SINO-SINGAPORE INTERNATIONAL JOINT RESEARCH INSTITUTE

中新国际联合研究院

Annual Report | **年报**
2019

中国 / 新加坡　CHINA / SINGAPORE

SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院

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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.

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SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院

研究院概况
SSIJRI PROFILE

中新国际联合研究院（以下简称“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重大科技合作项目。研究院由中新广州知识城管理委员会、华南理工大学、新加坡南洋理工大学、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。

研究院将以需求为导向，引入华南理工大学、新加坡南洋理工大学，以及国内外知名大学和研发机构的优势科技、人才资源，通过机制创新和科技创新，建立“开放、多元、动态、高效”的创新模式，进一步释放科技资源的活力和创造力，加速国际先进、成熟的技术和产品落地转化。围绕广州市重点发展的IAB、NEM产业，研究院建设了人工智能、生命健康、新能源、新材料、绿色建筑与智慧城市及污染控制与环境修复六大研发平台，引进多个国际合作产业化项目，孵化及引进一批高科技创业企业。

研究院将依托省市区及社会各类资源优势吸纳世界顶尖人才和资源，努力建设成为世界一流的集技术创新与研发、成果孵化与应用于一体的新型研发机构，成为中新广州知识城创新驱动型产业发展的关键引擎，从而提升两国和地区科研、人才的国际化水平，驱动世界范围内的知识转移和科技进步。

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 collaboration platform jointly set up by the China-Singapore Guangzhou Knowledge City Administrative Committee (CSGKC Administrative Committee), South China University of Technology (SCUT), Nanyang Technological University (NTU Singapore) and SSGKC Investment and Development Co., Ltd (GKC Co). The institute is located in Guangzhou Knowledge City, home to many world-class resources for the international collaboration.

Guided by demand, SSIJRI will bring in advanced technologies and top talents from SCUT, NTU Singapore and renowned universities and research institutes home and abroad. An innovative model of ‘Openness, Diversity, Dynamics and Efficiency’ has been established through innovations in mechanism and technology. Such innovative model will further enhance the vitality and creativity in research, and accelerate the local application of advanced and mature international technologies and products. In line with the pivotal IAB and NEM industries in Guangzhou city, the Institute established 6 R&D platforms: Artificial Intelligence (AI), Life and Health, New Energy, New Materials, Green Buildings and Smart Cities, Pollution Control and Environmental Restoration. It has also successfully kick-started over 20 international joint commercialisation projects, incubated and introduced a batch of high-tech start-ups.

Leveraging the massive support from the local governments and the various sectors in the society, SSIJRI has attracted world’s top talents and resources. It strives to build a world-class R&D institute integrating technological innovation, incubation and commercialisation and targets to become the key engine to the innovation-driven industrial development of CSGKC so as to further enhance the internationalisation of research and talents in both countries and the region and facilitate knowledge transfer and technological advancement worldwide.

理事寄语
MESSAGE FROM THE GOVERNING COUNCIL

2015年11月，中新国际联合研究院在中国国家主席习近平和新加坡总理李显龙的见证下签约成立。作为中新两国科技合作的标志性项目，研究院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，致力于国际科技合作和国际技术转移，结合粤港澳大湾区高新技术产业发展需求和发展趋势，将研究院打造成为引领国际科技创新和技术转移的成功典范。

自成立以来，研究院受到各界的关心与支持，广东省省长马兴瑞、新加坡副总理王瑞杰等多位粤新两地领导也莅临考察研究院项目和设施。研究院在国际科技合作和产业孵化方面成效显著，产生了一批原创性的科研成果，引进多项国际高端技术在华转化或者许可，承担了一批省市区科技项目，孵化和引进了包括国家高新技术企业在内的一批高科技企业，被认定为广东省新型研发机构。未来，研究院要坚持以全球视野谋划和推进科技成果转化，通过可转化型研究，努力将实验室基础研究和创新成果与产业应用和市场对接；以更积极、更开放的姿态对接全球科技资源，紧密结合国家和区域发展需求，在人才引进与培养、科学研究、技术转移上继续发力，在互利共赢的路上走出高质量，跑出加速度！

Witnessed by Chinese President Xi Jinping and Singapore's Prime Minister Lee Hsien Loong, the collaboration agreement on the setup of Sino-Singapore International Joint Research Institute (SSIJRI) was signed in November 2015. As a landmark project for scientific and technological collaboration between China and Singapore, SSIJRI builds on the research strengths of Nanyang Technological University, Singapore (NTU Singapore) and South China University of Technology (SCUT), and is devoted to international collaboration in science and technology and technology transfer. In line with the demand and development trend of hi-tech industries in the Greater Bay Area, SSIJRI aims to become a role model for international scientific and technological innovation and technology transfer.

Since its establishment, SSIJRI has received significant support and attention from all sectors, and Guangdong Governor Ma Xingrui, Singapore Deputy Prime Minister Heng Swee Keat as well as other senior officials from Guangdong Province and Singapore have personally visited SSIJRI facilities and were briefed on its progress. SSIJRI has achieved remarkable results in international collaboration in translational research, technology commercialisation and incubation, and developed a spectrum of innovative technologies to be applied in respective industries. The institute has successfully facilitated the licensing of several international cutting-edge technologies in China. In addition to the competitive grants awarded by the provincial and municipal governments, SSIJRI has incubated a number of hi-tech enterprises, including one that has won the High and New Technology Enterprise (HNTE) status. SSIJRI has also been recognised as the "New R&D Institution" by the Guangdong Science and Technology Department. Going forward, SSIJRI should commit to the commercialisation of scientific and technological achievements with a global perspective, and focus on innovative translational research, transforming laboratory basic research into applicable and marketable solutions for society-at-large. SSIJRI should continue to connect with global scientific and technological resources with a more active and open attitude, closely integrate with national and regional development needs, and expand the scale and scope of talent attraction and development, scientific research, and technology transfer to create a win-win situation for all stakeholders with high quality and sustainable growth.

朱敏 教授
理事会联席主席
Professor Zhu Min
Governing Council Co-Chair

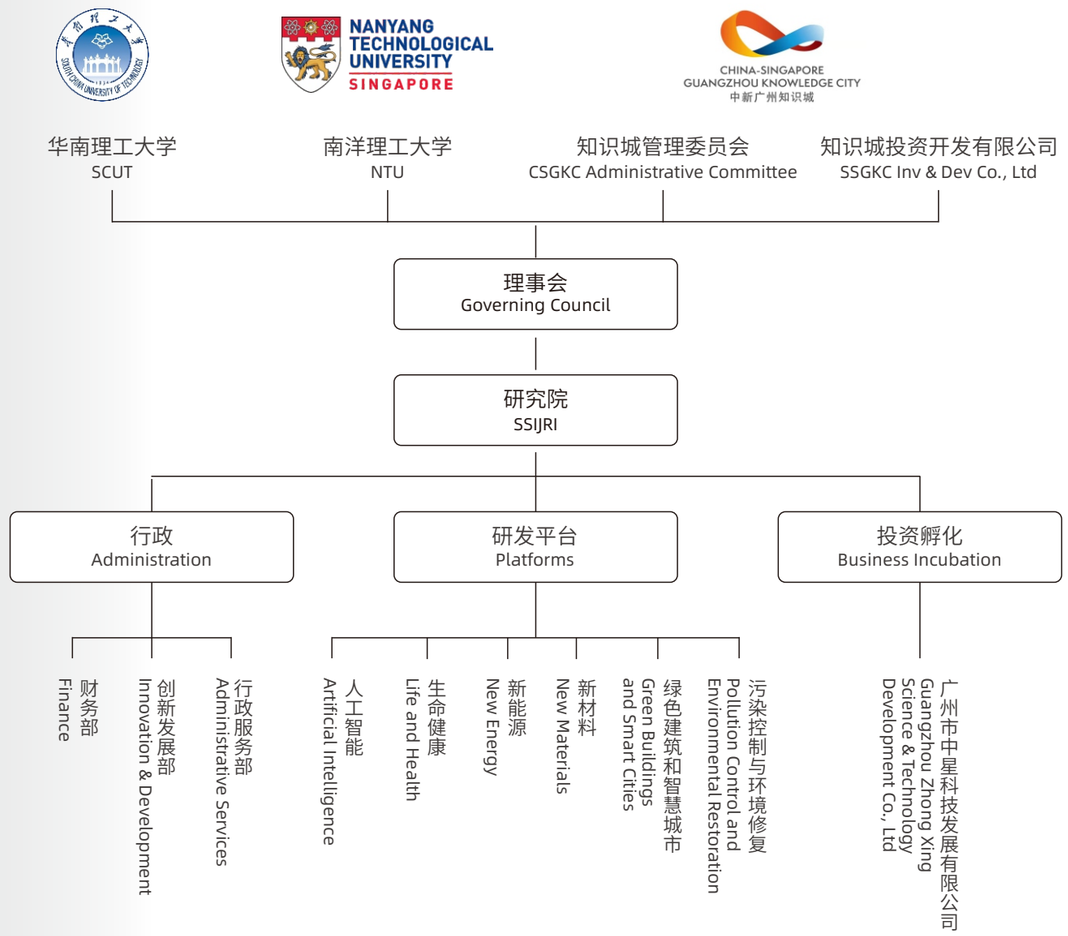
蓝钦扬 教授
理事会联席主席
Professor Lam Khin Yong
Governing Council Co-Chair

徐晖 先生
理事
Mr Xu Hui, Cheston
Governing Council Member

翁文炳 先生
理事
Mr Ang Boon Peng
Governing Council Member

SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院

管理架构
GOVERNANCE STRUCTURE



理事会成员
GOVERNING COUNCIL MEMBERS

朱敏 教授
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

Professor Zhu Min
Governing Council Co-Chair, SSIJRI
Vice President, South China University of Technology

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高级副校长(研究)

Professor Lam Khin Yong
Governing Council Co-Chair, SSIJRI
Senior Vice President (Research), Nanyang Technological University, Singapore

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, SSIJRI
Deputy Director General, CSGKC Development and Construction Office

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高级总监

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

SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院

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 先生
副院长（行政）

Mr Xie Xinghua
Vice Director (Administration)

顾海文 博士
科研主任

Dr Gu Haiwen
Research Director

年度大事记
YEAR IN REVIEW

领导关怀 LEADERSHIP SUPPORT

1月 新加坡前驻华大使罗家良来访研究院。

Mr Stanley Loh Ka Leung, former Singapore's Ambassador to China, visited SSIJRI.

5月 新加坡副总理兼财政部长王瑞杰来访知识城并听取研究院介绍。

Mr Heng Swee Keat, Deputy Prime Minister and Minister for Finance of Singapore visited CSGKC, and was briefed on SSIJRI's development.

7月 广东省副省长覃伟中调研研究院

Mr Qin Weizhong, Vice Governor of Guangdong Province visited SSIJRI.

8月 新加坡企业发展局局长方章文来访研究院。

Mr Png Cheong Boon, Chief Executive Officer of Enterprise Singapore, visited SSIJRI.

SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院

科研 R&D

1月 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。

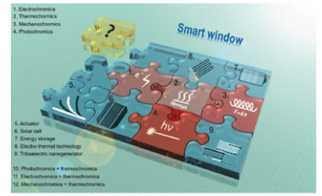
SSIJRI was recognised as the New Research and Development Institute of 2018 by the Department of Science and Technology of Guangdong Province.

3月 入驻团队邢本刚教授课题组在国际顶级学术期刊《自然通讯》*(Nature Communications)* 上发表其相关成果综述论文。

Prof. Xing Bengang and his team published their research results in Natural Communications.

9月 入驻团队龙祎博士课题组在国际顶级学术期刊《先进能源材料》*(Advanced Energy Materials)*（2018年影响因子：24.88)上发表相关成果综述论文。

Dr. Long Yi and her team in SSIJRI published their research results in Advanced Energy Materials (2018 impact factor: 24.88).



