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Sinergy

Singapore Consortium for
Synthetic Biology

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Dear Colleagues,

Last year was challenging for everyone. Even though Singapore managed to contain SARS-CoV-2 spreading and maintain a sense of normalcy, a lot of our interpersonal interactions, engagement, and professional activities had to move online. Nevertheless, the Covid-19 pandemic highlighted the importance of life science research and biotechnology applications that reach the society.

Keeping this in mind, SINERGY entered 2021 with a renewed commitment to facilitate collaborations at all levels. SINERGY supports research collaborations with the Seed Grant, awarded twice a year. I would like to congratulate Jee Loon Foo, Assistant Professor at NUS, who, together with our industry partner GenScript, was awarded a seed grant for "Advancing combinatorial DNA library assembly technologies for metabolic engineering applications". Learn more about the project and GenScript on P.3.

We are excited to introduce Associate Professor Susanna Leong, Assistant Provost of Applied Research at the Singapore Institute of Technology. Learn more about Susanna's research and Synthetic Biology vision on P.2.

In the last few months, the SINERGY family has grown.

Konstantinos (Kostas) Vavitsas joined as the consortium manager. Kostas is a synthetic biology researcher, science writer, and communications consultant who is eager to engage with the community and catalyze fruitful interactions.



Kostas Vavitsas
SINERGY Manager

I would also like to introduce our three newest industry partners, all local SMEs. FalconBio focuses on developing probiotic treatments for cancer. TeOra uses microbes to produce high-value compounds for the food and beverage industry. Az Evergreen aims to source and develop emerging technology in the area of food and agriculture technology and electronics. A warm welcome!

Matthew Chang,
SINERGY Director





Recent Publication Highlights

Future trends in synthetic biology in Asia

Mao N, Aggarwal N, Poh CL, Cho BK, Kondo A, Liu C, Yew WS, Chang MW
Advanced Genetics (2021)
2:e10038

Development of a polymer-based antimicrobial coating for efficacious urinary catheter protection

Low JL, Kao P H-N, Tambyah PA, Koh GLE, Ling H, Kline KA, Cheow WS, Leong SSL
Biotechnology Notes (2020)

Novel Modalities in DNA Data Storage

Lim CK, Nirantar S, Yew WS, Poh CL
Trends in Biotechnology (2021)

Tweak to Treat: Reprogramming Bacteria for Cancer Treatment

Sieow BFL, Wun KS, Yong WP, Hwang IY, Chang MW
Trends in Cancer (2020)

Systems biology approaches integrated with artificial intelligence for optimized metabolic engineering

Helmy M, Smith D and Selvarajoo K
Communications, Volume 11 (2020)

Bioinformatics-aided identification, characterization and applications of mushroom linalool synthases

Zhang C, Chen X, Lee RTC, Rehka T, Maurer-Stroh S, Rühl M
Communications Biology 4: 223 (2021)

Researcher Spotlight

Susanna Leong: Engineering anti-microbial peptides for health and bioremediation

Singapore Institute of Technology (SiT) is one of the newest Universities in Singapore, and one of SINERGY's most recent academic members. Established in 2014, SiT offers industry-focused degree programmes, integrating learning, industry, and community targeted at growth industries. For our 3rd newsletter, we have the pleasure of featuring Susanna Leong, Associate Professor and Assistant Provost of Applied research, and enthusiastic Synthetic Biologist!

Susanna Leong graduated with a B.Eng. and M.Phil. in Chemical Engineering from the University of Manchester Institute of Science and Technology (UMIST). She obtained her Ph.D. in Chemical Engineering from Cambridge University, before moving back to Singapore. Susanna's research focuses on engineering antimicrobial peptides for applications ranging from health to bioremediation. Antimicrobial peptides are highly promising second generation antibiotics - their membrane-targeting mechanism of microbial kill results in a low likelihood of microbial resistance development.

