



# ASBA SPOTLIGHT

Monthly news from  
the Asian Synthetic Biology Association

Editorial Pick	1
News	4
Announcement	7
Commentary	10
Upcoming events	11
Recruitment	12

Edition 3, May 2026

Curated by Xiaofang Huang & Xinyi Chen

## Gut barrier breakdown in fatty liver disease traced to a single integrating signal

EDITORIAL PICK

Report by Ho Chun Loong

A new study led by Damien Chua, with co-supervision by Prof Nguan Soon Tan (LKCMedicine, NTU) and Prof Liang Li (SUSTech), has identified a molecular hub that explains how diet and gut microbes jointly undermine the intestinal barrier in metabolic dysfunction-associated steatotic liver disease (MASLD/MASH). The work, an international collaboration spanning Singapore, China, Thailand, India, France, and Switzerland, is published in Nature Communications.

### nature communications

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Article | [Open access](#) | Published: 22 May 2026

### Angptl4 integrates dietary and microbial signals to disrupt gut barrier function in MASH

[Damien Chua](#) , [Zun Siong Low](#), [Joseph Han Sol Kim](#), [Yin Hao Lee](#), [Rattapanorn Kiatbumrung](#), [Pornjira Somnark](#), [Min Xu](#), [Yue Shi](#), [Gourav Kaushal](#), [Marcus Ivan Gerard Vos](#), [Aparna Mahadevan](#), [Natalie Hooi](#), [Mathan Raj](#), [Ekaterina Sviriaeva](#), [Beiming Cui](#), [Shaun Tan](#), [Kazuyuki Kasahara](#), [Chun Loong Ho](#), [Walter Wahli](#), [Kuo Chao Yew](#), [Sunny H. Wong](#), [Christine Cheung](#), [Mintu Pal](#), [Ru Zhang](#), [Natthaya Chuaypen](#), [Pisit Tangkijvanich](#), [Hong Sheng Cheng](#) , [Liang Li](#)  & [Nguan Soon Tan](#)  [Show fewer authors](#)

[Nature Communications](#) (2026) | [Cite this article](#)

MASLD is among the most common chronic liver diseases worldwide, yet how breakdown of the gut barrier contributes to its early progression has remained poorly understood. The team identified intestinal angiopoietin-like 4 (Angptl4) as a central integrator of dietary and microbial signals that governs both barrier integrity and hepatic oxidative stress — two hallmark features of early disease.

Combining intestinal-specific Angptl4 knockout mice, mechanistic in vitro systems, humanized microbiota models, and multi-cohort human studies, the researchers showed that intestinal Angptl4 sits at the convergence of two parallel inputs.

Dietary fatty acids drive its expression through PPAR  $\alpha$  signaling, while microbiota-derived signals act through pattern-recognition pathways, including flagellin-activated TLR5 – EGR1 signaling, alongside diet-associated shifts in TLR signaling more broadly. When this regulation is disturbed, the intestinal epithelial barrier destabilizes, amplifying the flux of metabolites and microbial products from gut to liver and fuelling early hepatic stress.

Importantly, the findings translated to humans. Across multiple patient cohorts, fecal Angptl4 rose in tandem with gut dysbiosis and metabolic dysfunction, capturing a gut barrier – related dimension that is distinct from endotoxemia or acute injury. This positions fecal Angptl4 as a promising, non-invasive exploratory biomarker for tracking barrier dysfunction in MASLD — a notable step given the field's longstanding need for accessible markers of early disease.



Prof Nguan Soon Tan



Mr. Damien Chua

Taken together, the study reframes intestinal Angptl4 as a mechanistic link connecting diet, the microbiome, and gut – liver dysfunction. Beyond its conceptual contribution, the work points toward precision, barrier-targeted strategies for MASLD, including the possibility of microbe-associated molecular pattern (MAMP)-based interventions to reshape the trajectory of disease progression.

The project reflects a genuinely global collaborative effort. The authors gratefully acknowledge contributions from collaborators across institutions, including the Faculty of Medicine at Chulalongkorn University (Thailand), Southern University of Science and Technology and the Chinese Academy of Sciences (China), the All India Institute of Medical Sciences (India), and partners in Switzerland. The research was supported by funding from NTU's Lee Kong Chian School of Medicine, the Singapore Ministry of Education, the Singapore Ministry of Health's National Medical Research Council, and counterpart agencies in China and Thailand. First author Damien Chua is a recipient of the Nanyang Presidential Graduate Scholarship from NTU Singapore.

### Abstract

Metabolic dysfunction-associated steatotic liver disease (MASLD) is a major contributor to liver morbidity, yet mechanisms linking gut barrier dysfunction to early progression remains poorly defined. We identify intestinal angiotensin-like 4 (Angptl4) as a central integrator of dietary and microbial signals that governs barrier integrity and hepatic oxidative stress, key early MASLD features. Using intestinal-specific Angptl4 knockout mice, mechanistic in vitro systems, humanized microbiota models, and multi-cohort human studies, we show that intestinal Angptl4 expression is regulated by dietary fatty acids via PPAR $\alpha$  signaling and microbiota-derived pattern-recognition pathways, including flagellin-activated-TLR5-EGRI activation, alongside diet-associated shifts in TLR signaling. These signals destabilize epithelial barriers, amplifying gut-to-liver metabolic and microbial flux. In human cohorts, fecal Angptl4 increases with dysbiosis and metabolic dysfunction, capturing a gut barrier-related dimension distinct from endotoxemia or acute injury. Thus, intestinal Angptl4 emerges as a mechanistic hub linking diet, microbiota, and gut-liver dysfunction, supporting precision barrier-targeted strategies in MASLD.

