



Agency for
Science, Technology
and Research

A*STAR AT A GLANCE



HELPING COMPANIES SCALE UP AND BE COMPETITIVE

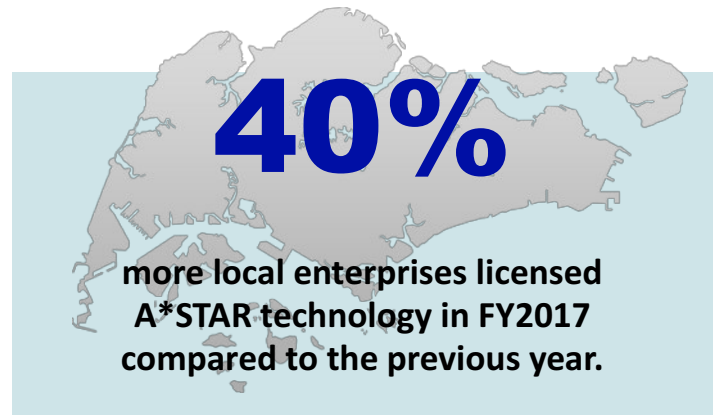
2017



Worked on over
2,100 R&D projects
with companies in FY2017

↑ 20%
compared to FY2016

In both FY2016 and FY2017, one-third of the total industry projects were with **local enterprises**.



THROUGH TECHNOLOGY ROADMAPMING AND TALENT

SINCE 2013

>20%

companies have benefitted from the Operation and Technology Roadmapping (OTR) programme, which helps SMEs to develop customised technology roadmaps aligned to their business strategies and goals.



>760

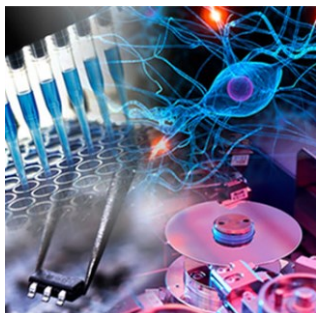
A*STAR Research Scientists and Engineers have helped over 600 companies to scale up their businesses.

Updated as of November 2018

CONNECT WITH US!

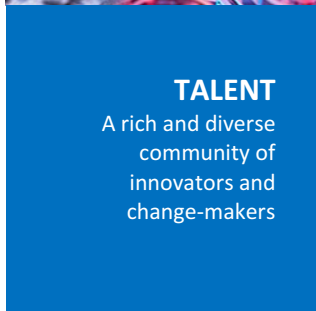


CREATING GROWTH, ENHANCING LIVES



SCIENCE & TECHNOLOGY

Improving lives with game-changing discoveries



TALENT

A rich and diverse community of innovators and change-makers



INDUSTRY & ENTERPRISE

Rewarding partnerships that create value for you and the economy

The Agency for Science, Technology and Research (A*STAR) drives mission-oriented research that advances scientific discovery and technological innovation. We play a key role in nurturing and developing talent and leaders for our Research Institutes, the wider research community, and industry.

Our research creates economic growth and jobs for Singapore. As a Science and Technology Organisation, we bridge the gap between academia and industry in terms of research and development. In these endeavours, we seek to integrate the relevant capabilities of our research institutes and collaborate with the wider research community as well as other public sector agencies towards meaningful and impactful outcomes.

CORE CAPABILITIES @ A*STAR

At A*STAR, our biomedical sciences and physical sciences and engineering research institutes drive impactful research making advancements in basic science, to patented inventions, and ready-to-use technologies.



Infocomm & Media

Communications
Software and Computing
Digital Content and Media
Networking



Chemicals & Materials

Specialty Chemicals
Performance Materials
Bio-Pharma Processing
Functional Films



Electronics

Advanced Packaging
More-than-Moore Technologies



Engineering

Precision Engineering
Aerospace
Marine Oil & Gas
Automotive
Logistics & Supply Chain Management



Nutrition & Personal Care

Development of high-value nutrition and personal care/consumer products



Medical Technology

Medical devices, info tech, diagnostics



Pharmaceuticals

Development of small molecule therapeutics



Biotechnology & Biologics

Development of protein-based therapeutics



Scan here to learn about our research entities and capabilities.