12月 研究院4个项目获2019年广州市高端外国专家引进项目补助支持。

Four SSIJRI projects were awarded the High-end Foreign Experts Project subsidy.

研究院3个项目获广东省重点领域研发计划项目立项支持。

Three SSIJRI projects were awarded the Guangdong Province Key Areas Research and Development Project Fund.

年度大事记
YEAR IN REVIEW

产业化进展 COMMERCIALISATION PROGRESS

8月

研究院主办、广州开发区知识产权协会承办的中新国际联合研究院项目路演活动（新加坡南洋理工大学专场）在科学城举行。

Supported by Guangzhou Development District Intellectual Property Association, SSIJRI held the roadshow for NTU-led Projects in Science City, Guangzhou.

孵化企业派虎科技获第五届中国“互联网+”大学生创新创业大赛广东省分赛金奖。

Guangzhou Paihu Technology Co., Ltd., a start-up company in SSIJRI, won the Gold Medal of the 5th China “Internet+” University Students’ Innovation and Entrepreneurship Competition.

研究院与湖南汇富康达健康管理研究院签订共建“湖南汇富康达健康管理研究院-中新国际联合研究院联合研发中心”协议。

SSIJRI and Hunan Huifukangda Health Management Research Institute signed the Strategic Cooperation Agreement to set up the joint research center.

研究院与广东华清园生物科技有限公司共建“南药活性物质与利用国际研发中心”，并于研究院举行签约暨揭牌仪式。

SSIJRI and Guangdong Huaqingyuan Biotechnology co-founded the Nanyao Active Pharmaceutical Ingredients Development Centre, and held the signing and plaque unveiling ceremony.

11月

研究院分别在广州、东莞、深圳三地作为主办方举办项目路演活动（新加坡南洋理工大学专场）。

SSIJRI hosted project roadshows for NTU-led projects in Guangzhou, Dongguan and Shenzhen.

发展数据
FACTS AND FIGURES

产业化项目 Innovative Projects

44 总启动项目数 Total Number of Project	**>100,000,000 RMB** 科研投入 Funding for Research Facilities	**42** 已建成的实验室 Number of Laboratories
13 承担政府项目数量 Approved Government-Funded Projects	**3** 联合实验室 Joint Laboratory	**24** 两校联合项目数 Total Number of SCUT-NTU Joint Projects

科研成果 Research Results

68 发表论文 Publications	**32** 合作伙伴 Industry Partners	**35** 专利申请 Patent application
15 技术服务 Technological Support Projects	**18** 已孵化企业 Incubated Companies	**5** 专利授权/转让 Patent licensing/assignment

国际交流 International Exchange

8 学术讲座 Lectures	**6** 学术会议 Conferences	**5** 路演 Road Show

发展数据
FACTS AND FIGURES

高层次人才 Top Talents

1

中科院院士

Fellow of the Chinese Academy of Sciences

4

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

3

英国皇家化学会会士

Member of the Royal Society of Chemistry

3

教育部新世纪人才

New Century Outstanding Talent by China's Ministry of Education

2

珠江学者特聘教授获得者

Distinguished Professor of Guangdong Pearl River Scholars Programme

1

汤森路透“全球最具有影响力的科学思想家”获得者"

The World's Most Influential Scientific Minds" award by Thomson Reuters

1

东盟工程技术研究院院士

Fellow of the ASEAN Academy of Engineering and Technology

人才构成 Profile of Talents

126

博士
Doctors

118

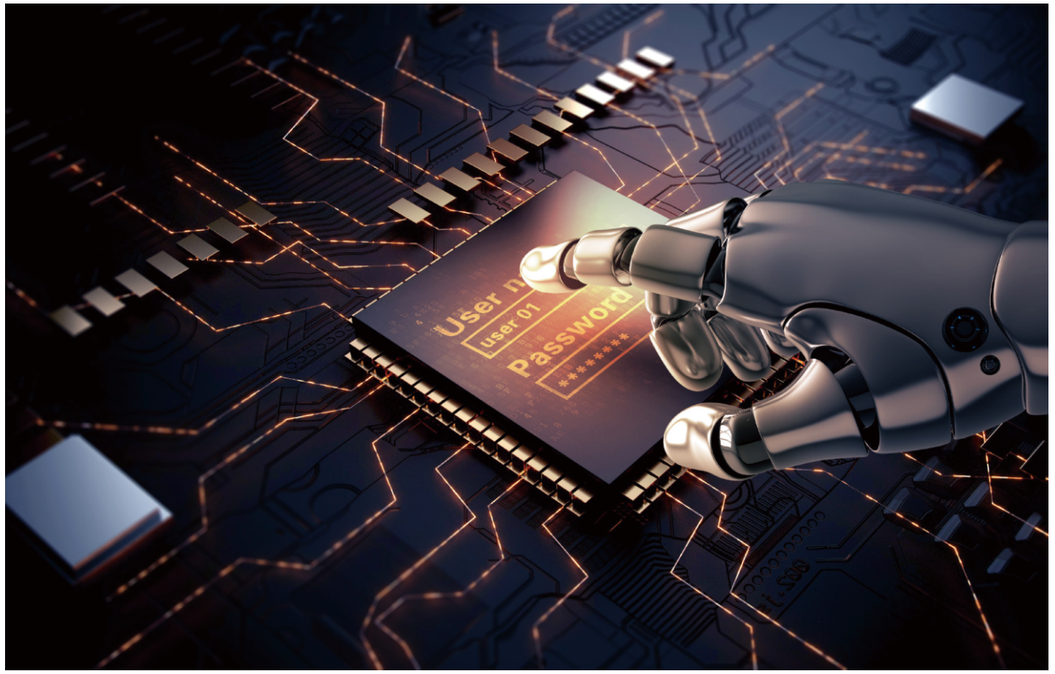
硕士
Masters

160

学士
Bachelors

注：所选列项目大多属于多学科交叉的研发课题，根据其下游产业化应用可在各大研发平台之间有机流动，具体合作需求可直接与研究院接洽。

Note: Most of the projects listed in this annual report involve interdisciplinary R&D. For specific collaboration needs, please contact SSIJRI directly.



人工智能研发平台
Artificial Intelligence R&D Platform

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、健康乐龄、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 R&D 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 real-world applications like intelligent fintech, health and ageing, smart transportation, safe city, and bioinformatics. With the advantages of the Academia-Industry collaborative research model, the technologies obtained from this platform are expected to make significant contribution to the rapid development of the AI industry of Guangdong province.

飞机牵引车智能辅助感知系统
An Intelligent Assistive Perception System for Pushback Tractor

项目负责人 Principal Investigator:
王郸维 教授 新加坡南洋理工大学
Prof. WANG Danwei, NTU Singapore

联合项目负责人 Co-Principal Investigator:
裴海龙 教授 华南理工大学
Prof. PEI Hailong, SCUT

项目介绍

本项目旨在利用传感器和机器人系统来促进机场作业的自动化和智能化，从而降低人力开支，提高作业效率，减少碰撞事故，优化机位布局。本项目的实施可以极大提高机场的自动化和智能化程度，降低运营成本，为机场更高效安全的运作打下坚实基础。

Introduction

This project aims to use smart sensors and robot systems to promote the automation and intelligent operation at airports; and in turn reduce manpower cost, improve operational efficiency, avoid collisions, and optimise the use of airport apron. Implementation of this project upgrades the efficiency and safety level of the airport operation while reducing the overall management cost.

创新点

◎ 通过多传感器融合和智能算法替代了人工观察员，减少了人力成本，并提升了感知的视域范围，丰富了牵引车操作员对作业环境的感知信息，为牵引车操作员更好地发现可能出现的碰撞提供了准确的信息。

◎ 通过彩色相机、热感相机与激光雷达的融合向牵引车操作员提供更加精准的飞机与障碍物之间的相对位置关系，同时，对于夜晚光照较弱，人工感知能力下降的问题，通过激光雷达与热感相机提供的信息加以弥补，确保感知的稳定性。

Innovation

◎ Adopting multi-sensor fusion and AI algorithm to replace manual observation withreduced manpower cost, increased perception range, and more perceived and accurate information on the environment for the tractor driver to avoid collision.

◎ Integration of colour cameras, thermal cameras and LiDAR provides exact relative positions between the pushed plane and the obstacles to the driver. Meanwhile, degeneration of human perception capacity at night is compensated by LiDAR and thermal cameras.

产业化应用

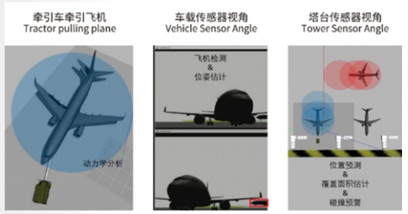
◎ 多源多目标3D智能识别摄像头（套件）：通过多目专业视频传感器（具备夜视功能），结合内置的AI算法，自动识别视界范围内的主要物体的类型，并主动获取各个物体在三维空间中详细的空间位置和运动状态。产品可应用于防碰撞系统、动作分析、特种机器人、辅助机器人等。

◎ 车载智能安全应用辅助控制平台：面向终端使用者的多应用集成平台，具有良好的人机交互界面，可根据不同应用场景的需要安装对应的辅助控制APP，例如防撞预警应用、安全距离监测应用、三维空间扫描应用等。

Commercialisation

◎ A multi-source and multi-target 3D intelligent camera (kit): by utilising professional video sensors (equipped with night vision) with built-in AI algorithm, cameras can automatically identify objects within visual field, and actively obtain spatial position and motion pattern of each object in 3D. This product can be used in collision avoidance, motion analysis, special robots, assistant robot etc.

◎ An intelligent safety assistant control platform: a multi-application integration platform for terminal users, with good human-computer interaction interface, and adaptable for installation of corresponding auxiliary control applications according to the needs of different application scenarios, such as collision warning, safety distance monitoring, 3D space scanning application, etc.



技术模块 Technical Module

智能安全预警平台（室内功能展示）Intelligent Collision Warning Platform（Indoor Demo）

数据驱动的人群行为建模技术及其应用
Data-driven Crowd Modeling and Its Applications

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项目介绍

人群行为建模技术在公共场所应急管理和异常行为检测等领域有广泛应用，针对现有的人群仿真系统在使用时需要手动设置大量的参数和规则，建模过程比较繁琐和耗时，系统的通用性和智能化水平亟待进一步提高。本项目拟开展数据驱动的人群行为智能建模技术研究，利用前沿的人工智能技术，研发出具有较高的通用性和智能化水平的人群仿真系统。

Introduction

Crowd modeling techniques have been widely used in many areas such as emergency control and abnormal behaviour detection in public places. It has received extensive attentions from both governments and academia. However, current crowd modeling systems require lots of parameters and rules to be manually set up in advance, which is time-consuming and tedious. The project team proposes data-driven crowd modeling techniques for smart crowd modeling and simulation. Equipped with advanced artificial intelligence methodologies, the proposed data-driven modeling system can improve the efficiency of crowd modeling procedures as well as the quality of the designed model.

创新点

◎ 本项目研发的系统具备基于计算智能方法的行为规则智能挖掘技术，能够从人群轨迹数据中自动学习出通用的人群行为规则，与现有技术相比具备更高的通用性和智能化水平。
◎ 本项目研发的系统具备基于计算智能方法的参数自动校准技术，能够根据传感数据自适应校准模型的参数，具备更高的建模效率和建模质量。

Innovation

◎ The proposed system contains intelligent behaviour rule mining techniques based on computational intelligence methodologies. The proposed techniques can learn general human behaviour rules from human trajectory data. The generality and intelligence of the crowd modeling system can thus be improved.
◎ The proposed system contains automatic parameter calibration techniques based on computational intelligence methodologies. The proposed techniques can automatically calibrate the parameters of the simulation model based on sensor data. The modeling efficiency can thus be increased, and the simulation quality can be improved.

