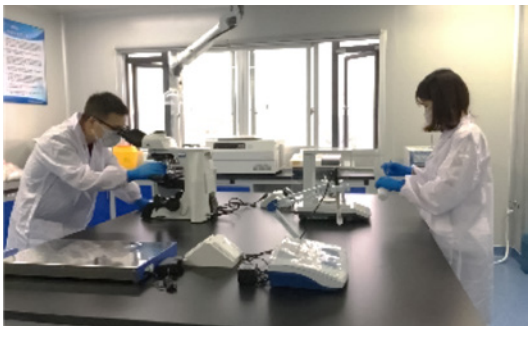
  位于知识城南起步区的核心区域
  Located at the core of southern start-up area of CSGKC

  总面积 Total Area
  25,000 m²

实验室设施
Lab Facilities

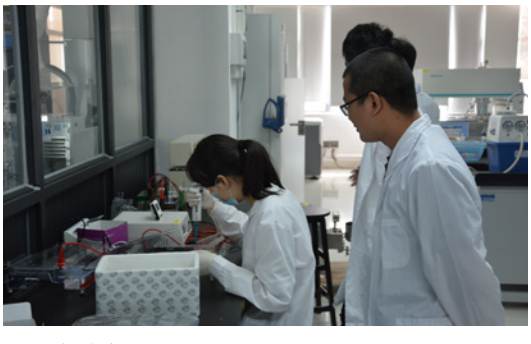
实验室 23 间 A total of 23 labs are built under the 6 research platforms, including:

VOCs 研发实验室
VOCs Lab

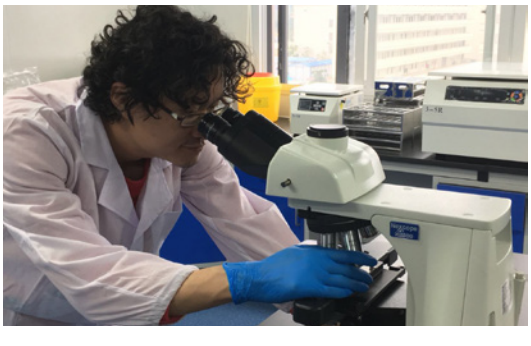


新能源研发实验室
New Energy Lab

功能性蛋白与活性肽研究室
Functional Protein & Peptide Lab



果酒实验室
Fruit Wine Fermentation Lab



生物医用材料实验室
Biomedical Materials Lab

生物酶研发实验室
Bio-enzyme Lab

发展数据
Facts and Figures

产业化项目 Innovative Projects

44
总启动项目数
Total Number of Projects

RMB ≈100,000,000
启动项目金额
Total Project Funding

RMB 6,500,000
承担政府项目金额
Special Government Grant

23
已建成实验室
Number of Laboratories

32
两校联合项目数
Total Number of SCUT-NTU Joint Projects

科研成果 Achievements

19
发表论文
Publications

5
专利申请
Patent Application

7
已孵化企业
Incubated Companies

8
新工艺
New Technology

16
新产品
New Products

>10
正在孵化
Incubation in progress

6
技术服务
Technological Support Projects

>10
合作企业
Industry Partners

人才构成 Talents@SSIJRI

1
中科院院士
Member of the Chinese Academy of Sciences

2
新加坡工程院院士
Fellow of the Academy of Engineering Singapore

3
国家级人才（长江学者、杰青、科技部创新领军人才）
National Talent Award Winner in China

2
英国机械工程师学会 George-Stephenson 最高荣誉奖获得者
The Geoge-Stephenson Gold Medal Award Winner, Institution of Civil Engineers, UK

1
新加坡总统科技奖获得者
Singapore President's Technology Award (PTA) Winner

3
教育部新世纪人才
New Century Excellent Talents in University Award Winner

2
珠江学者特聘教授获得者
Pearl River Scholar Professor

71
博士
Doctors

57
硕士
Masters

93
学士
Bachelors

对外交流 Academic Exchange

6
主办学术讲座
Lectures

3
协办大型学术会议
Conferences

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