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**Global pharma giants partner Singapore researchers to boost innovation in biologics and vaccines manufacturing**



*[From left to right] A/Prof Susanna Leong, Vice President (Applied Research), SIT; Prof Thorsten Wohland, Director, Research Governance and Enablement, Office of the Deputy President (Research and Technology), NUS; Prof Ng Huck Hui, Assistant Chief Executive, Biomedical Research Council, A\*STAR; Mr Chan Siong Wan, Site Director, GSK; Mr Tan Kong Hwee, Executive Vice President, EDB; Mr Koh Liang Hong, Site Head, EVolutive Facility, Sanofi; Mr George Lam, Site Head, Takeda Manufacturing Singapore; Prof Lim Keng Hui, Assistant Chief Executive, Science & Engineering Research Council, A\*STAR; Prof Peter Preiser, President's Chair in Biological Science & Associate Vice President (Biomedical and Life Sciences), NTU Singapore; Mr David Toh, Director and Chief Executive Officer, NTUitive*

**SINGAPORE** – Leading pharma companies GSK, Sanofi and Takeda will partner with research communities from the Agency for Science, Technology and Research (A\*STAR); National University of Singapore (NUS); Nanyang Technological University, Singapore (NTU Singapore) and its innovation and enterprise company, NTUitive; and Singapore Institute of Technology (SIT) to boost Singapore's biologics manufacturing capabilities.

Their partnership will be formalised through the Biologics Pharma Innovation Programme Singapore (BioPIPS), a consortium initiated by A\*STAR with support from the Singapore Economic Development Board (EDB).

BioPIPS seeks to use research and innovation to grow Singapore's manufacturing capabilities for biologics, which include recombinant therapeutic proteins, and vaccines. Amid the COVID-19 pandemic, biologics and vaccines played a critical role globally in preventing severe disease and saving lives.

The consortium will bring together leading industry experts and Singapore's research ecosystem to enhance manufacturing productivity, improve operational efficiency and achieve sustainability goals. The consortium ultimately aims to make Singapore's biologics manufacturing capabilities best-in-class and well-positioned for the introduction of new products and novel manufacturing technologies.

"New opportunities will emerge as the biomanufacturing industry undergoes major changes brought about by the rapid pace of digitalisation, Industry 4.0, and the need for greater sustainability. As Singapore makes biopharma production a priority area in its Research, Innovation and Enterprise 2025 Plan, A\*STAR aims to contribute our R&D capabilities through BioPIPS to help make the local biomanufacturing industry become more agile and better positioned to benefit from new products and technologies," said Professor Lim Keng Hui, Assistant Chief Executive, Science and Engineering Research Council, A\*STAR.

"Riding on the success of PIPS, BioPIPS aims to enhance Singapore's innovation capabilities in biologics and vaccines manufacturing by leveraging the strengths of our leading pharmaceutical companies and institutes of higher learning. The programme will develop highly productive, sustainable and advanced production technologies and solutions. We look forward to deepening partnerships with like-minded companies to strengthen Singapore's position as a global biopharma manufacturing hub," said Mr Tan Kong Hwee, Executive Vice President, EDB.

Specifically, BioPIPS will have three workstreams.

- The Sensing and Modelling workstream aims to harness machine learning and mechanistic modelling technologies, together with smart sensors, to enable simplified and faster workflows. Data analytics will enable the effective translation of process knowledge gained into performance improvements, which in turn benefits the overall manufacturing process.
- The Sustainability workstream focuses on tackling sustainability challenges in biologics and vaccines manufacturing, which typically utilises single-use (disposable) equipment due to the extremely sterile environment needed for product purity. This workstream will explore the use of novel materials and circular economy approaches to address this challenge, as well as models to promote more sustainable and resilient supply chains.
- The Compliant Agility workstream focuses on the removal of manual tasks to achieve greater productivity in the manufacturing facilities while maintaining compliance status, by using solutions like robotics and advanced analytics.

BioPIPS is in line with Singapore's Manufacturing 2030 vision, which aims to anchor leading manufacturing activities to grow the country's manufacturing value-add by 50 per

cent from 2020. The solutions developed through BioPIPS will also enhance Singapore's capabilities to meet the growing global demand for biologics and vaccines, as well as equip pharmaceutical companies here with the resources to scale up and respond more rapidly to future pandemics.