产业化应用

该项目将研发出一套数据驱动的人群行为智能建模系统。该系统可根据传感数据智能学习人群行为规则和校准模型参数，具有较高的建模效率。本项目的研究成果可用于大型公共场所（如火车站和飞机场）的人群行为仿真、公共场所的设计优化和辅助管理密集人群等应用。

Commercialisation

This project intends to develop a new data-driven intelligent crowd modeling system. This system will be able to learn human behavior rules and calibrate parameters automatically and intelligently based on sensor data. Therefore, this system will possess high generality and intelligence level. The system can be applied to important public places (e.g., metro stations, railway stations and airports) for pedestrian simulation, layout design optimisation, and crowd control, etc.

公共场所的分流栅栏布局优化
Optimizationofbarrierin public places

基于传感数据的真实感人群行为仿真
Realisticcrowdsimulation basedonsensordata

生命健康研发平台
Life and Health R&D Platform

依托华南理工大学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，以及合成生物学的重点研发专项，联合南洋理工大学雄厚的研发团队，通过高端国际合作，围绕现代食品生物技术、生物制备与化学修饰相结合的生产技术等方向进行产业化研究。平台将服务于广东省和大湾区生命健康领域的发展，为保障食品、医药的安全和健康提供重要的技术支持和科学依据。

Relying on SCUT's capability in light industrial technology and engineering (ranking No. 1 in China), food science and engineering (ranking No. 3 in China) and the key R&D projects of synthetic biology, as well as NTU's strong R&D team in this field, the platform shall conduct high-end international cooperation on the industrialisation studies of modern food biotechnology, biological preparation and chemical modification, etc. It shall support the development of life and health sector in Guangdong as well as the Greater Bay Area, and provide important scientific and technological support to ensure the safety of food and medicine.

超临界低温挤出技术在多孔可溶性大豆蛋白中的应用
Preparation of Soluble Soybean Protein Using Supercritical Fluid Extrusion

项目负责人 Principal Investigator:
余龙 教授 华南理工大学
Prof. YU Long, SCUT

项目介绍

目前市场上速溶大豆蛋白粉的相关产品主要是将豆乳进行杀菌、浓缩、喷雾、干燥后制成，该技术方法反应效率低且加工过程易使蛋白变性失活，影响产品的品质及口感。近年来出现的低温干燥技术为美国（杜邦）及日本（FUJI）等跨国公司垄断，进而使相关产品的价格居高不下。本项目通过研发低温挤出加工装备和超临界流体挤出工艺，自主开发出可连续性生产、低成本、高水溶性（>95%）和易分散的多孔速溶大豆蛋白粉，并建立年产200吨的示范生产线。

Introduction

In current Chinese market, the soy protein-related products are mainly made of soybean milk, which are conventionally processed by a series of technologies including sterilisation, concentration, spraying and drying. However, such method has low reaction efficiency and the produced protein is easily deactivated during processing, which has an undesired influence on the product quality and taste. In recent years, low-temperature drying technology has been monopolised by a few multinational companies such as DuPont from the United States and FUJI from Japan, resulting in high price in related products. The project team designed and developed a new technology with a combination of low temperature reactive extrusion processing equipment and supercritical CO2 to produce instant soy proteins with porous structure, which is water soluble (>95%), low cost, and can be produced continuously.

创新点

传统的喷雾干燥工艺存在蛋白易变性及热敏物质易失活及能耗高等问题，本项目拟采用无损、低能耗、可连续生产的低温挤出喷雾干燥一体化技术，为健康食品产业的发展提供专用蛋白配料解决方案，突破国外专利技术封锁，建立自有知识产权的专用大豆蛋白基料生产技术体系，提高我国食品企业的国际竞争力。

Innovation

The traditional spray drying processing technology has many weaknesses such as protein variability, deactivation of heat-sensitive substance, and high energy consumption, etc. This project intended to adopt a new technology with a combination of low-temperature extrusion and spray drying technology that is non - destructive, low energy consumption and capable of continuously production. It targets to break through the patent technology blockade of some multinational companies such as DuPont and FUJI for the production of special protein ingredients, and will establish a special soybean protein ingredient production technology system with its own intellectual property rights and improve the international competitiveness of food enterprises in China.

产业化应用

◎ 本项目自主开发出可连续性生产、低成本、高水溶性（>95%）和易分散的多孔速溶大豆蛋白粉，并建立年产200吨的示范生产线，预估年产值1000万元。

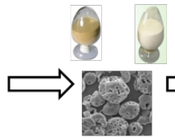
◎ 开发新型低温挤出技术及开发系列功能性大豆蛋白产品，结合商业化推广和资本市场的运作，孵化高新技术健康食品企业。

Commercialisation

◎ The project independently developed instant soybean protein powder with porous structure that can be produced continuously withlow cost, high water solubility (> 95 %) and easy dispersion. The project team has established an industrial production line with an annual output of 200 tons and an estimated annual output value of 10 million RMB.

◎ The project team is developing new low-temperature extrusion technology and series of functional soybean protein products, and plans to incubate high-tech health food enterprises with commercial promotion and capital market operation.

充气低温挤出颗粒化平台技术
Aerated Low Temperature Extrusion Granulation Platform Technology



多孔速溶性功能蛋白（肽）
Porous instant protein functional protein (peptide)

婴儿配方奶粉、特医食品及运动饮料
Infant formula，Food for Special Medical Purpose, and sports drinks

用于癌症诊断和治疗管理的生物仿生技术平台
Biomimetic Technology Platform for Cancer Diagnosis and Management

项目负责人 Principal Investigator:
赵南俊 教授 新加坡南洋理工大学
Prof. CHO Nam-Joon, NTU Singapore

项目介绍

近年来，人们对于研发如何检测血液中的循环肿瘤细胞（CTCs），作为一个非侵入性方法来诊断和预测癌症极为关注。特别是在癌症早期阶段，可以通过确定CTCs分子特征来制定治疗策略，也可以用于分离CTCs以限制治疗后产生的转移现象。用于检测和分离CTCs的临床转化工具的开发将大力推进该领域，最终给患者提供更优质的选择来诊断和预测癌症。

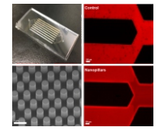
Introduction

In recent years, there has been strong interest in developing methods to detect circulating tumor cells (CTCs) in blood, as a non-invasive means to diagnose and prognosticate cancers. CTC detection offers key advantages over solid biopsies, especially at earlier stages of cancer progression, and the molecular characteristics of CTCs can be determined in order to guide treatment strategies. Such capabilities might also be used to isolate CTCs in order to limit metastasis after surgery or therapy. The development of clinically translatable tools to detect and isolate CTCs would greatly advance the field. The end result would be better diagnostic and prognostic options for patients.

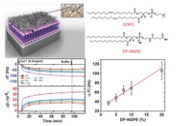
创新点 Innovation

- 开发可以捕获CTCs的微流体装置（图1）
  Microfluidic Device to Capture CTCs (Figure 1)
- 仿生膜涂层（图2）
  Biomimetic membrane coating (Figure 2)
- 细胞捕获或定量（图3）
  Cell capture and quantification (Figure 3)
- 探测功能化（图4）
  Probe functionalization (Figure 4)

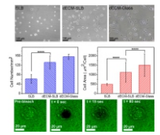
  细胞捕获效率
  Cell Capture Efficiency



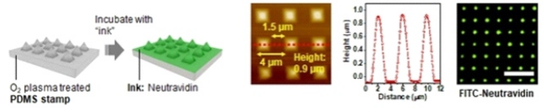
（图1）(Figure 1)



（图2）(Figure 2)



（图3）(Figure 3)



（图4）(Figure 4)

产业化应用

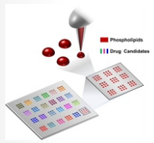
◎ 项目组的创新方法是提供仿生膜涂层，通过降低非特异性细胞粘附来提高纯度，该方法先进性强、使用范围广泛，适合商业化。现已开发了第一代原型(如右图所示)，为CTCs检测和隔离提供下一代标准。

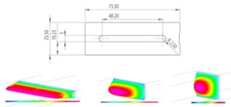
◎ 该试剂盒正在被世界各地的实验室和生物技术公司使用，并将通过该项目以精准医学应用为基准进一步开发，即CTCs检测和隔离技术。

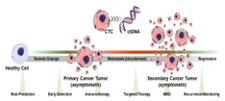
Commercialisation

◎ The project team's innovative approach provides a biomimetic membrane coating to improve purity by reducing nonspecific cell adhesion and uses broadly scalable, state-of-the-art fabrication approaches that are suitable for commercialisation, developed a first-generation prototype as seen on the right and are committed to commercialising the technology platform while providing next-generation standards for CTC detection and isolation.

◎ The above-mentioned microarray kit is being used by academic laboratories and biotechnology companies worldwide and will be further developed in this project to be tailored for precision medicine applications, namely CTC detection and isolation.







龙脑及龙脑衍生产品开发
Development of Borneol and Its Derivative Products

项目负责人 Principal Investigator:
苏健裕 教授级高工 华南理工大学
Professor-level Senior Engineer SU Jianyu, SCUT

项目介绍

本项目通过培育高产天然右旋龙脑（Natural Borneol，NB）树种、改进NB制备技术、提高NB利用率等，解决原料短缺问题；实现高品质、高纯NB制备，副产物高值化利用，以及高端衍生产品开发。

Introduction

This project aims to relieve shortage on raw materials by cultivating high-yield Natural Borneol (NB) tree species, improving NB preparation technology, enhancing NB utilisation rate, etc.

核心技术

◎ 粗脑野外提取及精脑结晶纯化加工技术
◎ 龙脑生产过程副产物高值化利用技术
◎ 龙脑促跨膜吸收多组学联合靶点鉴定分析技术。

Core Technologies

◎ Crude borneol extraction and fine borneol crystal purification technology;
◎ High-value utilisation technology of by-products from the production process of borneol;
◎ Borneol pro-transmembrane absorption multi-omics coupled with target identification and analysis technology.

精脑结晶实物图片
Photo of fine borneol crystal

粗脑提取现场
Crude borneol extraction site

精脑生产现场
Fine borneol production site

龙脑衍生产品实物图
Photo of borneol derivative products

产业化应用

现已与广东华清园生物科技共建联合实验室“南药活性物质与利用国际研发中心”，主要开展科学技术研究、成果转化、产品开发、技术推广和培训。

Commercialisation

Jointly built the Active Pharmaceutical Ingredients Development Centre with Guangdong Huaqingyuan Biotechnology, focusing on scientific technological research, research results transformation, product development, techniques promotion and training.

新型多肽纳米水凝胶生物材料研制及应用
R&D and Cosmeceutical Application of New Degradable Multifunctional Peptide Nano-hydrogel Bio-compounding Materials

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Prof. XING Bengang NTU, Singapore

联合项目负责人 Co-Principal Investigator:
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Prof. CHENG Jianhua, SCUT

项目介绍

多肽是一类由多个氨基酸组成的生命必需活性物质，因其对皮肤抗衰老、修复与再生等有重要作用，目前被越来越多的用于生产高品质的护肤品、医药品等。然而，多肽本身结构的不稳定性、易被体内生物酶降解，以及皮肤的低渗透性等缺点严重影响了它的活性及应用。在本项目中，项目组开发了一种新型多功能，可降解的多肽纳米水凝胶生物复合材料，并详细研究了其在药妆品中的应用。

Introduction

Peptides are vital active substances consisting of multiple amino acids, and have been frequently used in the production of high quality skincare and medicines due to their strong performance in skin anti-aging, restoration and regeneration. However, peptides' activeness and applications are hampered by issues such as unstable structures, easy degradation by in vivo enzyme and low skin absorption. The project team develops a new and multifunctional degradable peptide nano-hydrogel biocomposite material and exploit its applications in cosmeceuticals.