ADVANCING EXCELLENT SCIENCE & TECHNOLOGY FOR INNOVATION

Pursuing Mission-inspired Knowledge Creation



On the Cover of High Impact Publications:

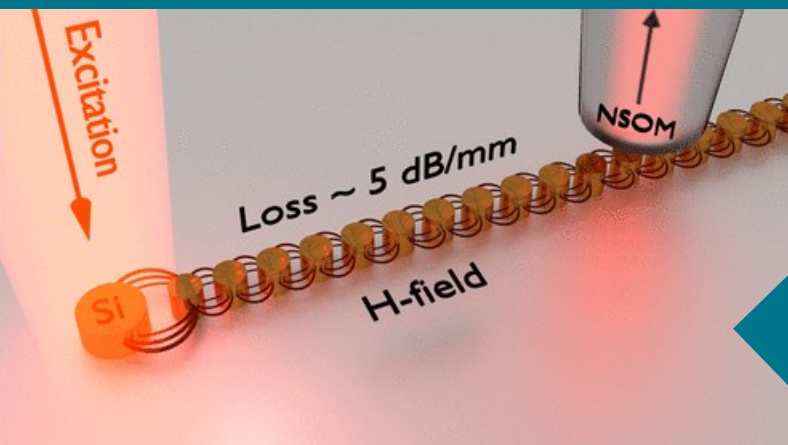
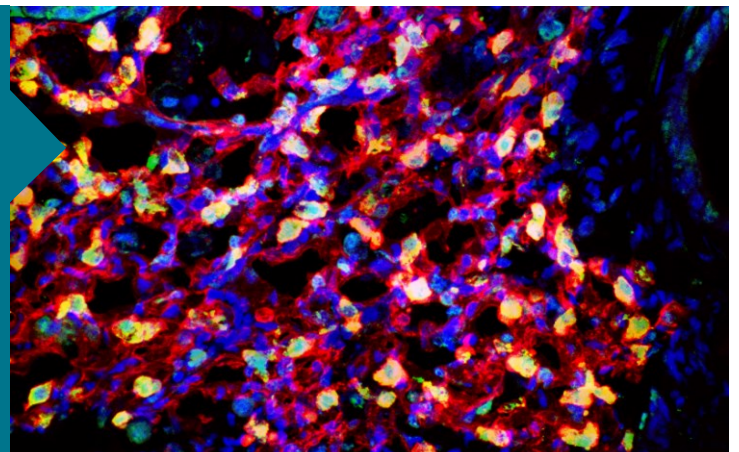
IHPC's work on novel transducers for direct electrical-plasmonic signal conversion was featured in the October 2017 issue of Nature Photonics.

Researchers from IBN have created a DNA technology with two new genetic letters that could better detect infectious diseases, such as dengue and Zika. Their work was published in the September 2017 issue of the journal Angewandte Chemie International Edition.

IMB's discovery of Lgr5-expressing cells in the stomach was featured in the July 2017 cover of Nature Cell Biology. These cells have been recruited to function as stem cells for epithelial (tissue) renewal following injury.

A Step Forward:

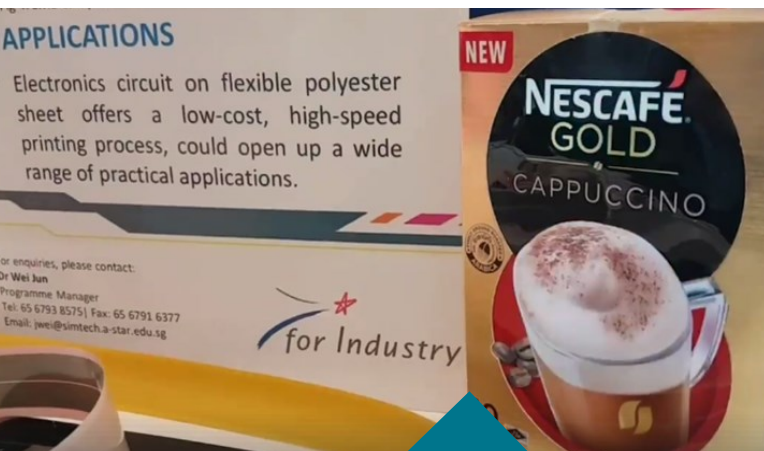
For the first time, researchers have demonstrated that they can grow lung stem cells in large numbers in a petri dish. Upon injection into toxin-injured lungs, these lung stem cells were able to regenerate lung tissue in laboratory mice. The discovery, published in the journal Nature Methods, was made by researchers from GIS, together with US collaborators from Stanford University, the Jackson Laboratory and Clarkson University.



