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UNIVERSITY OF
OSCAR OXFORD

NEWSLETTER 033 APRIL 2020

CONTENTS

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Director Prof. Zhanfeng Cui Awarded 2020 Newton Advanced Fellowship Grant

Prof. Zhanfeng Cui

OSCAR PI and Director Prof. Zhanfeng Cui has been announced as one of 25 recipients of the 2020 Newton Advanced Fellowships as a UK partner on 2nd April. The Sino-UK collaborative programme is jointly sponsored by National Natural Science Foundation of China (NSFC), the Royal Society (RS) and the Academy of Medical Sciences of the UK.

This talent programme is intended to encourage exchange of ideas and cooperative research activities between young Chinese scholars and prominent British collaborators.

The funded project "Nano-enzyme Induced Differentiation of Stem Cells for Neurodegenerative Diseases Treatment" is in collaboration with Chinese researcher Prof. Huiyu Liu from Beijing University of Chemical Technology.

Please see the official grant approval announcement on http://bic.nsfc.gov.cn/Show.aspx?AI=1270 (Chinese only).

2020年度国家自然科学基金委员会与英国皇家学会、英国医学科学院人才项目批准通知

2020年04月02日　作者: 国际合作局　发布：国际合作局

2020年度，国家自然科学基金委员会（NSFC）与英国皇家学会（RS）、英国医学科学院（the Academy of Medical Sciences）共同资助人才项目（英方项目名称为: Newton Advanced Fellowship，即"牛顿高级学者基金"），鼓励我国青年学者与英国合作者之间开展交流互访与合作研究活动。经过公开征集，双方共受理申请118项。根据国际评审结果并经三方机构共同协商，以下25个申请获得批准：

序号	科学部编号	项目名称	中方申请人	中方依托单位	英方合作者	英方依托单位
1	2191101543	分子筛催化剂上低碳烷烃转化的的固体NMR及EPR谱学研究	徐君	中国科学院武汉物理与数学研究所	Professor Graham J. Hutchings	Cardiff University
2	2191101553	共晶材料的超分子组装与室温磷光性能调控研究	闫东鹏	北京师范大学	Professor Jonathan William Steed	Durham University
25	2191101552	纳米酶诱导干细胞定向分化用于神经退行性疾病的治疗	刘惠玉	北京化工大学	Prof Zhanfeng Cui, FREng	University of Oxford

OSCAR PIs Win Funding in the 2019 IMPACT R&D Programme

Three projects, from OSCAR PIs Prof. Ronald Roy, Prof. Hua Ye and Prof. Mauro Pasta, will receive grants from the 2019 IMPACT R&D Programme. The programme is a specialised research fund set up by Jiangsu Industrial Technology Research Institute (JITRI) to encourage R&D projects within the Mathematical, Physical, and Life Sciences (MPLS) Division of the University of Oxford and promote technology transfer to Jiangsu Province for commercialisation, based on the establishment of Oxford-JITRI Innovative Materials and Processes for Advanced and Critical Technology (IMPACT) programme.

The three awarded projects, entitled "Application of ultrasound for gene augmentation of multispecies biofilms" (proposed by Prof. Ronald Roy), "Characterisation and production of functional secretome from human mesenchymal stromal cells using combination of cell-based assay, comparative transcriptomics, and biomarker quantitative (q)PCR" (proposed by Prof. Hua Ye) and "Single-atom electrocatalysts for the water-splitting reaction" (proposed by Prof. Mauro Pasta). One researcher (Postdoc or PhD student) from the University of Oxford will be cultivated in each project as JITRI overseas joint research fellow.

Prof. Ronald Roy

- Professor in Mechanical Engineering, University of Oxford
- Head of Department of Engineering Science, University of Oxford
- Professorial Fellow, Harris Manchester College, University of Oxford

Prof. Hua Ye

- Associate Professor in Engineering Science, University of Oxford
- Associate Director, Oxford Centre for Tissue Engineering and Bioprocessing
- Fellow of Linacre College, University of Oxford

Prof. Mauro Pasta

- Associate Professor of Materials, University of Oxford
- Fellow of St. Edmund Hall, University of Oxford