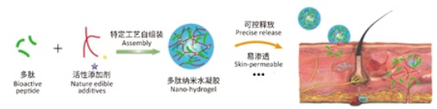
项目创新点

此技术可以在降低费用的基础上，同时提升多肽的多功能生物活性。该技术明显的优势如下:
◎ 该技术利用水凝胶使多肽形成3D形态，提高多肽的稳定性和阻止非特定酶分解。
◎ 该技术可以促进皮肤对多肽的快速高效吸收，并在无副作用的情况下增强组织修复，抗老以及美白功效。
◎ 该纳米水凝胶还具有优异的防紫外损伤、抗氧化和抗菌等功能。
◎ 合成工艺简单且绿色环保、易于工业化批量生产。

Innovation

This technology enhances the multifunctional bioactivities of peptides while reducing cost. Its advantages include:
◎ This technique encapsulates peptides with hydrogel and transforms them into 3D state to improve on peptide stability and resistance to non-specific enzymatic degradation.
◎ This technique facilitates rapid and efficient skin absorption of peptides and enhances tissue repairing, anti-aging and whitening effects without complications.
The nano-hydrogel shows excellent UV protection, anti-oxidation and anti-bacteria performance.
◎ The synthesis process is simple, green, environmentally friendly and mass production ready.

降解多肽纳米医用材料对皮肤作用原理示意图
The effect of degradation of peptide nano-medical materials on skin



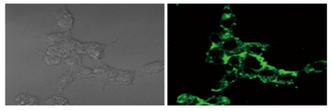
产业化应用

项目组已经申请了专利，目前正在进一步优化配方，实现高品质下工业放大制备，并进一步降低工业化生产成本，使其早日应用到国内大型化妆品企业应用当中。

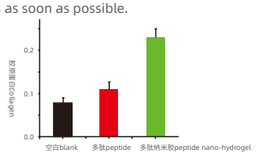
Commercialisation

The project team has applied for patent on the peptide-based hydrogel material. Currently, we are improving on existing recipe to scale up quality production while continue to reduce production cost. Our goal is to introduce this material to the domestic cosmetic enterprises as soon as possible.

多肽纳米凝胶 Peptide nano-hydrogel



细胞高效渗透 Highly-effective penetration into cells



促进胶原蛋白合成 Promotion of generating collagen

蛋白颗粒化及Pickering 乳液技术开发及应用
Development of Protein Colloidal Particle and Pickering Emulsion Platform Technology and Its Application

项目负责人 Principal Investigator:
尹寿伟 教授 华南理工大学
Prof. YIN Shouwei, SCUT

项目介绍

本项目通过研发对撞式反溶剂纳米沉淀平台技术与装备，自主开发低成本、水溶性的醇溶蛋白胶体颗粒制备技术，解决美白类化妆品中功能因子失活、变色问题。通过研发Pickering 乳液模板平台技术，自主开发出低成本的多重乳液制备技术，开发新型具有促进伤口愈合、抗衰老的化妆品。

Introduction

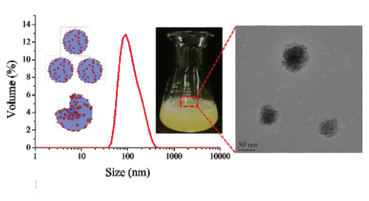
In this project, anti-solvent Flash Nano Precipitation (FNP) equipment was developed to allow low cost production of water-soluble prolamin-based colloidal particles, which resolves the deactivation and discoloration issues of functional factors in whitening cosmetics. Pickering multiple emulsion was developed to formulate a new type of low cost cosmetics that promotes wound healing and anti-aging.

核心技术

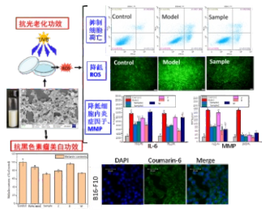
◎ 对撞式反溶剂装备的自主设计与开发，及自组装蛋白制备技术。
◎ 醇溶蛋白基美白化妆品配料制备技术。
◎ Pickering 乳液美白因子多重包埋控释技术。

Core Technologies

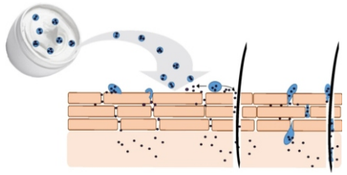
◎ Design and development of anti-solvent Flash Nano Precipitation (FNP) equipment, and preparation technology of self-assembled protein colloidal particles.
◎ Preparation technology for self-assembled prolamin colloidal particles in whitening cosmetics.
◎ Pickering multiple emulsion for controlled release of whitening factors.



纳米银-蛋白基抗菌粒子
AgNP-Protein colloidal particles with broad-spectrum antimicrobial activity



蛋白颗粒抗光老化和美白功效
Protein particles fortified with anti-photoaging and whitening efficacy



蛋白基乳霜的开发和应用
Development and application of protein based cream

产业化应用前景

本项目以氧化白藜芦醇开发天然美白产品具有极高的市场价值。目前，年需求量都在5000万以上。

Commercialisation

This project develops naturally whitening products fortified by oxyresveratrol. The annual demand for such product is over 50 million RMB.

新能源研发平台
New Energy R&D Platform

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，推出新一代的产能、储能、用能及其智能化、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 to provide technical support to the development of energy industry in Guangdong, and to construct technical framework for the supply chain formation required by the commercialisation of new energy devices in the province. This platform will launch a new generation of intelligent, digitalised and miniaturised products for production capacity, energy storage and energy use.

三维非均匀分布的高效长寿命膜电极制备工艺及中试生产

3D Non-uniformly Distributed PEMFC CCM with High Performance and Enhanced Longevity, the Technology for Same and Pilot Scale Production

项目负责人 Principal Investigator:
曾少华 教授 新加坡南洋理工大学
Prof. CHAN Siew Hwa, NTU Singapore

项目介绍

本项目立足于燃料电池的实际操作状况和电化学发生的真实环境，主要面向新型质子交换膜燃料电池所用的膜电极，膜电极性能高，稳定性好，寿命长。有助于明显降低膜电极的成本，大幅度延长电堆系统的使用年限。

Introduction

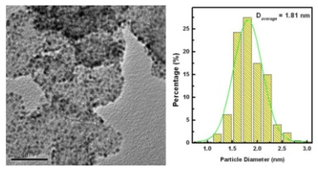
Based on the actual operation conditions and the electrochemical environment, this project focuses on the R&D and pilot scale production of novel PEMFC CCM (catalyst-coated membrane) of which the catalyst layers are produced by many combined methods. That means the higher availability and efficiency of expensive catalyst in practical operation, and higher performance and longer lifespan of CCM and the whole stack system.

创新点

◎ 采用微波-螺旋管组合反应器的催化剂生产新工艺，实现低成本和连续快速生产。
◎ 三维非均匀分布的高效长寿命膜电极制备工艺，可实现膜电极性能高、稳定性好、寿命长。

Innovation

◎ The new process of catalyst mass production by microwave spiral tube composite reactor is adopted to realize low production cost and continuous rapid production.
◎ Three-dimensional non-uniform distribution of high-efficiency, long-life membrane electrode preparation process to achieve high performance, stable and long-life catalyst-coated membrane for PEMFCs.



采用该专利技术制备的催化剂粒径分布
TEM image and particle size histogram of carbon-supported platinum sample produced with the novel procedure

小面积膜电极性能评价测试工作站（左）和大面积膜电极寿命测试工作中（右）。
Small-area single-cell testing station (activity, upper) and large-area single-cell testing station (longevity).

多功能CCM生产机（A4 尺寸，单片生产）
Figure 1. Multi-functional equipment for CCM production (A4 size).

连续双面喷涂膜电极制备设备
The double-side coating machine for the continuous CCM mass production.

制备膜电极的连续超声喷涂设备。
Ultrasonic spraying machine for the continuous CCM production.

制备CCM的另一种设备—超声喷涂设备及喷头(右)
Another CCM machine——ultrasonic spraying coat machine and the nozzle (right).

产业化应用

◎ 目前已申请专利六项；
◎ 与广东合即得能源科技有限公司合作，成立新向(广州)氢能科技有限公司。

Commercialisation

◎ Applied for 6 patents;
◎ Set up joint venture with Guangdong Hydrogen Energy Sci & Tech Co., Ltd., namely Xin-Xiang (GZ) Hydrogen Energy Technologies Co., Ltd.

高性能锂离子电池关键材料与器件的开发和产业化研究

Development of Key Material for High-performance Li-ion Batteries and Devices and their Commercialisation

项目负责人 Principal Investigator:
范红金 教授 新加坡南洋理工大学
Prof. FAN Hongjin, NTU Singapore

联合项目负责人 Co-Principal Investigator:
杨成浩 教授 华南理工大学
Prof. YANG Chenghao, SCUT

项目介绍

本项目将制备用快离子导体包覆的高镍正极材料(NCM, NCA)，通过对其表面改性，优化高镍正极材料的循环稳定性、倍率性能以及安全性能。负极方面，也将使用更高容量的金属基复合材料，通过纳米复合技术改善长循环稳定性和大电流下的倍率性，结合高镍正极材料，最终制备出18650型锂离子电池。

Introduction

This project will develop nickel-rich high-capacity cathode materials (NCM and NCA) modified by fast-ion conductors. We will optimise and enhance the cycle stability, rate capability, and safety property of the cathode. Meanwhile, the project team will choose higher-capacity metal-based materials to match the cathode materials. New 18650 cells will be fabricated based on the new high-Ni NCM cathode and anode materials.

创新点

◎ 采用新工艺制备了高密度球形高镍正极材料，大幅提高了其振实密度；
◎ 全新策略提高了高镍正极材料的界面稳定性和截止电压；抑制阳离子混排；提高锂离子扩散；
◎ 采用金属基复合材料替代传统石墨负极提高比容量，全电池具备快充能力，循环稳定性提升到2000次。

Innovation

◎ New-type spherical Ni-rich cathode materials with pack-density are prepared;
◎ Unique surface modification improves the interfacial stability and cut-off voltage; Cation mixing of host material is suppressed leading to fast ion conduction and diffusion;
◎ Metal-based anode material replaces conventional graphite to improve specific capacity and realises faster-discharging capability. Smartly designed full cells are flexible and stable upon 2000 cycles.

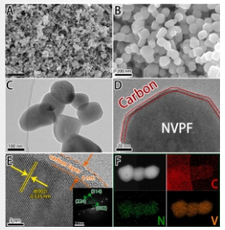


图1
(A-B)扫描电镜图像
(C-D)透射电镜图像
(E)选区电子衍射的高透射电镜图像
(F) NVPF-NC元素分布的透射电子显微镜图像

Fig.1
SEM images
TEM images
HRTEM image with the inset figure of SAED pattern
TEM-EDX elements mapping of NVPF-NC

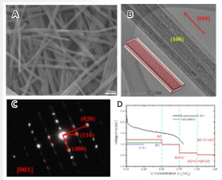


图2
(A) TiO2(B)@PP纳米带扫描电镜图像
(B)电子衍射图像
(C)TiO2(B)纳米带沿[010]轴生长，显露(100)面的HRTEM图像s
(D)TiO2(B)锂化的计算和实验电压分布，0.1C放电到1V的实验电压分布

Fig.2
The SEM images of TiO2(B)@PP nanobelts
The corresponding electron diffraction pattern
HRTEM images of TiO2 (B) nanobelts grew along the [010] axis with significant (100) facets exposed
The calculated and experimental voltage profile of TiO2 (B) lithiation, the experiment profile discharged to 1V at 0.1C.