### References:

<https://www.nature.com/articles/s41467-026-72575-6>

# Generation of an autophagy-targeting influenza A virus as live attenuated vaccine

EDITORIAL PICK

Report by Xinyi Chen

Influenza virus is a critical respiratory pathogen worldwide. Its rapid evolution and strong transmissibility cause widespread infections and fatalities every year. Vaccination is the most effective and economical way to fight influenza. Live attenuated vaccines (LAVs) stand out for simulating natural infection and inducing comprehensive mucosal, humoral and cellular immunity. Even so, balancing safety and immune performance has long been a major challenge for LAV research.

nature communications

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Article | [Open access](#) | Published: 28 April 2026

## Generation of an autophagy-targeting influenza A virus as live attenuated vaccine

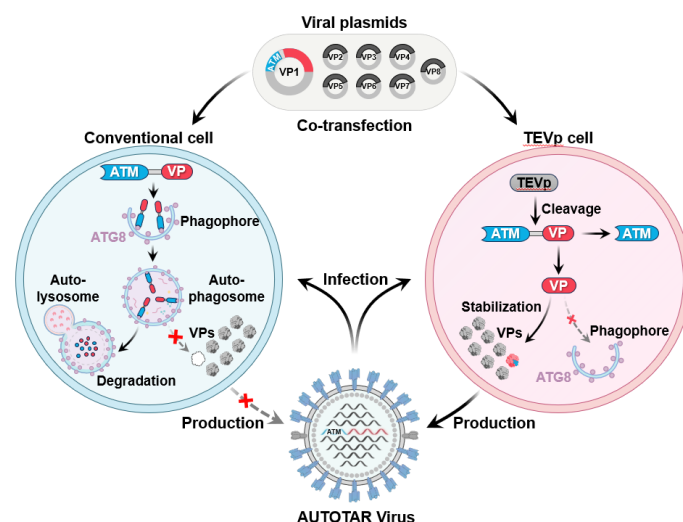
Jiawei Hao, Ping Wang, Le Li, Qikai Wang, Quan Shen, Le Tong, Chengyao Liu, Zihao Wang, Qisi Zhang, Demin Zhou, Xiaoshan Shi & Longlong Si

*Nature Communications*, Article number: (2026) | [Cite this article](#)

A team led by Prof. Longlong Si and Prof. Xiaoshan Shi from the Shenzhen Institute of Advanced Technology (SIAT), Chinese Academy of Sciences, has developed a novel LAV platform called AUTOTAR. The research achievement was published in *Nature Communications*.

AUTOTAR adopts an original viral attenuation strategy based on autophagy, a conserved intracellular pathway that breaks down abnormal substances to sustain cell stability. The research team embedded autophagy-targeting sequences into viral proteins, which can selectively inhibit influenza replication in normal cells. For vaccine production, the team added a removable tag and a protease cleavage site to the viral NS1 protein. This design ensures high-yield virus production in engineered cells while achieving effective attenuation in human bodies.

In vitro tests confirmed the engineered virus replicates poorly in common cells, and viral protein degradation is solely driven by autophagy instead of the proteasome system.



Animal experiments further validated its excellent safety: vaccinated mice had no weight loss, lung injury or deaths. The modified virus showed no transmission risk and maintained genetic stability after continuous passages. A single intranasal vaccination successfully triggered full-range immune responses. It provided complete protection against homologous virus and showed great potential to defend against different influenza subtypes.

This study verifies the feasibility of autophagy-targeted regulation for LAV design and enriches theories and technologies for vaccine engineering. The AUTOTAR platform can be further applied to develop vaccines for more viral diseases, supporting the upgrade of next-generation vaccines and global public health defense.

Conducted at SIAT, the study takes Prof. Silong Long and Prof. Xiaoshan Shi as co-corresponding authors, and Jiawei Hao and Ping Wang as co-first authors. The research was funded by national science foundations, key R&D programs and institutional innovation projects.

### References:

<https://www.nature.com/articles/s41467-026-72426-4>

# SynCell Asia Initiative Unveils a Decade-Long Roadmap to Build a Synthetic Cell Center in Shenzhen

## NEWS

Report by Ho Chun Loong

On 26th May 2026, the SynCell Asia Initiative, led by scientists from six Asian nations under the coordination of the Shenzhen Institute of Advanced Technology (SIAT) of the Chinese Academy of Sciences, published a landmark article in *Nature Biotechnology* titled “A framework for building a synthetic cell from the SynCell Asia Initiative.”