Recent OSCAR Publications

Prof. Wei Huang's group and Prof. Zhanfeng Cui's group jointly published a research article "*RT-LAMP for rapid diagnosis of coronavirus SARS-CoV-2*" in *Microbial Biotechnology*. Prof. Wei Huang, Dr. Huidong Jia, Dr. Yun Wang, Yida Zeng, Mengmeng Ji, Dr. Hui Wang and Prof. Zhanfeng Cui are joint authors with an OSCAR affiliation.

https://doi.org/10.1111/1751-7915.13586

microbial biotechnology

Research article | Open Access

RT-LAMP for rapid diagnosis of coronavirus SARS-CoV-2

Wei E. Huang, Boon Lim, Chia-Chen Hsu, Dan Xiong, Wei Wu, Yejiong Yu ... See all authors

First published:25 April 2020 | https://doi.org/10.1111/1751-7915.13586

Funding information:
Oxford Suzhou Centre for Advanced Research (OSCAR), University of Oxford.

SECTIONS PDF TOOLS SHARE

Summary

The pandemic coronavirus SARS-CoV-2 in the world has caused a large infected population suffering from COVID-19. To curb the spreading of the virus, WHO urgently demanded an extension of screening and testing; thus, a rapid and simple diagnostic method is needed. We applied a reverse transcription-loop-mediated isothermal amplification (RT-LAMP) to achieve the detection of SARS-CoV-2 in 30 min. We designed four sets of LAMP primers (6 primers in each set), targeting the viral RNA of SARS-CoV-2 in the regions of orf1ab, S gene and N gene. A colorimetric change was used to report the results, which enables the outcome of viral RNA amplification to be read by the naked eye without the need of expensive or dedicated instrument. The sensitivity can be 80 copies of viral RNA per ml in a sample. We validated the RT-LAMP method in a hospital in China, employing 16 clinic samples with 8 positives and 8 negatives. The testing results are consistent with the conventional RT-qPCR. In addition, we also show that one-step process without RNA extraction is feasible to achieve RNA amplification directly from a sample. This rapid, simple and sensitive RT-LAMP method paves a way for a large screening at public domain and hospitals, particularly regional hospitals and medical centres in rural areas.

A research article "*Multi-Label Random Forest Model for Tuberculosis Drug Resistance Classification and Mutation Ranking*" was published in *Frontiers in Microbiology*, with an OSCAR affiliation for Dr. Yang Yang, Senior Research Associate in Prof. David Clifton's group.

https://doi.org/10.3389/fmicb.2020.00667

ORIGINAL RESEARCH ARTICLE

Front. Microbiol., 22 April 2020 | https://doi.org/10.3389/fmicb.2020.00667

Multi-Label Random Forest Model for Tuberculosis Drug Resistance Classification and Mutation Ranking

Samaneh Kouchaki[1*], Yang Yang[1,2], Alexander Lachapelle[1], Timothy M. Walker[3,4,5], A. Sarah Walker[3,4,6], CRyPTIC Consortium, Timothy E. A. Peto[3,4,6], Derrick W. Crook[3,4,6] and David A. Clifton[1]

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[2]Oxford-Suzhou Centre for Advanced Research, Suzhou, China
[3]Nuffield Department of Medicine, University of Oxford, Oxford, United Kingdom
[4]National Institute of Health Research Oxford Biomedical Research Centre, John Radcliffe Hospital, Oxford, United Kingdom
[5]Oxford University Clinical Research Unit, Ho Chi Minh City, Vietnam
[6]NIHR Biomedical Research Centre, Oxford, United Kingdom

Resistance prediction and mutation ranking are important tasks in the analysis of Tuberculosis sequence data. Due to standard regimens for the use of first-line antibiotics, resistance co-occurrence, in which samples are resistant to multiple drugs, is common. Analysing all drugs simultaneously should therefore enable patterns reflecting resistance co-occurrence to be exploited for resistance prediction. Here, multi-label random forest (MLRF) models are compared with single-label random forest (SLRF) for both predicting phenotypic resistance from whole genome sequences and identifying important mutations for better prediction of four first-line drugs in a dataset of 13402 *Mycobacterium tuberculosis* isolates. Results confirmed that MLRFs can improve performance compared to conventional clinical methods (by 18.10%) and SLRFs (by 0.91%). In addition, we identified a list of candidate mutations that are important for resistance prediction or that are related to resistance co-occurrence. Moreover, we found that retraining our analysis to a subset of top-ranked mutations was sufficient to achieve satisfactory performance. The source code can be found at http://www.robots.ox.ac.uk/~davidc/code.php.