"By collaborating to tackle common challenges, we can leverage diverse skills and capabilities to create a sustainable manufacturing environment in Singapore. We also look forward to developing new ways to monitor and control our processes and automate our manufacturing operations," said Chan Siong Wan, Site Director, GSK.

"Sanofi is building a next generation manufacturing site, the EVolutive Facility, in Singapore, which will bring advanced digital and modular vaccine production capabilities to the Asia region. The BioPIPS programme's focus on transforming biologics and vaccines manufacturing through pre-competitive partnerships is aligned with Sanofi's vision for the EVolutive Facility, to continuously push the envelope of innovation for biopharmaceutical manufacturing," said Mr Koh Liang Hong, Site Head, EVolutive Facility, Sanofi.

"The objectives of BioPIPS are aligned to Takeda's ambitions of being net carbon zero in our operations by 2035 and how we can tap on data, digital and technology to transform our manufacturing site. We look forward to this partnership with Singapore's research ecosystem to further strengthen our capabilities, and discover new and sustainable ways to develop and manufacture innovative medicine to deliver on Takeda's commitment to Patient, People and Planet," said George Lam, Site Head, Takeda Manufacturing Singapore.

BioPIPS builds on the consortium model established by the Pharma Innovation Programme Singapore (PIPS), which was set up to boost Singapore's capabilities for manufacturing of small molecule drugs made of chemical compounds.

"NUS is delighted to be a member of BioPIPS, contributing our capabilities in areas such as biocatalysis, reactor manufacturing, and digital factory. By leveraging the complementary strengths of A\*STAR, EDB, the academia and the pharmaceutical industry, we can create a strong technology foundation for innovations that will bring about compelling improvements in productivity, operational efficiency and sustainability practices in Singapore's biopharma manufacturing sector," said Professor Thorsten Wohland, Director, Research Governance and Enablement, Office of the Deputy President (Research and Technology), NUS.

"The Covid-19 pandemic has highlighted the need for the biomanufacturing industry to be innovative and agile when dealing with challenges, including future pandemics and disease outbreaks. At the NTU Smart Campus, our scientists have been pioneering advanced solutions such as breathalysers that can detect Covid-19 in two minutes and a semi-autonomous robot that can disinfect surfaces. Such groundbreaking research underlines our commitment to the NTU 2025 strategic plan that aims to solve some of humanity's grand challenges, including addressing the needs and challenges of healthy

living and ageing. With our strengths in interdisciplinary research and innovation, we hope to play our part to bolster the sector's manufacturing productivity and operational efficiency in a sustainable manner. We look forward to achieving meaningful results with our partners through this national consortium," said Professor Peter Preiser, Associate Vice President (Biomedical and Life Sciences), NTU Singapore.

"SIT is excited to be part of BioPIPS, which will inject next-generation process innovation into the local pharmaceutical industry. This partnership will allow SIT to strengthen its applied research capabilities in sustainable biopharma manufacturing technologies. Under this initiative, SIT will explore opportunities to work with manufacturers to apply digitalisation for process optimisation and better regulatory oversight while incorporating environmental considerations to progress production processes for the pharmaceutical industry," said Associate Professor Susanna Leong, Vice President (Applied Research), SIT.

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### **About the Agency for Science, Technology and Research (A\*STAR)**

The Agency for Science, Technology and Research (A\*STAR) is Singapore's lead public sector R&D agency. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit the economy and society. As a Science and Technology Organisation, A\*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by improving societal outcomes in healthcare, urban living, and sustainability. A\*STAR plays a key role in nurturing scientific talent and leaders for the wider research community and

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The Singapore Economic Development Board (EDB), a government agency under the Ministry of Trade and Industry, is responsible for strategies that enhance Singapore's position as a global centre for business, innovation, and talent. We undertake investment promotion and industry development, and work with international businesses, both foreign and local, by providing information, connection to partners and access to government incentives for their investments. Our mission is to create sustainable economic growth, with vibrant business and good job opportunities for Singapore and Singaporeans.

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