### nature biotechnology

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Comment | Published: 26 May 2026

## A framework for building a synthetic cell from the SynCell Asia Initiative

Zhuojun Dai, Wataru Aoki, Pimchai Chaiyen, Matthew Wook Chang, Xixian Chen, Zibo Chen, Byung-Kwan Cho, Nan-Nan Deng, Shishen Du, Jee Loon Foo, Julius Fredens, Meifang Fu, Xiaojun Han, Tomohisa Hasunuma, Norikazu Ichihashi, Nurulfiza Mat Isa, Daisuke Kiga, Dong-Myung Kim, Jongmin Kim, Akihiko Kondo, Yuishin Kosaka, Kobkul Laoteng, Joongoo Lee, Jian Li, Junbai Li, Ming Li, Sierin Lim, Jianbo Liu, Xingqiao Liu, Yuan Lu, Nan Luo, Tomoaki Matsuura, Wataru Mizunashi, Yan Qiao, Ahmad Bazli Ramzi, Sang Woo Seo, Yoshihiro Shimizu, Kwanwoo Shin, Liangfei Tian, Wanwipa Vongsangnak, Baojun Wang, Cheng-Cai Zhang, Xian-En Zhang, Guoping Zhao, Bo Zheng, Yaoqi Zhou & Chenli Liu  — Show fewer authors

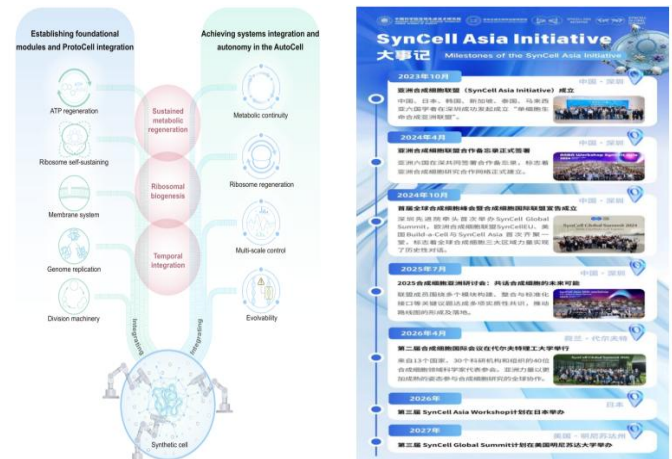
*Nature Biotechnology* (2026) | [Cite this article](#)

The article systematically outlines a 10-year research roadmap to construct a fully functional synthetic cell from the bottom up, establishes a clear regional collaboration mechanism, and provides targeted solutions to break through core bottlenecks in synthetic cell development, contributing Asian insight and commitment to the global mission of creating life from inanimate molecules.

De novo construction of a living cell using biological macromolecules stands as one of the most challenging frontiers in synthetic biology. It not only deepens humanity’s fundamental understanding of life but also enables programmable, customizable cells to revolutionize biomanufacturing and biomedicine. While global initiatives have made progress in developing individual functional modules, the spatiotemporal integration of these modules into a robust, self-sustaining system remains a long-standing global bottleneck.

Since its launch, the SynCell Asia Initiative has established a powerful, distinctive voice for Asia in the global synthetic cell landscape. Through repeated SynCell Asia Workshops, members engaged in deep discussions, aligned visions, and gradually developed a scientific framework and action agenda rooted in Asian perspectives and regional strengths. The roadmap presented today is the culmination of those efforts.

The initiative identifies four core challenges: metabolic continuity, autonomous ribosome synthesis, missing modular design rules, and spatiotemporal coordination complexity.



To address these, it proposes a centralized AI-driven biofoundry operating under a “central factory plus distributed workstations” model, enabling a cross-border closed-loop Design-Build-Test-Learn system. It also integrates single-synccell omics, hybrid modeling, and artificial cell evolution to support reliable system integration.

The 10-year roadmap consists of two progressive phases. Phase 1 (Years 1 – 5) targets the ProtoCell: a stable vesicle with a minimal genome that supports endogenous metabolite synthesis and a digital twin for simulating cellular division. Phase 2 (Years 6 – 10) aims to deliver the AutoCell, capable of autonomous ribosome regeneration, continuous growth-division cycles, and the formation of functional synthetic cell communities.

This framework leverages complementary scientific strengths across Asia to create an unprecedented collaborative model with shared infrastructure and open standards. It shifts synthetic cell research from fragmented modular exploration to systematic, standardized construction, while driving advances in quantitative biology, artificial intelligence, and biomanufacturing.

Supported by the Asian Synthetic Biology Association (ASBA) and the Global Biofoundries Alliance (GBA), the SynCell Asia Initiative will continue to deepen regional cooperation, accelerate roadmap implementation, and solidify Asia’s leading role in the global synthetic cell research community.

### References:

<https://mp.weixin.qq.com/s/jBg03XldqXD8QbF5-t-Yw?from=groupmessage&scene=1&subscene=10000&clicktime=1779787417&enterid=1779787417>

# Prof. Chenli Liu Highlights Foundational Research Breakthroughs After Symposium and CCTV's Focus

## NEWS

Report by Xiaofang Huang

On April 30, 2026, the national Symposium on Strengthening Basic Research was held in Shanghai, where General Secretary Xi Jinping delivered an important speech to guide the country's sci-tech development. Prof. Chenli Liu, Director of the Shenzhen Institute of Advanced Technology (SIAT), Chinese Academy of Sciences, took part in this high-level event. During the symposium, he reported on the progress of basic research work at his institute and put forward practical opinions and suggestions for further advancing foundational research across the sector. He also holds the concurrent post of Co-Chair of the Asian Synthetic Biology Association (ASBA).