产业化应用

逐步实现以改性高镍正极材料基18650动力电池的小试、中试及产业化；技术转移等转化行动正在计划中。

Commercialisation

To carry out in phases small-scale tests, pilot tests, and large-scale industrialisation study of 18650-type power battery based on the new electrode materials, Technology transfer and other commercialisation plans are in progress.

以原子层沉积技术制备高质量薄膜的工业应用
Industrial Applications of High Quality Thin Films Deposited by Atomic Layer Deposition

项目负责人 Principal Investigator:
苏培珍 副教授 新加坡南洋理工大学
Assoc. Prof. SU Pei-Chen, NTU Singapore

• 项目介绍

原子层沉积技术（ALD）是一项重要的高质量纳米级薄膜生成技术，在多种工业领域中有广泛的应用。原子层沉积技术的应用范围包括但不限于半导体、医疗设备以及包括太阳能电池，燃料电池在内的储能设备。尤其在芯片加工方面，原子层沉积技术已经成为生成高质量栅氧化层绝缘体薄膜不可或缺的一项技术。

Introduction

Atomic layer deposition (ALD) has evolved to be a very important thin film deposition tool for high quality and nanometer scale thin films in various industry applications. Such applications include but not limited to areas in semiconductors, medical devices, and energy devices like solar cells batteries, and fuel cells. Particularly, in semiconductor foundry, ALD has become an inevitable tool for high quality and fine feature gate oxide insulating layer.

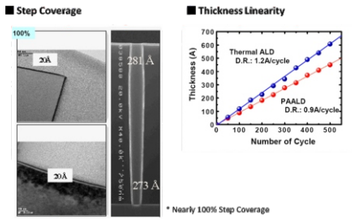
• 核心技术

◎ 所镀的薄膜拥有优秀的3D基板表面覆盖度；
◎ 完整的材料配方库；
◎ 快速及定制化的设备提供能力；
◎ 拥有微型燃料电池的独家生产能力以及多年制造经验。

Core Technologies

◎ The coated film has excellent 3D substrate surface coverage;
◎ Complete material formulation library;
◎ Ability to provide fast and customised equipment;
◎ Exclusive manufacturing capability of micro fuel cells and years of manufacturing experience.

（图1 Figure1）ALD仪器
Atomic Layer Deposition (ALD) Apparatus



（图2 Figure2）
(左) 用ALD仪器和方法所镀的Al2O3具有良好的阶梯覆盖性
(右) 热ALD和等离子辅助ALD均呈现完美的沉积层厚度线性趋势
(left) Superior step coverage of ALD-Al2O3 deposited with our ALD
(right) Excellent thickness linearity of both Thermal ALD and Plasma-assisted ALD

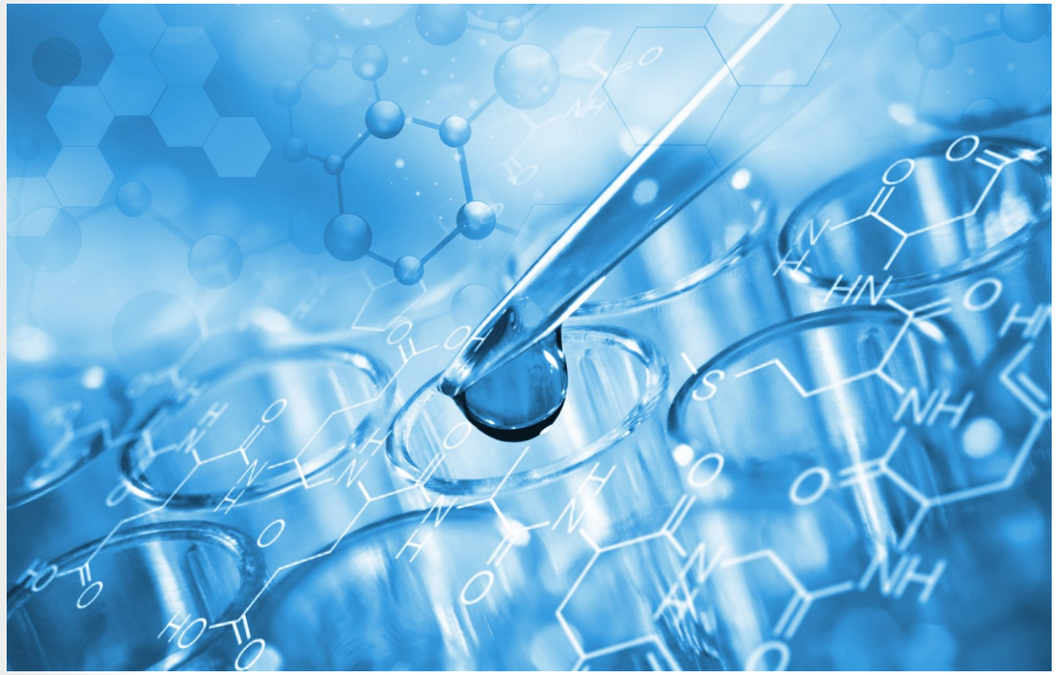
• 产业化应用

◎ Micro-OLED属于微型显示装置，适合用于近距离观看显示装置如虚拟现实眼镜、工业或军事用途装置。更小及更有效率的VR系统促进了Micro-OLED市场的不断扩大。
◎ 本项目生产的高质量ALD薄膜可以有效地密封micro-OLED，减少湿气透过率，以确保高品质的micro-OLED产品，具有很强的市场竞争力。
◎ 丰富完整的材料库（金属，氧化物，氮化物等等），提供各种高端器件所需之高质量镀膜涂层，应用十分广泛。

Commercialisation

◎ Micro-OLEDs are tiny (usually less than one inch in diameter) displays used in near-eye applications - such as VR/AR, industrial and military applications and more. The micro-OLED market is seeing increased interest at these micro-displays which can enable much smaller and more efficient VR systems, compared to the current HMDs which use smartphone-sized OLED display.
◎ The high quality ALD films we developed are capable of encapsulation of micro-OLEDs with superior coverage that ensures a low value of WVTR, which guarantees the quality of the device and therefore can be very competitive in the micro-OLED market.
◎ Our rich material recipe data base including a wide range of metal , oxides, and nitride coating needs, which provides high quality coatings for various devices with a wide range of applications.

SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院



新材料研发平台
New Materials R&D Platform

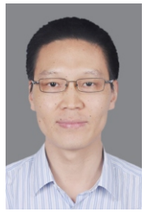
以华南理工大学国家人体组织功能重建工程研究中心、广东省医学工程重点实验室和南洋理工大学卓越生物先进材料和器械研发为依托，汇聚国际顶尖科研团队的资源，逐步完善生物基环保材料、生物医用材料以及植入医疗器械研发到产业化的创新链。平台将不断培育核心技术，解决塑料工业带来的资源和环境问题，并带动生物医用材料及医疗器械的行业创新能力，提升我国新材料源头创新能力。

Leveraging the advanced R&D on materials and medical devices of National Engineering Research Institute for Tissue Restoration and Reconstruction and Guangdong Key Laboratory of Biomedical Engineering of SCUT, and Centre for Excellence for Biology of NTU, gathering resources of the world's leading research teams, and gradually improving the innovation chain of bio-based environment protection materials, biomedical materials and from implant medical device R&D to industrialisation; continuously nurture core technologies, solve problems in resources and environment caused by the plastic industry, drive up the innovation capability of the biomedical material and medical device industries, and improve the innovation capabilities in new material sources of China.

工业规模手性双胍相转移催化制备阿莫达非尼

Industrial Scale-up of Chiral Bisguanidinium Phase-transfer Catalyst for the Preparation of Armodafinil

项目负责人 Principal Investigator:
陈俊丰教授 新加坡南洋理工大学
Prof. TAN Choon Hong, NTU Singapore



联合项目负责人 Co-Principal Investigator:
祝诗发 教授 华南理工大学
Prof. ZHU Shifa, SCUT

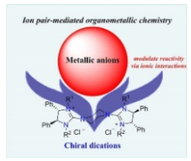
项目介绍

由于不对称相转移和离子对催化具有广泛的反应范围、稳定性和低催化量，因而利于工业应用。最近项目组开发了双胍盐型离子对催化剂并可以应用在各种有机转化。使用过氧水溶液作为氧化剂，手性双胍能很有效的对映选择催化硫醚氧化，阿莫达非尼是一种觉醒促进剂，能够提高觉醒和意识。项目将基于目前的科研基础，致力于将双胍和阿莫达菲尼的制备扩大到工业规模进行公斤级的工艺研究和开发。

Introduction

Due to their broad reaction scope, robustness in scaling up, and low catalyst loading, asymmetric phase-transfer and ion pair catalysts are of industrial interests. Recently the team developed versatile bisguanidinium-type salts-based ion pair catalysts for various organic transformations. The enantioselective sulfoxidation of dialkyl sulfides using aqueous H_2O_2 as the terminal oxidant demonstrates the exemplary catalytic performance of bisguanidinium dinuclear oxodiperoxomolybdosulfate. Armodafinil is the (R)-enantiomer of the modafinil, which is a type of eugeroic drug that promotes wakefulness and alertness. The team plans to extend their work to industrial scale-up of the isolatable and stable bisguanidinium catalyst for the preparation of armodafinil. Process research and development will be carried out for the manufacturing of this active pharmaceutical ingredient in kilo scale.

双胍催化剂BG catalyst



离子对催化Ion-pairing catalysis

公斤级实验室Kilo lab

项目创新点

◎ 只需少量催化剂就可以高选择性的得到手性亚砜，且反应效率极佳；
◎ 由于用的氧化剂是过氧水，唯一的副产品是水，因此该工艺相对环保。反应完全无需柱层析纯化，因此有可能扩大到工业合成生产；
◎ 创建单一的对映异构体而非拆分外消旋混合物，成本更低，效率更高。

Innovation

◎ The bisguanidinium catalytic asymmetric sulfoxidation process provides simplest and robust technology for Armodafinil synthesis from simple starting materials Chiral sulfoxide can be obtained using little catalyst from a high efficiency process;
◎ The process is environmentally friendly as hydrogen peroxide is used as oxidant and the sole by-product is water. The catalyst is easily removed by aqueous wash and the crude product obtained is essentially pure. The reactions are clean and straightforward without the need for chromatographic purification. Therefore, there is potential to scale up the synthesis for production;
◎ Low cost and high efficiency process can be achieved as single enantiomer is created instead of resolution of a racemic mixture.

产业化应用

申请中国专利一篇，国外专利一篇以及发表一篇SCI论文；并推广这项手性技术应用于创新药的开发。

Commercialisation

Apply one Chinese patent of invention, one overseas patent and publish one SCI research paper. Actively promote the application of this chiral technology in new drug research & development.

多肽药物的高效生物制备

High Efficiency Biosynthesis of Peptide Drugs

项目负责人 Principal Investigator:
林章凛 教授 华南理工大学
Prof. LIN Zhanglin, SCUT

项目介绍

多肽药物已成为多种疾病的常用药物，但存在制备效率低、成本高等重大生产瓶颈，对于中长多肽还没有高效的生产方法。国内外都普遍采取化学法和传统基因工程法，但化学法生产中长多肽效率很低，而采用传统基因工程法，多肽在生物体内合成时易被降解而收率低，且分离提纯成本较高。本项目研究开发新型、高效、更有竞争力的多肽合成方法，更能快速占据市场。

Introduction

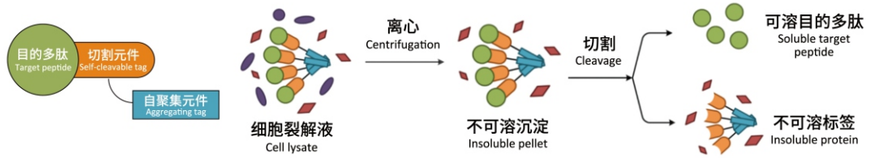
Peptide drugs are frequently prescribed in medical treatments. However, current methods suffer from inefficiency and high cost in the production of the medium- and large- size peptide drugs. The chemical synthesis method is inefficient as a procedure; while the traditional genetic engineering method produces peptides that are vulnerable to degradation during biosynthesis in vivo, resulting in low yield and high separation-purification cost. The proposed new method - cSAT scheme, will improve on the efficiency and market competitiveness of the peptide synthesis procedure.