1. Introduction

As reported by the World Health Organization, resistance co-occurrence is very common, and is especially so between first-line drugs for treating tuberculosis (TB): isoniazid (INH), ethambutol (EMB), rifampicin (RIF), and pyrazinamide (PZA) (World Health Organization, 2017). Two types of resistance co-occurrence are especially important: (i) multi-drug resistant TB (MDR-TB) defined as cases that are resistant to at least INH and RIF; and (ii) extensively drug-resistant TB (XDR-TB), defined as isolates that are resistant to INH and RIF plus any of the fluoroquinolones such as levofloxacin or moxifloxacin and at least one of the three injectable second-line drugs, including amikacin, capreomycin, or kanamycin. Hence, resistance co-occurrence to anti-TB drugs has become an urgent public health concern (World Health Organization, 2017).

Conventional methods for resistance prediction from whole genome sequences are usually based on identifying specific known resistance-conferring variants (i.e., single nucleotide polymorphisms; insertions or deletions) and interpreting (i) the presence of any of them as indicating resistance; and (ii) the absence of all of them as indicating susceptibility to an individual drug

Open to Collaborations

Senior Leaders from Nantong City Visit OSCAR

On 4th April, Mr. Huimin Xu, Secretary of the CPC Nantong Committee, visited OSCAR with a delegation of around 70 high-level government officials from Nantong. Nantong, Jiangsu lies 100km north of Suzhou on the banks of the Yangtze River. The delegation was accompanied by Mr. Shaomin Lan, Secretary of the CPC Suzhou Committee, Suzhou's Mayor Mr. Yaping Li, and several Suzhou and SIP senior leaders.

During the visit, OSCAR General Manager Leah He briefed the delegation on the collaboration model between the University of Oxford and SIP, and OSCAR's establishment and research progress. Senior Research Scientist Dr. Yun Wang introduced the rapid test technology OSCAR has recently developed for SARS-CoV-2 (COVID-19) to the officials.

Mr. Huimin Xu was Party Secretary of SIP from September 2016 to April 2018, and was actively engaged in the negotiation of the OSCAR project.

Leah He leads a tour and briefing about OSCAR.

Dr. Yun Wang explains the key advantages of OSCAR's rapid test technology to Mr. Shaomin Lan (L2), Secretary of the CPC Suzhou Committee.

Meet OSCAR's Researchers

Interview with Dr. Dandan Wang

Dr. Dandan Wang received her BSc in Chemical Engineering and Technology from Soochow University in 2010, followed by a PhD in Chemistry from National University of Singapore in 2016. Her PhD project focused on the fundamental study of the structural and electrochemical properties of self-assembled monolayers (SAM) as well as molecular electronics of SAM based devices. After her graduation, Dr. Wang joined National University of Singapore Suzhou Research Institute (NUSRI), where she worked for 3 years on the development of materials for 3D bioprinting using an electrohydrodynamic jet printing system. In February 2019, she joined OSCAR as a research scientist in the Surface Science group led by Prof. Mark Moloney.

Q: Why did you decide to join OSCAR?

I joined OSCAR's Surface Science group in February 2019 as a Research Scientist in Materials Chemistry under the supervision of Prof. Mark Moloney. I knew of OSCAR by a casual conversation with my friends. From my perspective, as the first overseas research centre of the University of Oxford, OSCAR would give me a great chance to pursue scientific excellence by working with the world's top researchers. Therefore, I applied to the position suited to my research interest. After my interview, Prof. Mark Moloney showed me around the chemistry labs of OSCAR, though they were empty at that time. The design of being able to characterise compounds and materials immediately next door truly impressed me. Besides, the idea of boosting multi-disciplinary research and cooperation in OSCAR also prompted me to take the decision to join the OSCAR family.

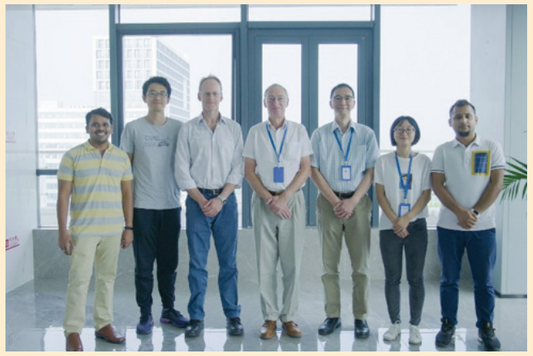
Q: What is your research project and how is it progressing?