Shortly after the symposium, Prof. Liu was invited to appear on CCTV-13's flagship program *Focus Interview*. In this exclusive interview, he further expanded on his vision for strengthening basic research to solidify the foundation of China's sci-tech power. He pointed out that Chinese modernization and the development of a powerful science and technology nation can never rest on the technological foundations of other countries. Future global competition is essentially a competition over basic research and original innovation capabilities, and China must courageously step into the "uncharted territory" of scientific exploration to seize the initiative for long-term development.

As a pioneering figure in quantitative synthetic biology, Prof. Liu noted that SIAT has long adhered to forward-looking layout in foundational and frontier research fields. His team has secured remarkable breakthroughs in multiple key areas, including synthetic bacterial cancer therapeutics, the rational design of artificial biological systems, and sustainable biomanufacturing technologies.



The program also presented real scenes of Prof. Liu and his research team working in the laboratory, vividly demonstrating how cutting-edge basic research is converted into practical innovations to solve real-world problems.

Prof. Liu emphasized that influential basic research requires long-term perseverance, just like "grinding a sword for ten years". Closely aligning with national strategic demands, SIAT keeps optimizing its innovation ecosystem and promotes the "upstairs innovation, downstairs entrepreneurship" model. This effective mechanism connects laboratory discoveries with industrial transformation, delivering strong original innovation support for China's pursuit of high-level sci-tech self-reliance. While leading scientific research, Prof. Liu also promotes exchanges and cooperation within the global synthetic biology community in his role as ASBA Co-Chair.



## References:

<https://mp.weixin.qq.com/s/E7C39XENCi1n2hrwq7BIfQ>

# The Second National Symposium on Industry–University–Research Collaboration in Green Biomanufacturing Held in Nanjing

## NEWS

Report by Xinyi Chen

The Second National Symposium on Industry – University – Research Collaboration in Green Biomanufacturing was successfully held in Nanjing, China, bringing together leading experts, researchers, industry representatives, and policymakers from across the country to discuss the future of synthetic biology and sustainable biomanufacturing.

Jointly organized by the Chinese Society of Biotechnology and China Pharmaceutical University, the conference focused on emerging areas including synthetic biology, intelligent biomanufacturing, microbial cell factories, future foods, sustainable biomaterials, and low-carbon biotechnology. The event aimed to strengthen collaboration between academia and industry while accelerating the industrialization of next-generation biotechnologies.



Discussions emphasized how engineering biology is evolving from laboratory-scale innovation toward industrial-scale applications capable of supporting greener and more sustainable manufacturing pathways.

In recent years, SIAT has continued to strengthen its interdisciplinary research platforms in synthetic biology and green biomanufacturing. Based in Shenzhen’s Guangming Science City, the institute has established multiple innovation platforms focused on: synthetic biology, metabolic engineering, engineered living materials, intelligent biomanufacturing, AI for biology, and sustainable bio-based manufacturing.

Earlier conferences and international collaborations hosted by SIAT have also demonstrated the institute’s commitment to advancing frontier research in programmable biology and industrial biotechnology.

Participants noted that green biomanufacturing is becoming an increasingly important strategic industry worldwide, driven by growing demand for sustainable production technologies and carbon-neutral industrial solutions. The Nanjing symposium provided an important platform for cross-disciplinary dialogue and industry collaboration, further promoting the development of China’s biomanufacturing sector.

### References:

<https://news.cpu.edu.cn/a8/7b/c243a239739/page.htm>



A strong delegation from the Shenzhen Institutes of Advanced Technology (SIAT), Chinese Academy of Sciences, participated in the symposium. Multiple SIAT researchers and collaborators were involved in thematic forums and academic exchanges related to synthetic biology, engineering biology, AI-driven biotechnology, and sustainable manufacturing systems. Their participation reflected SIAT’s growing influence in China’s rapidly expanding biomanufacturing ecosystem.

During the symposium, experts highlighted the increasing integration of artificial intelligence, automation, and systems engineering into biological manufacturing processes.

# Singapore to Host Mini Symposium on BioDesign and Manufacturing for the Bioeconomy

## ANNOUNCEMENT

Report by Xinyi Chen

SINERGY Singapore will host the “Mini Symposium: BioDesign and Manufacturing for the Bioeconomy” on June 15, 2026, at the Centre for Life Sciences (CeLS) Auditorium, National University of Singapore (NUS).

The symposium will feature presentations by Professor Tom Ellis from Imperial College London and Dr. Taek Soon Lee from Lawrence Berkeley National Laboratory and the Joint BioEnergy Institute (JBEI). The event will focus on emerging developments in engineering biology, synthetic biology, and sustainable biomanufacturing.

Professor Tom Ellis will deliver a talk titled “Growing Materials from Bacteria,” focusing on the use of cellulose-producing bacteria to develop engineered living materials. According to the official event description, the presentation will explore how bacterial materials can be designed for applications in healthcare, environmental remediation, food, fashion, and textiles.

Dr. Taek Soon Lee will present “BioDesign and Manufacturing for the Bioeconomy,” highlighting strategies for developing microbial cell factories capable of producing advanced biofuels and high-value chemicals. The talk will cover approaches including metabolic engineering, CRISPRi-based regulation, automation, and machine learning-assisted optimization for sustainable biological production systems.