核心技术

技术团队前期开创性地开发出了可切割自聚集标签(cleavable self-aggregating tag, cSAT)技术。该技术利用了自聚集短肽诱导目标多肽在体内形成活性聚集体，以沉淀形式保护而避免降解；再于体外切割获得目标多肽，极大优化了多肽的合成和分离工艺。目前，已经在实验室规模上获得多种多肽，纯度高、收率大、成本低，从而为高效生产中长多肽药物提供极具前景的创新方法。

Core Technologies

The project group pioneered a cleavable self-aggregating tag (cSAT) technique; in which, the short self-assembling peptide drives the target peptide into active aggregation to protect them from degradation through precipitation; and later, the target peptide can be released by cleavage in vitro, greatly optimises the synthesis and separation of peptides. This new method has successfully produced various peptides with high purity, high yield and low cost in the laboratory, and thus making available a new method with great prospect in the high efficiency production of medium- and large- size peptide drugs.



专利：
◎ 多肽的产生和纯化方法，申请号：201280076298
◎ 两亲性α螺旋自组装肽及其应用，申请号201310265579

Patents:
◎ Methods for production and purification of Peptides,US Patent 9200306
◎ Production and purification of peptide, No.: 201280076298
◎ Amphiphilic alpha helix self-assembly and its application, No.: 201310265579

产业化应用前景

本项目将基于cSAT法，开发中长多肽药物的小试至中试的高效生产工艺/平台。项目所选择的4种多肽药物的全球市场额超过60亿美元。

Commercialisation

This project uses the cSAT scheme to develop an efficient production process/platform for the pilot production of medium- and large- size peptide drugs. The global market of the four selected peptide drugs for this project is more than 6 billion USD.

高活性人工关节及配套器械产业化
The Commercialisation of Bioactive Artificial Joint and Supporting Equipment

项目负责人 Principal Investigator:
宁成云 教授 华南理工大学
Prof. NING Chengyun

研究背景

人工关节是根据人体关节的形态、构造及功能制成人工关节假体，通过外科技术植入人体内，代替患病关节功能。《2016-2022 年中国人工关节行业研究分析及市场前景预测报告》认为，目前我国 60岁以上老人中有 55%的人患有骨关节炎，我国 2016 年就有 40 万例以上的人工关节置换手术，每年以超过30%的速度增加，人工关节行业市场潜力巨大。本项目在前期研究的基础上开发出高生物活性人工关节及配套器械，用以取代进口产品。

Background

Artificial joints are artificial joint prostheses made according to the shape, structure and function of human joints, which are implanted into the human body through surgical techniques to replace the function of diseased joints. "2016-2022 China Artificial Joint Industry Research Analysis and Market Prospect Forecast Report" point out · At present, 55% of the elderly over the age of 60 in China suffer from osteoarthritis. In 2016, there were more than 400,000 artificial joint replacement operations in China, which increased at a rate of more than 30% every year. This project developed high-bioactive artificial joints and supporting equipment based on previous research to replace imported products.

竞争优势

◎ 通过独特的表面改性技术，研制出高生物活性表面的医用金属植入体（如人工关节），促进植入体快速与骨组织骨性结合。
◎ 原位构建的微纳多级结构活性表面具有更接近人体骨组织的力学性能及生物性能。

Advantages

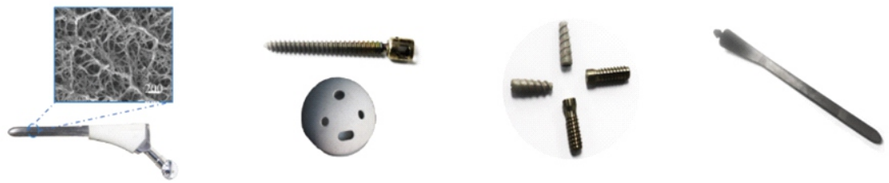
◎ Surface modification of traditional titanium and titanium alloy · develop medical metal implants with highly bioactive surfaces · Promote the osseointegration of implant and bone tissue quickly.
◎ The micro-nano multi-level structure active surface constructed in situ has mechanical and biological properties closer to human bone tissue.

产业化应用

人工髋关节和脊椎修复材料
◎ 实现人工髋关节和椎弓根内固定植入材料的表面改性，工艺成熟稳定；
◎ 建立医用金属表面处理中试生产线，优化加工工艺，实现稳定的规模化生产；

Commercialisation

Hip and spine repair materials
◎ Mature and stable process to carry out surface modification on hip implants and pedicle internal fixation implant materials;
◎ Build trial production lines of medical metal surface modification, improve on the quality system of product and enterprise standard, optimise process technique and achieve large-scale production stably.



基于新型纳米材料复合结构的智能光学、超声检测与传感器件技术研发
Research and Development of Intelligent Optical and Ultrasonic Detection and Sensing Techniques

项目负责人 Principal Investigator:
熊启华 教授 新加坡南洋理工大学
Prof. XIONG Qihua, NTU, Singapore

项目介绍

新型纳米材料，如钙钛矿材料、金属表面等离激元等，具有极优异的光电子特性，受到世界的广泛关注，是开发新型光电子器件的良好载体。本项目旨在发展高灵敏的光学传感和检测光谱探测技术，基于金属微纳结构表面等离子体共振产生的巨大局域电磁场增强效应，开拓光与新型纳米材料的相互作用增强的新机理和新方法，将为发展高灵敏度光谱探测、传感和成像技术提供了更多可能。

Introduction

Novel nano-materials with outstanding optoelectronic properties, such as perovskite and metallic plasmonics, have been receiving much attention recently. In order to develop highly sensitive optical sensing and detection technology, giant enhancement of localized electromagnetic field, created by the plasmonic resonance of metallic nano-structures surface plasma, is used to enhance the such effect. Benefited from the enhanced interaction between photons and such hybridized nanomaterial, more possibilities are now available for promoting the development of high sensitivity optical detection, sensing and imaging technologies.

项目创新点

◎ 本项目首次提出利用有源材料和金属表面等离激元结构，强化光与物质的相互作用，进而优化其在光学传感或光谱检测方面的性能，为器件的实用化指明了新的方向。
◎ 本项目将开展光力、光热、光机和光声耦合的学科前沿交叉研究，从单一光学和声学性质的研究，朝着多物理场互相影响、互相调控方向发展，将有利于在前沿交叉领域产生原创性研究成果。

Innovation

◎ This project proposed the combined use of active materials and metallic plasmonic structures to enhance light-matter interactions, thereby optimizing its performance in optical sensing or spectral detection, indicating a new direction for the practical application of devices.
◎ This project pioneered interdisciplinary research involving opto-mechanic, photo-thermal, photo-dynamic and photo-acoustic coupling. Compared with individual optic or acoustic research, these multiple disciplinary interactions and manipulations will benefit cutting-edge interdisciplinary research in producing innovative research results.

产业化应用

本项目将实现若干高灵敏（低至单分子水平）的多物理场的光学传感、检测的器件及集成设备，实现多物理场耦合增强的非接触无损检测，为无损检测和材料分析提供新的应用平台。将提供给食品检测、生物传感等产业领域一系列新型高灵敏度的检测手段。

Commercialisation

This project aims to develop highly sensitive (down to single molecule detection) multi-physics based optical sensing and detection components and integrated devices. We will realize non-contact detection enhanced by the multiple physical processes coupling, and thus provide a new application platform for the non-destructive detection and material analysis. This project will supply a series of new and highly sensitive detection techniques to related industries such as food inspection and biological sensing.

绿色建筑与智慧城市研发平台
Green Buildings and Smart Cities R&D Platform

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，以国内排名前列的华南理工大学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.

智能窗户应用的高性能热致光学开关复合膜的技术开发
Development of High-Performance Thermotropic Optical Switching Composite Films for Smart Windows Applications

项目负责人 Principal Investigator:
陈土培 副教授 新加坡南洋理工大学
Assoc. Prof. CHEN Tupei, NTU Singapore

项目介绍

针对普通玻璃产品的诸多缺点，本项目开发出了智能窗膜和智能玻璃结构的产品，具有自适应调光、隔音、阻隔红外线、安全防爆等多种功能。其中的自适应调光功能，能够自动地根据环境光照和温度进行透光率的调整，无需电路控制，实现冬暖夏凉的功能。

Introduction

In view of the disadvantages of ordinary glass products, this project has developed intelligent window film and smart glass products, with adaptive dimming, sound insulation, infrared rejection, safety and explosion protection and other functions. In particular, the window can automatically adjust the light transmittance according to the sunlight intensity and ambient temperature, without circuit control to achieve the effect of warm winter and cool summer.

创新点

◎ 智能适应环境，自动进行透光率调节，实现夏天降温，冬天保温的目的；
◎ 集成自适应调光、隔音、阻隔红外线、安全防爆等多种功能；
◎ 采用自主研发核心纳米材料，降低产品成本；
◎ 产品尺寸支持定制，特别是智能膜产品，其宽度可达2.2米，长度可 达1000米；
◎ 自主调光，无需额外能源控制，并且安装维护简单。

Innovation

◎ Intelligent adaptation to environment, automatic adjustment of sunlight transmittance in response to sunlight intensity and ambient temperature; Keeping houses cool in summer and warm in winter;
◎ Multiple functions such as adaptive dimming, sound insulation, infrared rejection, safety and explosion protection and other more;
◎ Low product cost with independently developed core nano-material;
◎ Customisable dimensions;up to 2.2 m in width and maximum 1000 m in length for intelligent film products;
◎ No additional energy control for adaptive dimming function; simple installation and easy maintenance.

智能窗膜放在屋顶太阳光照下试验
Test of intelligent window film prototype under sunlight on the rooftop of a building

产业化应用

Commercialisation

建筑天窗、窗户、幕墙
Building sky window/window/glass wall

室外广场屋顶
Roof of plaza

温室大棚
Greenhouse

汽车天窗/侧后窗
Car roof/back side window

大跨桥梁智能检测装备研发及产业化
R&D and Commercialisation of Intelligent Inspection Equipment for Large-Span Bridges

项目负责人 Principal Investigator:
黄仕平 副教授 华南理工大学
Assoc. Prof. HUANG Shiping, SCUT

项目介绍

裂缝是大跨桥梁结构寿命期最重要的指标，针对传统的检测工具如桥检车，其存在检测盲区、结果可靠度不高、有安全隐患等问题，该项目开发了大跨桥梁智能检测装备，利用数字成像技术对结构检测区域自动拍摄成像，利用无线方式传给终端，由终端自动完成结构检测的一种综合性智能装备。

Introduction

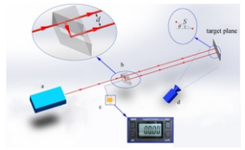
Cracks are the most critical indicator of the life span of long-span bridge structures. Traditional detection tools such as bridge inspection vehicles come with disadvantages such as blind spots in detection, low reliability of the results, etci. To address aforementioned issues, the project team development a set of intelligent detection equipment for long-span bridges. It is a comprehensive intelligent equipment that uses digital imaging technology to automatically capture images of the inspection area, and then transmit the images to the terminal wirelessly to perform automatic structural inspection.