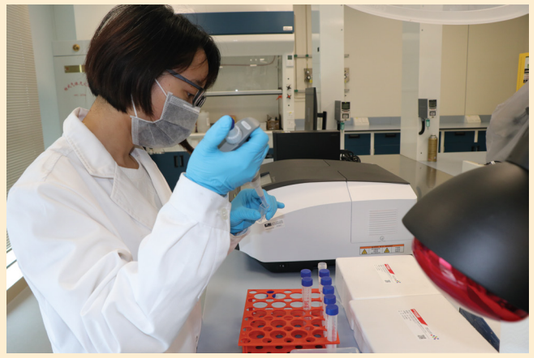
My current research project focuses on the development of functional materials using carbenes, highly reactive reagents that can form covalent bond on the surface of various materials. Our research group's interest is to expand the properties of commercially available materials for possible engineering or biological applications but without changing their bulk behaviour. One of the applications is for enzyme immobilisation. Enzyme immobilisation enables the reusability of enzyme, massively decreases labour input, and ultimately can benefit both economy and environment. Our technology enables the study of enzyme affinity onto different materials, like polystyrene, polyethylene, nylon, silica gel, cotton, etc. Now I have successfully immobilised enzyme onto polystyrene beads and have been optimising the immobilisation condition to achieve higher loading and reusability. Another application I am seeking is for biosensing. Via the linkage of electrochemical groups onto conductive surfaces like carbon-based materials, we can use the material as a biosensor for the sensitive detection of antibiotics, etc.

OSCAR offers full support to researchers to attend conferences, forums, technical training and academic communication meetings. I have attended Technical Communication Meeting of Supercritical Fluid Chromatography, the 4th China (Jiangsu) Biomedical Innovation and Entrepreneurship Summit, JITRI-UK Science and Technology Innovation Week, etc.

Q: What are your short-term and long-term research plan and aims at OSCAR?

My short-term research plan is to develop functional materials which can be applicable in enzyme immobilisation and biosensing. With materials playing important roles in the biomedical industry, and problems of the surface interface of these materials are attracting growing attention, in the long-term, we would like to generate a platform technology which provides access to functional materials, especially biomedical materials. Our team aims to improve the functionality of the surface for antifouling, antibacterial, anticoagulation or other properties based on commercially available materials.





Q: How is your life at OSCAR and in Suzhou?

Before joining OSCAR, I had been working in Suzhou Industrial Park for nearly 3 years. When I finished my PhD in Singapore, Suzhou was my first choice for working and living, not only because of my familiarity to this city, but also because of the fast changes and advancement that have happened here over the past 10 years. At present, an international, modern Suzhou Industrial Park has been established, with high-tech industry layout and convenient traffic. Therefore, life in Suzhou is highly convenient and comfortable. Personally, working at OSCAR is very pleasant, and my supervisor is always supportive and gives valuable guide for my research constantly. Additionally, we have an excellent administrative team who always try their best to facilitate our research and relieve our concerns.

Q: Any others you would like to share?

Our Surface Science group is planning to recruit one more research scientist. If you are interested, please visit OSCAR's website for more details, you will not regret joining us!

Email: Dandan.Wang@oxford-oscar.cn

Overview of OSCAR's Research Cooperation Department

OSCAR Research Cooperation Department exists to support OSCAR's research activities, both in Suzhou and Oxford.

Managed by Senior Research Manager Catriona Inverarity and Industrial Cooperation Manager Alex Yang, the department helps researchers to carry out their research related activities in accordance with the regulations from the University of Oxford and Chinese government agencies. The department supports researchers in three major areas:

- identifying funding opportunities from state, provincial and municipal government and assisting researchers with applications;
- seeking industrial cooperation and collaborations such as sponsored research, joint research partnership, etc.
- managing the intellectual property arising from novel research, from initial patent filing to commercialisation.

The department also conducts other research-related duties such as receiving academic and industrial visitors, assisting with applications for professional titles, and attending workshops and events to expand OSCAR's reach and research impact.