Susanna and her research team are interested in rational engineering of antimicrobial peptides to produce short synthetic peptides with enhanced potency against a broad spectrum of microbes. This technology opens up the possibility to functionalize peptides on surfaces to confer antimicrobial functionalization for customized applications. Susanna and her team developed polymer-based coating chemistries to impregnate and controllably release the peptides to the environment. Their work demonstrated proof-of-concept viability on coating for urinary catheters to reduce planktonic and biofilm formation on intra- and extraluminal surfaces. With good scalability of the catheter prototype, she looks forward to pursuing further safety and efficacy studies in larger animal

models followed by human clinical trials.

Currently, Susanna and her colleagues, Joy Pang and Adison Wong, are targeting the use of these peptides for bioremediation applications. Joy Pang is an Assistant Professor at SiT and has a background in Biochemistry. Her research interests include protein engineering, as well as development of bioanalytical tools and methods for use in Biotechnology. She is currently working on developing a miRNA-based test kit with a Biotech company. Adison Wong is an Assistant Professor and trained as a synthetic biologist. His interest is in the development of genetically programmed biosensors.

Susanna is an enthusiastic member of the local Synthetic Biology community and believes that the discipline will feature increasingly more in what we use and consume in the future. Singapore is primed to be an onshore manufacturer of SynBio products given our concerted R&D efforts and investments in this field, and she looks forward to reaping the benefits of a better future made possible by SynBio innovations.



Susanna Leong, Joy Pang, Adison Wong, and their students standing next to a pilot scale bioreactor which supports their translational research work at SiT. Photo by S. Leong.

Featured Industry Partner

GenScript Asia Pacific: Making Research Easy

GenScript Biotech Corporation (Stock Code: 1548.HK) is a global biotechnology group with the mission to "Make the Human and Nature Healthier through Biotechnology".



Founded in New Jersey, US in 2002 and listed on the Hong Kong Stock Exchange in 2015, GenScript's business operation spans over 100 countries and regions worldwide, with legal entities located in the U.S., Mainland China, Hong Kong, Japan, Singapore, Netherlands and Ireland. GenScript Biotech Corporation is a leading life sciences research and application service and product provider that applies its proprietary technology to various fields from basic life sciences research to translational biomedical development, industrial synthetic products, and cell therapeutic solutions.

Leveraging in the Group's proprietary gene synthesis and other technology and know-hows, the Group has established four major platforms including (i) a leading contracted research organization ("CRO") platform to provide one-stop solutions to global research communities; (ii) a contract development and manufacturing organization ("CDMO") platform; (iii) an industrial synthetic products platform; and (iv) an integrated global cell therapy platform.

GenScript has a number of intellectual property rights and technical secrets, including more than 100 patents and over 270 patent applications. As of June 30, 2020, GenScript's products and services have been cited by 51,000 peer-reviewed journal articles worldwide.

GenScript Asia Pacific headquarter was set up during late 2019 in Singapore to act as a central hub to better serve our customers in the Asia Pacific region. *"Our team is expanding exponentially with a complete setup consisting of technical field application scientists, sales and marketing personnel, so that we are able to understand our clients' needs better and provide customized solutions for the research community"*, Dawn Lee, Sales Director of GenScript SEA, said.

While majority of the synthetic biology market is concentrated in North America, followed by Europe, Asia-Pacific is believed to host the fastest growing market in the coming years. Singapore is aiming to be one of the global leader in this field, supported by the government with the launch of synthetic biology program as well as the establishment of the first synthetic biology research centre (SynCTI).

Empowered by the advanced gene synthesis technology and high-throughput assembly platform, GenScript offers comprehensive synthetic biology tools, including precision mutant library and high-throughput DNA Library assembly. GenScript joined SINERGY as the industrial partner in the year of 2020 and successfully co-applied for the first Seed Grant with Jee Loon Foo, Assistant Professor at NUS.

"SynCTI and GenScript are in collaboration to develop an efficient DNA assembly platform for obtaining customized ready-to-use combinatorial libraries of genetic elements in various arrangements", Jee Loon Foo said. *"As a test bed, a library of a biosynthetic pathway for a valuable compound will be constructed and screened to identify the optimum pathway design"*.

"We hope to assist the research group to reach their goal with a more cost effective and time saving method", Edward Wong, Field Application Scientist at GenScript Asia Pacific, said. In the coming years, GenScript hopes to have more collaborations together with the local researchers so that they can benefit and fully utilize its technologies.