Guiding Light at the Nanoscale:

A*STAR researchers have demonstrated a new way to efficiently guide light at tiny scales. Their method, which involves lining up silicon nanoparticles, is promising for applications such as light-based integrated circuits, biosensors and quantum communications.

CO-INNOVATING FOR NEW PRODUCTS & SERVICES



Innovative Packaging

Empowered with technologies developed by SIMTech, local SME **Honsen Printing Industries** successfully incorporated printed lighting and flexible hybrid electronics in their smart packaging for the launch of a new range of NESCAFÉ products in Thailand. This has opened doors for Honsen to venture into new markets for smart packaging overseas.

The successful development of smart packaging for fast moving consumer goods was the outcome of an Operation and Technology Roadmapping ideation session between SIMTech and Nestlé.



In partnering with SIMTech, we are able to tap the use of Printed Lightning and Flexible Hybrid Electronics Technologies in smart packaging. This capability opens doors in new market for us."

Mr Garry Ng, Director of Honsen Printing Industries Pte Ltd

Game Changing Spin-off, Next-Gen Technology

The **Advanced Micro Foundry**, an A*STAR spin-off, was incorporated in July 2017. The AMF is a specialty commercial foundry for integrated optics manufacturing with expertise in silicon photonics technology. It is the world's first commercial micro foundry capable of high-mix low-volume manufacturing.

In the early 2000s, A*STAR decided to invest in research in silicon photonics, a technology platform that is now a game changer for future computing systems and advanced data centres. Since then, A*STAR has developed market leading capabilities that enabled the support of nearly 70% of the integrated photonics industry in silicon wafer fabrication, bringing the technology to production and commercialisation.

The creation of AMF marks a major milestone for A*STAR and Singapore. It is a testament to A*STAR's commitment to develop differentiated capabilities and nurture talent, enabling the capture of valuable economic outcomes for Singapore.



MANUFACTURING A KEY PILLAR FOR SINGAPORE'S ECONOMY

A key recommendation of the CFE was to maintain manufacturing at 20% of Singapore's Gross Domestic Product (GDP) in the medium term. To raise the competitiveness of the manufacturing sector and drive companies towards higher value-added activities, A*STAR helps industry to develop deeper innovation and digital capabilities as well as adopt Future of Manufacturing (FoM) methods and technologies.

Through initiatives such as Operation and Technology Roadmap (OTR), Technology for Enterprise Capability Upgrading (T-Up), and the public-private partnership (PPP) platforms of Tech Access, Model Factory, and Tech Depot, companies can tap into the latest manufacturing technologies, test-bed innovative solutions and eventually adopt them.



Model Factory

Through the Model Factory initiative, A*STAR bridges technological gaps in the private sector, helping businesses across sectors and the value chain to re-invent themselves through effective technology adoption.