One of OSCAR's key strengths lies in its dual nationality. However, the dual languages can prove a barrier. Alex and Catriona are working together to ensure that all applicable documents – including forms and guidance for grant applications, are available to staff in both English and Chinese. Bilingual operation allows OSCAR to fully interface both with the Chinese grant system and local collaborators as well as OSCAR PIs and their UK-based collaborators. The rapid antigen test for SARS-CoV-2, recently developed by Prof. Zhanfeng Cui and Prof. Wei Huang's teams, is a good demonstration of this. The test was developed by OSCAR researchers first in Oxford, then continued in Suzhou as the city began to reopen. The first clinical trials took place with real clinical samples in Shenzhen. The team is now pursuing further trials in the UK with more local partners as well as commercialising the testing kit.

Catriona Inverarity

- Executive Assistant to the Director and Senior Research Manager
- Email: catriona.inverarity@oxford-oscar.cn

Alex Yang

- Industrial Cooperation Manager
- Email: alex.yang@oxford-oscar.cn

OSCAR New Brochure Released

OSCAR recently released a new brochure including recent major highlights. The full version is available online at: https://oscar.web.ox.ac.uk/sites/default/files/oscar_new_brochure_2020.pdf?time=1585726450793

OSCAR LABORATORIES

9F

- Optoelectronic Technologies Lab (OeTL)
  - Advanced Materials Lab
  - Multifunctional Device Fabrication Lab
  - Printed Electronics Lab
  - Advanced Photonics Lab
  - Optoelectronics Characterization Lab
- Energy Storage and Conversion Lab
- Electrochemical Characterization and Analysis Lab



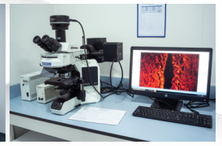


8F

- Environmental Biotechnology and Synthetic Biology Lab
- Cell Design Lab
- Single Cell Biology Lab
- Medical Ultrasound Artificial Intelligence Lab
- Photo-acoustics and Acousto-optics Lab
- Industrial and Biomedical Acoustics Lab
- Functional Surface Modification and Polymerization Lab
- Biocatalysis, Enzyme Evolution and Synthetic Biology Lab
- Analytical Characterization Centre



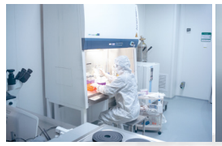




OSCAR LABORATORIES

6F

- Tissue Engineering & Biomaterials Lab
- Cellular & Advanced Therapy Lab
- Cancer Screening & Personalized Therapy Lab
- Bioprocessing & Bioformulation Lab
- Neural Function & Regeneration Lab
- Cryogenic Biology Lab


5F

- Computational Health Informatics (CHI) Lab




3F

- Reserved for Mathematical Research Group

4&7F

- Reserved for incoming research groups


OSCAR FACILITIES

Public and shareable facilities on ≥F


OSCAR Club
- Large, multi-function space suitable for meals and receptions as well as training
- Capacity for ~120 people
- Full AV facilities
- Moveable furniture and equipment

Office Space
- Modern, open plan office spaces
- A range of private meeting rooms available for informal or conference meetings
- Offices are set up for spinout companies, but space can be made available for training or other events

Meeting Rooms
- Four standard plus one larger meeting room
- AV, video conferencing and conference call facilities available
- Available for local meetings and small-scale training
- Based in office area, where spinouts are located

Private Offices
- Offers greater storage space and privacy
- Large, bright working space with room to meet colleagues

Staff GYM
- Fully equipped with a range of weights, cardio equipment, barre, etc.
- A built-in sound system
- Shower facilities



OSCAR Technology Accelerator
The OSCAR Technology Accelerator, a start-up incubator on the second floor, became operational in 2019. It currently houses two companies associated with the University of Oxford, OUI-Suzhou and Oxford MEStar Ltd.

LOCAL AMENITIES

Hotels	Price (B&B) (£)	Estimated cost for meal in hotel (£)	Distance to OSCAR
Worldhotel Grand Dushulake Suzhou	72	≥20	1.7 miles
Four Points by Sheraton Suzhou	75	≥17	1.4 miles
Oakwood Hotel & Residence Suzhou	55	≥16	1.5 miles
Scholars Hotel Suzhou	45	≥11	700 metres

Rental apartment

- Full equipped with 1 or 2 bedrooms
- £350-400/month
- About 1-2 miles
- Easy access to OSCAR, shops and CBD via bus, underground or taxi