The symposium is organized as part of SINERGY’s efforts to promote scientific exchange and collaboration in engineering biology and the broader bioeconomy community. Researchers, students, and professionals interested in synthetic biology, industrial biotechnology, and sustainable manufacturing are welcome to participate.

Registration information is available on the official event page.

Source: <https://sinergy.sg/event/mini-symposium-biodesign-and-manufacturing-for-the-bioeconomy/>

**ENGINEERING BIOLOGY SEMINAR SERIES**

## BioDesign & Manufacturing for the Bioeconomy

*Mini Symposium*

**15 JUNE 2026 (MON)**  
10:30 AM – 12:00 PM (SG)

- 10:30 AM Unlocking microbial synthetic biology for materials of all scales  
*Prof Tom Ellis*
- 11:15 AM Biological design and engineering of biofuels producing microbial systems  
*Dr Taek Soon Lee*
- 12:00 PM Networking Lunch

**Centre for Life Science (CeLS) Auditorium**  
28 Medical Dr, Singapore 117456

**Tom Ellis, Ph.D.**  
Imperial College London

**Taek Soon Lee, Ph.D.**  
Lawrence Berkeley National Laboratory  
Joint BioEnergy Institute

**JOIN US!**  
Scan the QR code to register.

Join us for this exciting talk and networking over lunch!

**NATIONAL CENTRE FOR ENGINEERING BIOLOGY, SINGAPORE**

**Sinergy**  
Singapore Consortium for Synthetic Biology

# International Symposium on Synthetic Biology & CRISPR Technology (ISynBioCT) 2026: Fostering AI-Powered Biological Innovation

## ANNOUNCEMENT

Report by Xiaofang Huang

Synthetic biology and CRISPR technology are advancing rapidly with AI-driven innovation. iSynBioCT 2026, hosted by Universiti Kebangsaan Malaysia (UKM) and supported by ASBA, will gather global experts under the theme “Fostering Biological Research with AI-Empowered Frontier Technologies.” The symposium covers interdisciplinary fields including AI, genome editing, synthetic biology, omics, automation, protein engineering, bioinformatics and biosafety. It provides academic exchanges, industrial cooperation, and multiple awards to support early-career researchers, while building a collaborative network to translate research into real-world applications and promote sustainable development.

Key Details:

Dates: 22 – 23 September 2026

Venue: UKM Bangi, Malaysia

Abstract deadline: 30 June 2026

Registration deadline: 31 August 2026

Website: <https://www.ukm.my/inbiosis/en/isynbioct2026/>

Registration Form: <https://forms.gle/YRUANPTC8TSC6ECS6>

**INTERNATIONAL SYMPOSIUM ON SYNTHETIC BIOLOGY & CRISPR TECHNOLOGY (ISYNBIOCT) 2026**  
FOSTERING BIOLOGICAL RESEARCH WITH AI-EMPOWERED FRONTIER TECHNOLOGIES

**22 - 23 SEPTEMBER 2026**  
**UNIVERSITI KEBANGSAAN MALAYSIA, BANGI**

**EXCITING AWARDS**

- TRAVEL GRANT AWARDS
- CBR GRANT AWARD
- BEST PRESENTER AWARDS

**IMPORTANT DATES**

- ABSTRACT SUBMISSION DEADLINE: 30 JUNE 2026
- REGISTRATION DEADLINE: 31 AUGUST 2026

**RESEARCH TOPICS**

- AI in Biology
- Synthetic Biology
- Genome Editing
- Engineering Biology
- Synthetic Cells
- Metabolic Engineering
- Protein Engineering
- CRISPR Technology
- In Silico Design
- Precision Biology
- Automation & Robotics
- (Meta)Genomics
- Proteomics
- Metabolomics
- Metagenomics
- Transcriptomics
- Molecular Docking
- Bioinformatics
- Structural Biology
- Biosafety & Biosecurity

**REGISTRATION FEE**

Registration Type	Local	International
Presenter	RM 390	RM 800
Participant	RM 280	RM 600

**MORE INFO** VISIT OUR WEBSITE: [HTTPS://WWW.UKM.MY/INBIOSIS/EN/ISYNBIOCT2026/](https://www.ukm.my/inbiosis/en/isynbioct2026/)  
REGISTRATION FORM: [HTTPS://FORMS.GLE/YRUANPTC8TSC6ECS6](https://forms.gle/YRUANPTC8TSC6ECS6)

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# Forging a New Frontier: Dr. Shen Haosheng Appointed Full Professor at Nankai University

ANNOUNCEMENT

Report by Ho Chun Loong



We are delighted to announce that Dr. Shen Haosheng, a member of the ASBA Singapore team, has been appointed Full Professor in the College of Life Sciences at Nankai University.

Dr. Shen earned his B.Sc. (Biology, Boling Class) from Nankai University and his Ph.D. from the National University of Singapore. While at NUS he gained wide recognition for his work on engineered commensal microbes for targeted nose-to-brain drug delivery, published in *Cell*. His research record also includes publications in *Nature Communications* and the *Journal of the American Chemical Society*, and he is a named inventor on two international patents for engineered-microbe and protein-based therapeutic approaches. He was recently awarded the NSFC Young Scientists Fund (Overseas) (海外优青) in recognition of his contributions to the field.