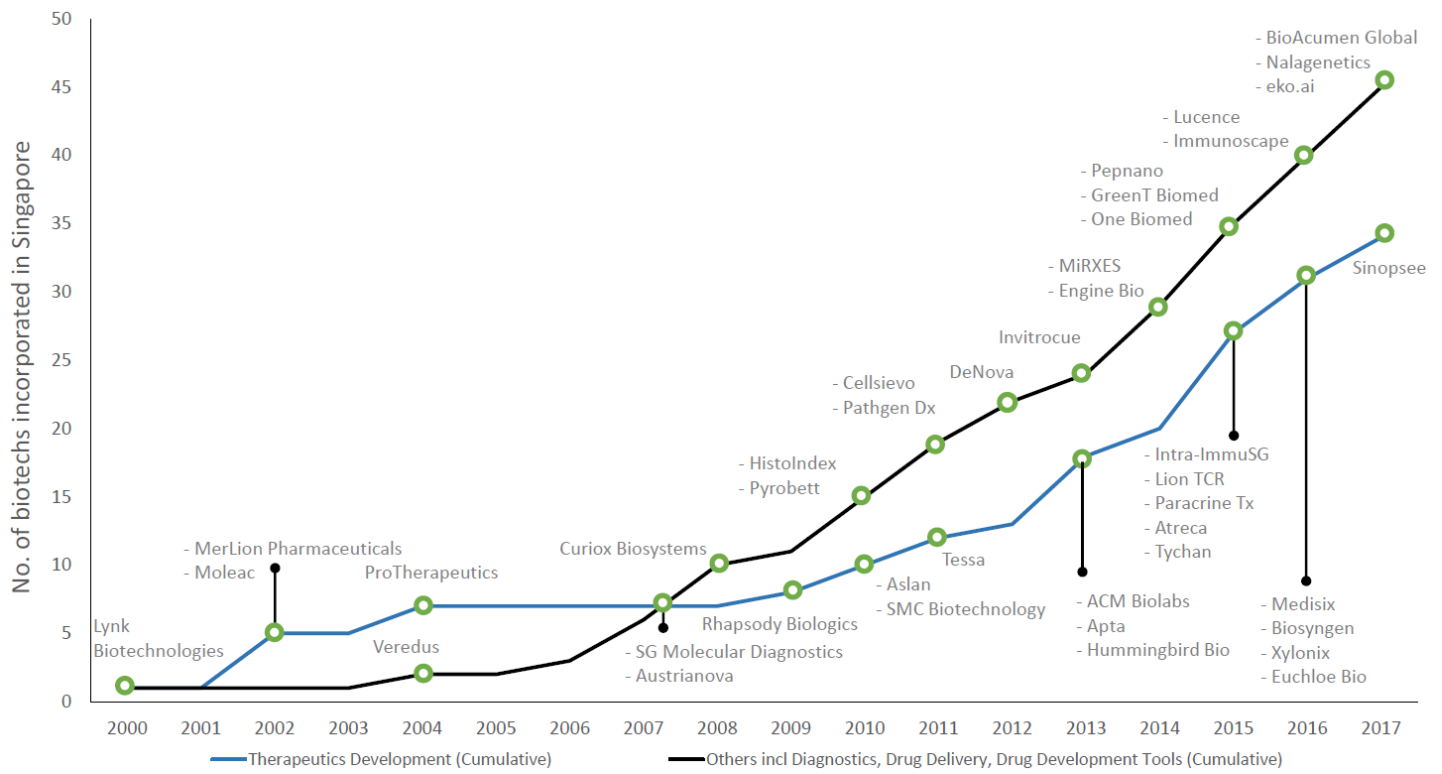
The Model Factory at SIMTech, which launched in October 2017, is targeted at local companies that are on their first mile of advanced manufacturing technology adoption. It provides a real-life production environment and low-cost, digital learning factory platform. Local SMEs such as Feinmetall, CKE Manufacturing, and JEP Precision Engineering have adopted and implemented FoM technologies on their shopfloors.

The Model Factory at ARTC targets companies that are more advanced in their digitalisation journey, providing a platform to develop and validate various convergence of Information Technology and Operational Technology (IT/OT) architectures, technologies and process models required for a smart factory concept.



SCAN here to learn more about our FoM Initiatives

CATALYSING A VIBRANT LOCAL BIOTECH ECOSYSTEM IN SINGAPORE



A*STAR has continued to nurture Singapore’s growing biotech ecosystem. As of 2017, there were 79 operational biotechs that were incorporated in Singapore, a quarter of which are A*STAR spin-offs, and about half of which have collaborations, IP licenses, joint labs, or were incubated with A* STAR.

From 2010 to 2017, at least 60 of these biotechs were incorporated in Singapore, three times that of the preceding decade from 2000 to 2009.

From 2011 to 2016, local biotechs’ contribution to R&D expenditure increased by nearly nine-fold, from S\$21 million to S\$186 million.

A*STAR aims to sustain the growth of the biotech industry, and provides support through incubators, and access to its research capabilities through joint projects and laboratories.



There are many reasons to be optimistic that Singapore's biotech ecosystem is poised to deliver even more, as our biotechs break new ground in drug discovery and development."