Restaurants

- Most Chinese cuisines
- International food (Italian, Thai, Indian etc.)
- Coffee shops including Starbucks
- All within walking distance

Hospital

- With VIP service for foreigners, in English. http://www.kowloonhospital.com/foreignguests/
- Half an hour driving

TRANSPORTATION

From Shanghai to Suzhou
- 30 minutes by bullet train
- 1-2 hours by car

In Suzhou
- Convenient and affordable taxi
- 5 underground lines in operation and 3 lines under construction or planned
- Bus and city bicycle

SIP News for April

Suzhou Strives to Develop a World Leading Biomedical Hub

The 2020 Suzhou Biomedical Industry Development Conference was held at Suzhou International Expo Centre, SIP on 25th April. At the event, Suzhou government laid out their 10 year strategy to develop Suzhou into a global landmark in the development of biomedical and healthcare industries.

The event included a series of forums, exhibitions and project matching activities designed to showcase Suzhou's achievements in the biomedical sector, explain related business support policies and programmes as well as supporting and accelerating development of businesses in the industry.

At the event, Suzhou government announced a 10-year (2020-2030) plan for the development of the local biomedical and healthcare industries, aiming to form a cluster of over 10,000 biotech businesses with a total output value exceeding 1 trillion RMB by 2030.

Suzhou is now home to over 3,000 biotech businesses with about 50,000 employees. Their total output value reached 172.8 billion RMB last year. Under the new plan, the city will focus on development and commercialisation of innovative drugs, advanced diagnostic technologies and therapies, high-end medical devices and public health emergency management systems. They aim to set up an integrated ecosystem for development, manufacturing and marketing of medical and healthcare products and services.

26th April 2020

http://www.sipac.gov.cn/english/news/202004/t20200426_1114287.htm

Airport Hub Announced for Yangtze Delta

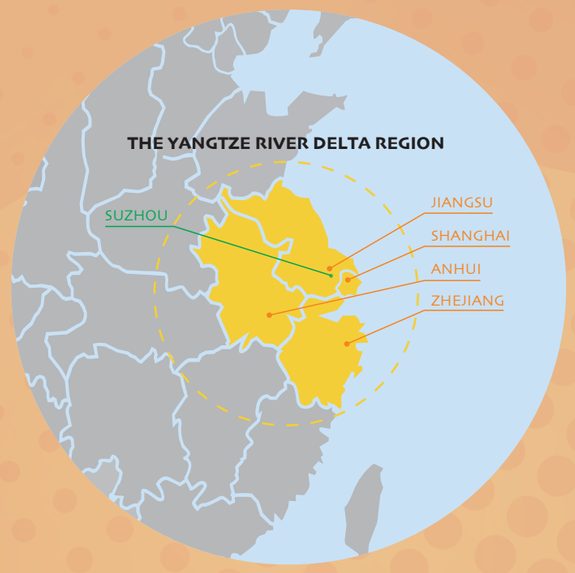
China is set to create a world-class airfield complex across the Yangtze River Delta region, according to a development plan issued by the National Development and Reform Commission (NDRC) on 27th April.

This plan, focused on high-quality integrated development of the region's transportation by 2025, aims to better adapt the Yangtze River Delta region to the international trading environment and global supply chain, improve its airport network and optimise coordination between ports.

"The Yangtze River Delta region has already formed an effective transportation network of airports, seaports, railways and roads that have greatly improved the region's attraction in the past few decades, and that is the foundation for future planning and development," said Zhu Ronglin, a regional planning expert from the Development Research Centre of the State Council and the NDRC.

Currently, travel between major cities across the region can be accomplished within 1.5 hours, and multiple transportation facilities enable goods to be shipped professionally across the region, according to the guidelines. But in accordance with higher standards of integration, there is still room for the region's transportation system to be improved, such as in the coordination of ports and airports, the service of the Shanghai international shipping centre and cross-regional planning and operations. The further integration of the Yangtze River Delta region calls for a world-class airfield complex to support transportation from the region to across China and the world, said Yu Hongsheng, a researcher with Shanghai Academy of Social Sciences.

"The significance of aviation will be key for China as the nation becomes more and more international and further opens up its economy. The high efficiency of the integrated airfield complex is key for the region's economic development and business vitality," Yu added.



China Daily,
29th April 2020

https://www.chinadaily.com.cn/a/202004/29/WS5ea8d2daa310a8b2411527dd.html