Dr. Shen's new group will focus on engineered symbiotic microbes for cancer therapy, microbiome-mediated nose-to-brain delivery, and natural-product discovery from microbiome and plant sources. He is open to collaborative projects within the ASBA community.

Please join us in congratulating Dr. Shen on this well-deserved appointment. We look forward to his continued contributions and future achievements.

To discuss collaborations or get in touch with Dr. Shen, please contact him at his email: [nkshs2026@163.com](mailto:nkshs2026@163.com)

#### References:

<https://sky.nankai.edu.cn/shs/list.htm>

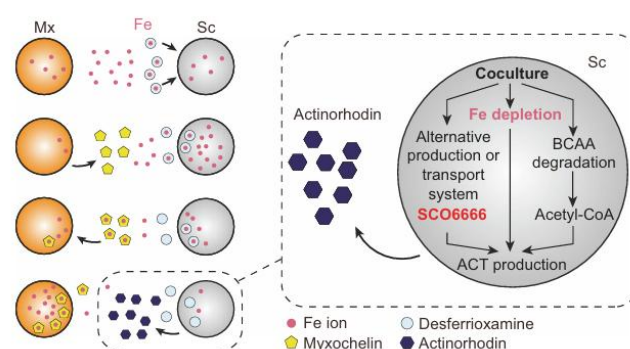
# Unlocking the full potential of *Streptomyces* through synergizing



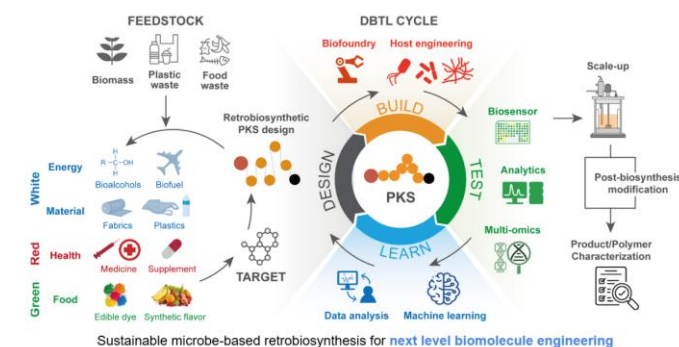
## COMMENTARY

Report by Huanran Xu

A recent ASBA online seminar held on May 11, 2026 featured Prof. Namil Lee from KAIST's Graduate School of Engineering Biology, who presented a comprehensive framework for harnessing *Streptomyces*' untapped genetic potential to address the global antimicrobial resistance crisis. *Streptomyces* produce over 80% of commercialized antibiotics, yet more than 90% of their secondary metabolite biosynthetic gene clusters (smBGCs) remain silent under standard laboratory conditions, leaving a vast reservoir of novel bioactive molecules inaccessible.



To translate these discoveries into industrial applications, Prof. Lee's team developed a high-throughput automated Design-Build-Test-Learn cycle optimized for polyketide synthase (PKS) engineering. This platform enables rational reprogramming of PKS modules to produce new-to-nature compounds, including substituted valerolactams that can be polymerized into high-performance nylon-5 materials with superior thermal stability.



Prof. Lee's transformative approach synergizes systems biology and synthetic biology through four interconnected pillars: mining novel smBGCs, awakening silent metabolic pathways, optimizing production via multi-omics analysis, and reprogramming biosynthetic machinery for retrosynthesis of new-to-nature compounds. This integrated framework overcomes the limitations of traditional random screening and single-gene manipulation.

A cornerstone of his research is large-scale genome mining. His team developed a hybrid long- and short-read sequencing pipeline to generate high-quality assemblies for these high-GC-content organisms, launching the ambitious 1,460 Korean *Streptomyces* Genome Project. Analysis of just 30 completed genomes identified 922 smBGCs, 201 of which have high potential to produce entirely novel secondary metabolites.

The most groundbreaking discovery was the iron competition mechanism that activates silent antibiotic biosynthesis. Prof. Lee demonstrated that co-culturing *Streptomyces coelicolor* with *Myxococcus xanthus* triggers a dynamic battle for iron: *M. xanthus* secretes the high-affinity iron chelator myxochelin to steal iron, which induces *S. coelicolor* to overproduce the antibiotic actinorhodin as a defense response. This finding provides a physiologically relevant strategy to unlock silent smBGCs by mimicking natural soil microbial interactions.

Looking ahead, several key directions warrant further investigation to advance this framework. First, the 1,460 Korean *Streptomyces* Genome Project requires standardized AI pipelines to accelerate functional annotation of novel smBGCs. Second, the generalizability of the iron competition mechanism in other microbial systems remains to be validated. Finally, integrating generative AI will further accelerate the automated DBTL cycle.

As an integrated strategy spanning genome mining, pathway activation, and automated biodesign, Prof. Lee's framework not only unlocks the untapped potential of *Streptomyces* but also establishes a scalable model for natural product discovery and sustainable biomanufacturing. This work sets a solid foundation for addressing antimicrobial resistance and building the next generation of biomolecular engineering technologies.

If anyone is keen for collaboration, Dr. Lee is contactable via email at [nilee@kaist.ac.kr](mailto:nilee@kaist.ac.kr).