进展与成果

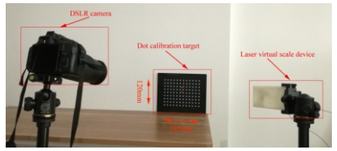
本装备利用无人机（或者探测支架）对结构物裂缝进行高清扫描及高精度定位，并实时通过图传系统传至地面，由地面终端对图片进行识别、分析后，生成检测报告。主要创新点包括：
◎ 可持续供电系统；
◎ 裂缝的识别，从定性到定量；
◎ 精准定位，可对全结构扫描，无遗漏；
◎ GPU并行技术，让海量照片的识别成为可能，大幅度降低了设备成本。

Progress and Achievements

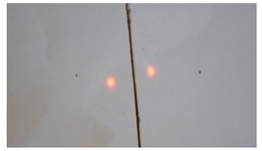
The equipment uses Unmanned Aerial Vehicles（UAV）(or the detection bracket) to perform high-definition scanning and high-precision positioning of the cracks of the structure and transmits the real-time images back to the ground through the image transmission system. The ground terminal identifies and analyses the images to generate a test report. Main innovative technologies include:
◎ Continuous power supply system;
◎ Identification of cracks qualitatively and quantitatively;
◎ Scanning the entire structure with precise positioning without any omission;
◎ GPU parallel technology for mass image recognition at low cost.



激光投影虚拟标尺技术
Laser virtual scale system



实验装置
Experimental setup



应用实例
Application example

产业化应用

已成立初创企业-广州市九州旗建筑科技有限公司，通过技术创新和高性价比的优势，提供如下服务：
◎ 直接向检测机构销售装备和提供技术服务；
◎ 提供解决方案，如特殊检测和施工监控；
◎ 直接为业主提供检测服务。

Commercialisation

A start-up company--Guangzhou Jiu Zhou Qi Architecture & Technology Co., Ltd. has been established. With advantages of technological innovation and cost effectiveness, business scope of the company includes:
◎ To sell equipment and provide technical services directly to the inspection agencies;
◎ To provide solutions for specialised inspection, construction monitoring and etc;
◎ To provide testing services to the property owner directly. To provide inspection services to property owners directly.

低辐射智能玻璃
Low-Emissivity Smart Windows

项目负责人 Principal Investigator:
龙祎 博士 新加坡南洋理工大学
Dr. LONG Yi, NTU Singapore

联合项目负责人 Co-Principal Investigator:
叶柿 教授 华南理工大学
Prof. YE Shi, SCUT

项目介绍

建筑耗能占据了全球耗能的40%以上。窗户是建筑中节能效率最低的组件。在夏天，绝大多数从窗户射入的太阳能将被转化为热量从而增加制冷能耗；而在冬天，超过30%的室内热量通过窗户损失到室外。对建筑节能的需求导致用于太阳能热控制的节能材料成为了一个热门的研究课题。

Introduction

The building sector takes up approximately 40% of the world's energy consumption. Window is the least energy efficient component in a building. In the summer, most of the solar energy entering indoor is converted into heat which increases cooling demand; while in the winter, almost 30% of the indoor heat is lost through windows. The demand for building energy conservation makes energy-saving materials for solar thermal control a hot research topic.

创新点

◎ 可自动响应环境变化进行太阳光透过率的智能调节，无需能量输入；
◎ 与目前节能效果最突出的低辐射玻璃相比，项目研发的低辐射智能玻璃能够节省约20%的能量；
◎ 相变材料无毒无害，对环境友好，使用寿命长；
◎ 生产工艺简单，不需要高端设备和大量前期投入；
◎ 相变材料的优良流动性使窗户具有极佳的均匀性并且易于制成各种形状。

Innovation

◎ Spontaneous regulation of sunlight transmittance in response to ambient temperature change, no external energy input required;
◎ Compared with currently most energy-efficient low-E glass, the product's energy-saving performance is 20% better;
◎ The phase change material is non-toxic, environment friendly and with high durability;
◎ Simple production process, no complex equipment required and low production cost;
The free-flow property of phase change material allows windows to be made into more complex shapes and maintain high uniformity.

产业化应用

该产品可应用于玻璃幕墙、建筑玻璃、酒店、写字楼、住宅等，可降低空调的使用，达到冬暖夏凉和大幅度节约能源的效果。
目前低辐射智能玻璃已经完成了原型制作和室内外性能测试，均显示出优异的节能效果。该智能窗体正在申请专利。

Commercialisation

This product is applicable in glass curtain walls, building glasses, hotels, office buildings, residential buildings etc., by reducing air-conditioning needs to effectively achieve warm winter-cool summer and energy saving results.
At present, low-emissivity smart windows have been prototyped and tested indoors and outdoors, which showed excellent energy-saving performance. Patent application has been submitted.

图1在一天中不同时段拍摄的大尺寸样品（1平方米）照片。液态相变材料灌注了一半的窗户以显示智能变色效果。
Figure 1 Optical photos for 1m*1m large scale window testing at different times of the day. The liquid-liquid phase change material is half-filled in the window (0.5m*1m).

污染控制与环境修复研发平台

Pollution Control and Enviromental 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所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，针对生态与环境修复技术的研发和集成工作以及固体废物无害化处理和资源化利用，共同突破一批关键共性技术，为打好污染防治攻坚战助力。

Leveraging the strong research capability of National Engineering Laboratory of VOCs Pollution Control Technology and Equipment of SCUT, and Nanyang Environment and Water Research Institute (NEWRI). A key R&D and application platform of multi-discipline and multi-technology integration is developed; this R&D platform will effectively integrate innovation resources, and make breakthroughs in critical generic technologies for development and integration of ecological and environment restoration technologies, and harmless treatment and reutilisation of solid wastes to support the efforts in pollution control and prevention.

养殖水体中关键污染物调控产品研究与开发

Research and Development on Contamination Control Products for Key Contaminants in Aquaculture Water

项目负责人 Principal Investigator:
牛晓君 教授 华南理工大学
Prof. NIU Xiaojun, SCUT

项目介绍

本项目为解决养殖水体面临的亚硝酸盐浓度增高和蓝藻爆发两大主要威胁，保障养殖水体水质健康。本项目将开发以下三种技术：

◎ 养殖水体关键污染物亚硝酸盐及蓝藻应急产品研发与应用。
◎ 养殖水体水质调控微生态制剂研发与应用。
◎ 养殖水体关键污染物实时监测及调控决策平台开发。

Introduction

Health of the aquaculture water is threatened by high concentration of nitrite and cyanobacteria outbreak. In order to help tackle these two problems, the team will focus on development of the following new technologies:

◎ Development and application of emergency products to regulate and control nitrite and cyanobacteria
◎ Development and application of micro-ecological preparations for water quality control
◎ Development of real-time monitoring and control of decision-making platform for key contaminants in aquaculture water.

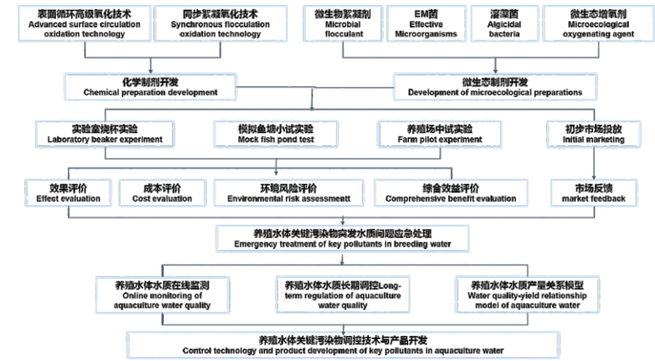
创新点

该技术能全方位、高效能、及时解决养殖水体的水质不平衡问题。特别适用于养殖水体突发水质问题应急处理。具有低成本，高效，生态环境友好等特点。

Innovation

This technology can resolve the imbalance of water quality in aquaculture in a comprehensive, highly efficient and timely manner. It is especially suitable as the emergency treatment for unexpected water quality incidents in aquaculture water. This product has the advantages of low cost, high efficiency, and eco-friendliness.

技术工艺流程图
Flow Chart



产业化应用

团队在养殖规模最大省份江苏省淮安市江苏好润生物科技公司、泰州兴化市的江苏省兴化市安丰镇润淼水产公司、江苏藻润科技有限公司进行产品的试验，经过试验现阶段的蓝藻应急产品的开发和推广已经取得初步进展，氨氮、亚硝氮微生物调控产品进行中试。

Commercialisation

Together with Jiangsu Haorun Biotechnology Co., Ltd., Runmiao Aquatic Products Co., Ltd. and Jiangsu Algae Technology Co., Ltd., the team conducted product testing in Jiangsu Province where the largest cultivation scale in China is found. Currently, the development and promotion of cyanobacterial emergency products have achieved initial results, while ammonia nitrogen and nitrous oxide microbial regulation products are being tested.

科研成效
ACHIEVEMENTS

科研成效
ACHIEVEMENTS

孵化企业 INCUBATED COMPANIES

人工智能研发平台
Artificial Intelligence R&D Platform

- 广州博依特智能信息科技有限公司
  Guangzhou POI-TECH Intelligent Information Technology Co., Ltd.
- 广州华生仿真科技有限责任公司
  Guangzhou Huasheng Technology Co., Ltd.
- 南洋星洲科技（广州）有限公司
  Nanyang Xingzhou Technology (Guangzhou) Co., Ltd.

生命健康研发平台
Life and Health R&D Platform

- 广州绿发材料科技有限公司
  Guangzhou GreenF Materials Technology Co., Ltd.
- 广州理格致生物科技有限公司
  Guangzhou Ligers Biotechnology Co., Ltd.
- 广州心安食品科技有限公司
  Guangzhou Xin'an Food Technologies Co., Ltd.
- 广州派虎科技有限公司
  Guangzhou Paihu Technology Co., Ltd.
- 广州英赞生物科技有限公司
  Guangzhou EnzyValley Biotech Co., Ltd.
- 广州肽安生物科技有限公司
  Guangzhou Taian Biotechnology Co., Ltd.
- 广州菲勒生物科技有限公司
  Fine (Guangzhou) Biotechnology Co., Ltd.
- 壹碳（广州）科技咨询有限公司
  One Carbon(Guangzhou) Technology Consulting Co., Ltd.

科研成效
ACHIEVEMENTS

孵化企业 INCUBATED COMPANIES

新能源研发平台
New Energy R&D Platform

- 新向(广州)氢能科技有限公司
  Xin-Xiang (Guangzhou) Hydrogen Technologies Co., Ltd.

新材料研发平台
New Materials R&D Platform

- 华工睿创(广东)科技有限公司
  Huagong Ruichuang (GD) Technologies Co., Ltd.
- 广州市相荣生物科技有限公司
  Guangzhou Xiangrong Biomedical Technology Co., Ltd.

绿色建筑与智慧城市研发平台
Green Buildings and Smart Cities R&D Platform

- 广州华建工智慧科技有限公司
  Guangzhou Smart Building Technology Co., Ltd.
- 广州瑞德道科技有限公司
  Guangzhou Reddot Technology Co., Ltd.
- 广州市九州旗建筑科技有限公司
  Guangzhou Jiu Zhou Qi Architecture & Technology Co., Ltd.

污染控制与环境修复研发平台
Pollution Control and Environmental Restoration R&D Platform

- 广州自然传奇生态环境科技有限公司
  Guangzhou Nature Legendary Environmental Technology Co., Ltd.

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孵化企业选介 HIGHLIGHTS OF INCUBATED COMPANIES

广州博依特智能信息科技有限公司
Guangzhou POI-TECH Intelligent Information Technology Co., Ltd.

广州博依特智能信息科技有限公司由华南理工大学“节能与过程优化”科研团队创立，团队长期从事流程工业（如造纸、陶瓷、水泥、玻璃、食品等行业）的过程建模、模拟与优化的深入研究和应用实践。是工业大数据深度挖掘的开拓者，也是智能制造和绿色制造协同创新的实践者。

Guangzhou POI-TECH Intelligent Information Technology Co., Ltd. (akaPOI-TECH) was established by the SCUT energy-saving procedure optimisation research team. The team spent years in in-depth research and application of process modelling, simulation and optimisation of different industrial procedures, such as, paper making, ceramics, cement, glass, food, etc. POI-Tech is also a pioneer in exploring the potentials of industrial big data and practicing collaborative innovation in intelligent and green manufacturing.