Synthetic Biology Solutions Provider





Pathway engineering solution

- Gene Fragments
- High-throughput Gene Synthesis
- Precision Mutant Libraries
- Combinatorial DNA Assembly Libraries
- Recombinant Protein Expression



Antibody & Protein Engineering

- Custom Mouse and Rabbit Monoclonal Antibody
- Recombinant Protein and Antibody Expression
- High-throughput Gene to Antibody Expression
- High Density Transient Expression



CRISPR genome editing solution

- CRISPR gRNA Plasmids
- CRISPR sgRNA Services
- Single-Stranded DNA Synthesis
- CRISPR Cell Lines
- gRNA Libraries

ap.marketing@genscript.com



SINERGY Seed Grant Calling for Submissions

SINERGY provides a one-year S\$50,000 seed grant for selected academic-industry collaboration research projects.

The grant call is open throughout the year with submission deadlines on 31 March and 31 October respectively.

Interested PIs and companies can find details at Sinergy.sg/#grant and submit to sinergy@nus.edu.sg.



SINERGY Membership

As a SINERGY member, an industry partner is entitled to apply for NRF grants, access select lab facilities at members' rate, and has other benefits such as marketing and licensing opportunities, advice and consultancy from top-notch scientists, among others.

For inquiries, please contact sinergy@nus.edu.sg.



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For any inquiries or issues, please contact sinergy@nus.edu.sg.

Recruitment Information



SINERGY is looking to recruit an Outreach Executive. Interested candidates can check out [here](#) for more information.

Research Assistant positions are immediately available in the laboratory of Professor Liang Zhao-Xun in the School of Biological Sciences, Nanyang Technological University.



Job Responsibilities:

De novo design and assembly of synthetic DNA constructs; editing of microbial genomes for the production of value-adding natural products.

Job Requirements:

BS or MS in Biology, Chemistry or related fields; Prior lab experience in molecular cloning, biochemistry or microbiology are preferred.

NTU seeks a diverse and inclusive workforce and is committed to equality of opportunity. We welcome applications from all and recruit on the basis of merit, regardless of age, race, gender, religion, marital status and family responsibilities, or disability. To apply, send you cover letter and CV to zxliang@ntu.edu.sg.



Allozymes is a deep tech company based in Singapore. We are revolutionizing the way industry uses enzymes for manufacturing chemicals and natural compounds. Our rapid discovery and evolution of custom-designed enzymes enables breakthrough developments for sustainable production of ingredients for pharmaceuticals, cosmetics, food and beverages.

Allozymes is hiring distinctive Scientists/Engineers for its microbiology and microfluidics teams. Working in a highly collaborative and dynamic environment, these roles have the opportunity to interact with other scientists, automation and process engineers to achieve their goals. Candidates in Microfluidics, Microbiology, Synthetic biology, Metabolic engineering, or Protein engineering are welcome to apply. Please send your CV to careers@allozymes.com.



WIL@NUS is the joint laboratory of Wilmar International Limited and National University of Singapore. The laboratory is involved in a wide spectrum of research areas including protein production and characterization, metagenomics, and host strain development. A research scientist position is currently available for working on industrial microbial host strains development through genome editing.

Responsibilities:

- Design and conduct experiments and process and analyse data
- Write research papers, patent applications, reports, reviews and summaries and communicate/present results to colleagues, external scientists and stakeholders
- Collaborate with Wilmar-related companies to apply the research findings and develop improved techniques, products or practices
- Visit factories and other Wilmar-related research and development centres to liaise future research directions
- Attend international conferences on topics of interest to Wilmar Innovation Centre
- Develop new areas of research and write proposals

Qualifications/Requirements:

- Ph.D. degree in enzyme and protein engineering, biochemistry, microbiology, molecular biology or related discipline
- Work experience in general microbiology, molecular cloning, protein expression and biochemistry, experience in genome editing is preferable
- Ability to work independently and also work effectively in a team
- Good interpersonal skills and the ability to work harmoniously with a diverse workforce

Interested applicants can send their CV to huimin.lim@sg.wilmar-intl.com