**Date of seminar** : 11th May 2026

**SpotifyLink** :

[https://open.spotify.com/show/2FNc4RVJjV6OoXpMOrbIRo?si=J\\_T\\_Ah\\_GTHS3MjR\\_H7Coew](https://open.spotify.com/show/2FNc4RVJjV6OoXpMOrbIRo?si=J_T_Ah_GTHS3MjR_H7Coew)

## UPCOMING EVENTS

Report by Xiaofang Huang

## ASBA Online announcement

## De novo design of functional protein complexes using deep generative models



ASBA Online  
Online Seminar by Dr. Sangmin Lee

De novo design of functional protein complexes using deep generative models

2<sup>nd</sup> June 2026 (Tuesday) | 10<sup>am</sup>-11<sup>am</sup>

Zoom Meeting ID: 6593801755

**Dr. Sangmin Lee** is an Assistant Professor in the Department of Chemical Engineering at Pohang University of Science and Technology (POSTECH), South Korea. His research focuses on de novo protein design, protein nanostructures, and the self-assembly and phase behavior of bio-inspired nanomaterials. Before joining POSTECH, he was a postdoctoral scholar with Prof. David Baker at the Howard Hughes Medical Institute and the University of Washington. He received his Ph.D. in Chemical Engineering from the University of Michigan under the supervision of Prof. Sharon Glazer. His work has been published in leading journals including Nature, Nature Materials, Nature Chemistry, PNAS, and Science Advances.

Protein complexes such as protein cages, cages, bundles, and patterned layers exist widely in nature and can also be constructed artificially. They participate in a variety of biological processes, including genetic material delivery, immune activation, and disease pathogenesis. Therefore, the design of artificial protein nanostructures that can regulate these biological processes has attracted extensive research attention. Over the past few decades, computational protein design has mainly relied on physics-based methods, such as scoring functions derived from theoretical chemistry and physics. However, recent advances in AI-based methods, including protein structure prediction, sequence design, and generative models, have greatly broadened the scope of achievable protein structure design. In this talk, he will provide an overview of the computational design of de novo protein nanostructures using AI-based software and present several examples of designed nanostructures, such as virus-like nanocages. Experimentally, the designed proteins were expressed in *Escherichia coli*, and the assembled nanostructures were verified using electron microscopy.

Edited by Dr. Xiaofang Huang (xh01@postech.ac.kr), Yoon Seon (y01@postech.ac.kr), Sangmin Lee (slee@postech.ac.kr), and Dr. Sangmin Lee (slee@postech.ac.kr).

An upcoming ASBA Online Seminar will be held, featuring cutting-edge insights into AI-driven de novo protein design and synthetic biology. We invite all ASBA members, researchers, students, and industry partners with an interest in synthetic biology, protein engineering, and AI-driven design to join this engaging online session, where you can connect with peers and gain valuable knowledge shared by academic experts.

## Seminar Details

Event: ASBA Online Seminar

Time: 10:00 AM (GMT+8), June 2nd

Format: Online (Zoom Meeting)

Zoom Meeting ID: 6593801755

Zoom Link:

<https://singaporetech.zoom.us/my/adisonwong>


Theme: De novo design of functional protein complexes using deep generative models

## About the Talk

Protein complexes such as oligomers, cages, bundles, and patterned layers are key to diverse biological functions, from genetic material delivery to immune activation and disease pathogenesis. The design of artificial protein nanostructures that regulate these processes is a rapidly growing research frontier.

In this seminar, Dr. Lee will overview the computational design of de novo protein nanostructures using AI-based software, with examples including virus-like nanocages. He will also discuss how designed proteins are experimentally validated via expression in *Escherichia coli* and electron microscopy.

This seminar is open to all ASBA members, researchers, students, and industry partners interested in synthetic biology, protein engineering, AI-driven design, and related fields.

Further updates will be shared via official ASBA channels soon. Please stay tuned for more information.

We sincerely look forward to your active participation in this upcoming ASBA Online Seminar!

If you would like to share your work in the next ASBA Online or feature your latest work in our future ASBA Spotlight edition, please contact us at [asba.center@siat.ac.cn](mailto:asba.center@siat.ac.cn) or reach us at our social media platforms (*Linkedin, Facebook, Instagram, X and Rednote*)

## RECRUITMENT

Report by Xiaofang Huang

# Research Assistant Positions in Quantitative Synthetic Biology at SIAT, CAS

The Institute of Synthetic Biology at the Shenzhen Institute of Advanced Technology (SIAT), Chinese Academy of Sciences (CAS), invites applications for Research Assistant roles in Prof. Liu Chenli's research group. Our lab dedicates to quantitative synthetic biology research, following the concept of quantitative analysis and synthetic reconstruction to explore core mechanisms of complex biological systems and rational design principles of synthetic biosystems.

The main research directions cover engineered bacteria development for solid tumor therapy and bottom-up synthesis of artificial single-cell life. Well-equipped experimental platforms and comprehensive research resources are available to support innovative fundamental and translational research.

Two research tracks are open for recruitment: engineered strain development, and pharmacology & toxicology research. Team members will engage in full-cycle laboratory experiments, data analysis, research documentation and project progress reporting.

Location: Shenzhen, Guangdong Province, China

## Qualifications

**Track 1:** Engineered Strain Development Candidates shall hold a Master's degree or above, or Bachelor's degree with no less than two years relevant working experience. Background in molecular biology, tumor immunology, synthetic biology or new drug research is favored. Proficiency in flow cytometry, qPCR, ELISA, cell culture and primary immune cell operation is required. Applicants need solid English literacy, independent problem-solving capacity and good teamwork awareness.