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

英赞以蛋白技术为核心，专注于酶制剂的研发和生产，产品涵盖体外诊断、食品安全检测、高通量测序和生命科学研究等领域，公司秉承“生物科技造福人类”的发展理念，勇于挑战国外技术壁垒，坚持从上游关键原料酶开始研发，为生物医药领域和生命科学研究提供国内一流的分子诊断检测产品和科研试剂。

EnzyValley focuses on the research, development and production of enzyme preparation based on protein technology. Its product range covers in vitro diagnosis, food safety detection, high throughput sequencing, life science research and more. The team upholds the developmental concept of ‘Biotechnology benefits mankind’, and challenges existing international technical barriers. It adheres to the research and development of enzyme from upstream key raw materials and supplies first-class molecular diagnostic testing products and reagents for biomedicine and life science research in China.

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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先进的燃料电池技术，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.

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，主要致力开发生物来源极具市场竞争力的新型材料，具备环保、低碳、低成本，可持续性发展的特性，其中最具价格优势非粮淀粉的TPS（热塑性淀粉）发泡材料，可以彻底解决缓冲包装带来的白色污染问题，同时还以高新材料为基础，应用云制造的理念，打造一个高效的环保包装材料及产品的供应链体系。

Based on the thermoplastic starch foaming material technology developed by Professor Yu Long and his team from SCUT, GreenF Materials focuses on developing new products made by materials that are eco-friendly, low carbon, low cost and sustainable. Among which the most price competitive is the thermoplastic starch (TPS) foaming material make with non-grain starch, it completely resolves white pollution caused by packaging, and builds a supply chain for eco-friendly packaging materials and products based on high-tech new material and the idea of cloud manufacturing application.

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广州华建工智慧科技有限公司
Guangzhou Smart Building Technology Co., Ltd.

华南理工大学土木与交通学院苏成教授团队创办华建工智慧科技有限公司，核心团队由华南理工大学BIM中心成员和新加坡南洋理工大学BIM中心成员组成，具有深厚的BIM技术积累，以“互联网+”为驱动，以行业需求为目标，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，形成可复用的知识、技术、产品与大数据积累，助力建设领域的信息产业化进程。

Professor Su Cheng and his team from School of Civil Engineering & Transportation, SCUT, founded Guangzhou Smart Building Technology Co., Ltd., and thecore members of the team consist of researchers specializing in Building Information Modeling (BIM) from SCUT and NTU. With rich experience in BIM technology and driven by “internet +”, the company focuses on the industry needs, and provides product research, technical support, and BIM consulting services covering the whole process of design, construction, operation and maintenance in projects such as housing and municipal construction. The team has accumulate reusable information, technology, product and big data to facilitate information industrialisation in the construction sector.

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 Hunan Qianjin Group to jointly develop fruit wines using seasonal fruits in Southern China.

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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
01	荧光探针化合物及制备方法及其检测内毒素的应用和方法	201910134604.8	姚必成，刘勇，谢你，唐本忠	发明专利
02	一种实时行人检测方法及神经网络、目标检测层	201910095995.7	胡永健，Alfasly Saghir Ahmed Saghir，刘琲贝，王宇飞	发明专利
03	行人检测网络及模型训练方法、检测方法、介质、设备	201910198487.1	胡永健、陈浩	发明专利
04	一种速溶多孔蛋白粉的制备方法	201910441947.9	余龙、吴伟、崔飞鹤、刘宏生	发明专利
05	一种多级高强脉冲电场连续性杀菌装置及方法	201910592798.6	曾新安、闫鹏、蔡锦林、王强	发明专利
06	一种多级高强脉冲电场连续性杀菌装置	201921021785.5	曾新安、闫鹏、蔡锦林、王强	实用新型
07	用于温度循环的电子组件焊点的稳定设计	201910664420.2	王毅华、沈乔飞	发明专利
08	一种基于域自适应学习和域泛化的人脸欺骗检测方法	201910602971.6	王宇飞、胡永健	发明专利
09	一种疏水材料动态包覆活性炭表面疏水性的方法	201910723073.6	曹珍珠、叶代启、吴军良 张楚馨、陈建东、付名利	发明专利
10	一种高热能储存和透光率自动调节的隔音隔热窗户	201910613773.X	龙祎、周洋、王善成	发明专利
11	一种基于对抗生成网络的人脸欺骗检测系统对抗样本生成方法	201910723573.X	蔡楚鑫、胡永健、王宇飞、刘排贝	发明专利
12	一种富含咖啡因的提神巧克力及其制备方法	201910643405.X	黄强、邵苗	发明专利
13	一种支原体PCR通用引物及其鉴别方法和应用	201910703993.1	姚茂金、任娇艳、李宇娟	发明专利
14	一种天然保肝抗氧化粉剂及制备方法	201910774448.1	任娇艳、戴伊繁	发明专利
15	一种快速鉴定小鼠基因型的方法	201910736276.9	姚茂金、任娇艳、曹家宁	发明专利
16	一种柔性超级电容器正极材料的制备方法	201911041505.1	申泽骧、张春艳、来琳斐	发明专利
17	多孔网状结构的磷酸钒纳米材料及制备方法	201911041516.X	申泽骧、蒋海凤、来琳斐	发明专利
18	一种半导体封装中焊点形状的优化方法	201910952186.3	王毅华、沈乔飞	发明专利
19	一种多孔淀粉及其叶黄素微胶囊的制备方法	201911193189X	黄强、余雅倩、李松南、张斌	发明专利
20	自然形成的粗短沙漏形焊点的设计和成形工艺	201911087498.9	王毅华	发明专利

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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
21	一种可拆卸式多功能小型气体加压过滤装置	201921839234.X	周卫江、程晓草、郝洪儒	实用新型
22	一种负载型铂钴核壳催化剂及其制备方法	201911071578.5	周卫江、郝洪儒、曾少华	发明专利
23	一种基于龙脑的高分子抗菌材料和制备方法及其应用	201911272633.7	苏健裕、杨柳、洪良智	发明专利
24	一种基于模糊BP神经网络的废水高级氧化处理智能加药系统及方法	201911337830.2	万金泉、叶刚、马邕文、张锦涛王艳、闫志成	发明专利
25	一种基于NSGA-III的废水好氧生化处理工艺的优化控制方法	201911336834.9	万金泉、张锦涛、马邕文、叶刚王艳、闫志成	发明专利
26	一种利用含铜污泥制备高纯水合氯化铜的方法	201911189163.8	刘学明、林璋、于垚	发明专利
27	一种物理域上针对人脸识别系统的对抗样本生成方法	201911179565.X	胡永健、蔡楚鑫、王宇飞、刘排贝葛治中、李皓亮	发明专利
28	一种抑制血管紧张素转换酶的十肽及其用途	201911396287.3	胡松青、黄滟波、侯轶	发明专利
29	一种具有ACE抑制活性的六肽及其应用	201911396292.4	胡松青、黄滟波、侯轶	发明专利

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01 Miaomiao Wang,2019,In vitro colonic fermentation of dietary fibers: Fermentation rate, short-chain fatty acid production and changes in microbiota,Trends in Food Science & Technology,88,1-9

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注:清单为2019年数据
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合作伙伴 COLLABORATION PARTNERS

01
广州绿发材料科技有限公司
Guangzhou GreenF Materials Technology Co., Ltd.

02
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

03
株洲千金药业股份有限公司
Zhuzhou Qianjin Pharmaceutical Co., Ltd.

04
佛山市顺德区恒锐环保设备有限公司
Foshan Shunde Hengrui environmental protection equipment Co., Ltd.

05
广州英赞生物科技有限公司
Guangzhou EnzyValley Biotech Co., Ltd.

06
中山市龙邦材料科技有限公司
Zhongshan Longbang Material Technology Co., Ltd.

07
澳门建信工程有限公司
Macao Rockone Engineering Co., Ltd.

08
湖南汇富康达健康管理研究院
Hunan Healfcode Health Management Institute

09
广东华清园生物科技有限公司
Guangdong Huaqingyuan Biotechnology Co., Ltd.

10
惠来丰登生态农业发展有限公司
Huilai Fengdeng Ecological Agriculture Development Co., Ltd.

11
广州菲勒生物科技有限公司
Fine (Guangzhou) Biotechnology Co., Ltd.

12
广东广中皇食品有限公司
Guangdong Guangzhonghuang Food Co., Ltd.

13
广州华玮创材环保科技有限公司
Guangzhou Huawei Innovative Materials Environmental Technology Co., Ltd.

14
东莞市国际技术转移中心
Dongguan International Technology Commercialiazation Center

15
湖南省农业科学院
Hunan Academy of Agriculture Sciences

16
广州开发区知识产权协会
Guangzhou Development District Intellectual Property Association

17
广东省促进投资协会
The Guangdong Investment Promotion Association

18
中新智擎科技有限公司
International Intelligent Machines Co., Ltd.

19
东莞华工创为生物科技有限公司
Dongguan Huagong Chuawei Biotechnology Co., Ltd

20
南洋国际俱乐部
Nanyang International Club

21
广东莱佛士制药技术有限公司
Guangdong Raffles PharmaTech Co., Ltd

22
佛山博文机械人自动化科技有限公司
Foshan Biowin Robotics and Automation Co., Ltd.

23
广东博然堂生物科技有限公司
Guangdong Brundo Biotechnology Co., Ltd

24
广州市广力机电设备工程有限公司
Guangzhou Guangli Efe Co., Ltd

25
广东秦时新能源有限公司
Guangdong Qinshi New Energy Co., Ltd

26
中粮集团营养健康研究院
COFCO Nutrition and Health Research Institute Co., Ltd

27
上海远梓工控设备有限公司
Shanghai Yuanzi Industrial Control Equipment Co., Ltd

28
南京日升昌生物技术有限公司
Nanjing Risingsun Biotechnology Co., Ltd

29
湖南菲勒生物技术有限公司
Hunan Feller Biotechnology Co., Ltd

30
成都市深思创芯科技有限公司
Deepcreatic Technologies Ltd. Chendu

31
广州星光测绘技术有限公司
Guangzhou Xingguang Mapping Technology Co., Ltd

32
广东都市百姓药业有限公司
Guangdong Mingjian Pharmaceutical Co., Ltd.

科研设施
R&D FACILITIES

研发和孵化场地 R&D AND INCUBATION FACILITIES

01

研发大楼10000平方米

R&D Headquarters at Yonghe(10000㎡)

02

腾飞园2700平方米

R&D Space at Ascendas OneHub GKC (2700㎡)

03

快能达孵化园2500平方米

Incubation Space at Kuainengda (2500㎡)

04

研究院新大楼（在建）

SSIJRI New Buildings (Under Construction)

SINO-SINGAPORE
INTERNATIONAL JOINT RESEARCH INSTITUTE
中新国际联合研究院

实验室设施 LAB FACILITIES

公共实验平台

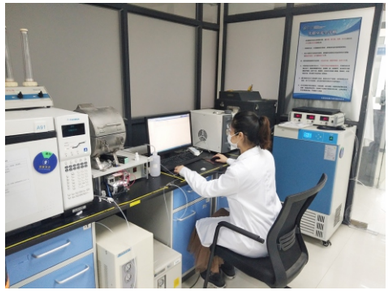
Public Experimental Platform

新能源研发实验室

New Energy Lab

纳米粒子研发实验室

Nano Particle Research Lab



环境检测实验室

Environmental Testing Lab

生物医用材料实验室

Biomedical Materials Lab

酶制剂研发实验室

Enzyme Preparation Lab