**Track 2:** Pharmacology & Toxicology Applicants with Bachelor's degree or majored in pharmacology, toxicology and related disciplines are eligible. Familiarity with NMPA, FDA regulations and ICH guidelines is necessary. Competence in English literature translation and technical report writing is required.

## Benefits

Competitive salary and performance bonus, complete social insurance and housing fund, talent housing subsidy, regular physical examination, meal allowance and paid annual leave. Researchers gain professional academic guidance, abundant research funding, advanced lab facilities and promising career development prospects in synthetic biology and pharmaceutical research fields.

## To Apply


Please send your PDF version CV to [nan.luo@siat.ac.cn](mailto:nan.luo@siat.ac.cn) Email subject format: "Applied Position - University - Major - Name"

Lab Homepage: <http://isynbio.siat.ac.cn/liulab/>

Prof. Liu Chenli's group sincerely welcomes passionate and rigorous young talents to join and advance frontier synthetic biology research together.

**Research Assistant Positions in Quantitative Synthetic Biology at SIAT, CAS**

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences



- Research Focus:**  
Quantitative synthetic biology, solid tumor therapy engineered bacteria, artificial single-cell life synt
- Two Tracks:**  
Engineered Strain Development, Pharmacology & Toxicology Research
- Qualifications Track 1:**  
1: Master's degree or above /  
• Bachelor's with 2+ years experience;  
• molecular biology, tumor immunology,  
• synthetic biology, background;  
• flow cytometry, qPCR, ELISA, cell  
• cell culture skills; solid English
- Qualifications Track 2:**  
• Bachelor's in pharmacology/toxicology;  
• NMPA/FDA/ICH familiarity;  
• NMPA/FDA/ICH familiarity;  
• English literature translation
- Benefits:**  
Competitive salary, performance bonus, social insurance, housing fund, talent subsidy, physical exam, meal allowance, tax; addendum guidance, and research funding, lab facilities.
- Application:**  
PDF CV to [nan.luo@siat.ac.cn](mailto:nan.luo@siat.ac.cn);  
Email subject: "Applied Position - University - Major - Name"; [Lay@siat.ac.cn](http://LabHomepage.ac.cn/liulab);  
<http://LabHomepage.ac.cn/liulab>

## RECRUITMENT

Report by Xinyi Chen

## Research Assistant Positions in Synthetic Biology / Metabolic Engineering at SIAT, CAS

The Institute of Synthetic Biology at the Shenzhen Institute of Advanced Technology (SIAT), Chinese Academy of Sciences (CAS), is pleased to announce 2 - 3 openings for Research Assistants in the Prof. Zhong Chao's Lab, focusing on synthetic biology, microbial engineering, engineered living materials, and sustainable biomanufacturing.

The laboratory conducts interdisciplinary research integrating synthetic biology, metabolic engineering, genetic circuit design, and materials engineering to develop programmable microbes, functional biomaterials, and engineered cell factories. Research applications span biomedical engineering (disease intervention, tissue repair, regenerative medicine) and sustainability-oriented technologies (environmental remediation, resource recycling, and green biomanufacturing).

The lab is supported by SIAT's advanced synthetic biology research platform and provides access to microbial engineering, fermentation systems, molecular biology facilities, biomaterial characterization, cell and animal experiment platforms, and translational validation resources.

You will join an interdisciplinary research team working on multiple directions, including microbial metabolic engineering, functional protein and enzyme systems, engineered living materials, and cell-material interaction studies.

Location: Shenzhen, Guangming District, China

Qualifications: Candidates should hold a Master's degree or above in synthetic biology, bioengineering, microbiology, metabolic engineering, molecular biology, biomaterials, or related fields. Applicants with experience in molecular cloning, plasmid construction, gene editing, protein expression, fermentation optimization, metabolite analysis, cell culture, PCR/qPCR, ELISA, Western blot, immunofluorescence, tissue processing, or animal experiments are encouraged to apply. Good English reading and basic scientific writing skills are preferred.

Benefits: Competitive salary package, performance bonuses, stable career development opportunities, full social insurance and housing fund contributions, talent housing support, health examination and medical services, meal subsidies, paid annual leave, and access to internationally advanced research facilities and funding support. Outstanding candidates will receive mentorship from leading scientists and opportunities for long-term academic and industrial development.

To Apply: Please submit your CV (PDF format) to [yy.wang5@siat.ac.cn](mailto:yy.wang5@siat.ac.cn)

Subject line:

“Position Applied - University - Major - Name”

Original Recruitment Page:

<http://www.isynbio.org.cn/employment/761>

Prof. Zhong Chao's Lab warmly welcomes highly motivated young researchers interested in synthetic biology, microbial engineering, engineered living materials, and sustainable biotechnology to join this innovative and fast-growing research environment.

Join  
Our  
Lab

Institute of Synthetic Biology  
SIAT, CAS

2026.3.1-2026.12.31

Research Assistant at SIAT

Synthetic Biology/Metabolic Engineering/Microbial Materials/Green Biomanufacturing

Contact: [yy.wang5@siat.ac.cn](mailto:yy.wang5@siat.ac.cn) | +86-755-12345678

Shenzhen, Guangming District