*Mr Lim Chuan Poh, Chairman A*STAR, in his article "Biotech Sector Poised to Deliver More Health and Wealth" for The Straits Times, 29 July 2017.*



SCAN here to read the full article "Biotech Sector Poised to Deliver More Health and Wealth" by Mr Lim Chuan Poh

FUELLING SINGAPORE'S FOOD, NUTRITION AND CONSUMER CARE INDUSTRY

Singapore's Food, Nutrition and Consumer Care (FNCC) cluster continues to grow, boosted by long-term investments in Biomedical Sciences R&D. BERD for the sector grew at a Compound Annual Growth Rate (CAGR) of 18% from S\$47 million in 2002 to S\$494 million in 2016, while the number of R&D jobs grew from about 340 to close to 1,970 within the same period.

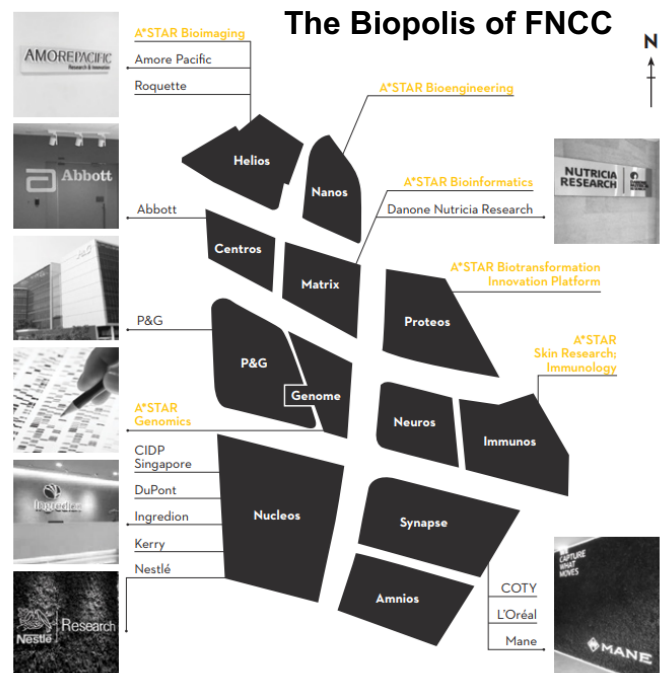
To step up the focus on Asian growth, companies like Roquette have opened a regional headquarters and innovation centre in Singapore at Biopolis. The French plant-based ingredients maker also works with BTI and the Clinical Nutrition Research Centre (CNRC) to examine critical issues such as how different Asian populations react to certain dietary ingredients.

Innovation Platform for Food and Consumer Care Sectors

Other global industry brands like Mondelez are tapping on A*STAR's Biotransformation Innovation Platform (BioTrans) and CNRC to develop product innovations.

The BioTrans platform uses microbial fermentation-based processes to impart flavours and functional benefits to food, produce high-value compounds sustainably, and convert food industry side streams into value-added products. With BioTrans, A*STAR is well positioned to contribute to this emerging market opportunity for Singapore to establish manufacturing standards, attract greenfield manufacturing investments, and be recognised as a global hub for production of new therapeutic modalities and bioingredients.

Since the beginning of the strategic partnership between Nestlé and A*STAR in 2014, scientists from both parties have since worked together to improve nutrient yields obtained from raw materials such as barley, during Nestlé's malt extraction process. This has enabled the company to advance operational efficiency and environmental sustainability. As of 2018, Singapore is one of Nestlé's top destinations[^] for public science and research partnerships.



Investing in Excellent Skin Research

Singapore's excellence in skin research has been instrumental in anchoring global industry leaders like P&G and L'Oreal. These MNCs have established skin and hair research labs in Biopolis, which have contributed to the growth of innovation partners, driving the robust and organic expansion of the Consumer Care sector.

To further boost the sector's innovation capacity, SRIS is building R&D capabilities to address common medical conditions like eczema, diabetic skin ulcers and tumours. These capabilities also have the potential to yield economic benefits.

Skin Research Institute of Singapore (SRIS) is also developing novel therapeutics for high-burden conditions like atopic dermatitis and acne, and therapies to manage hard-to-heal wounds. For example, the institute is developing customised 3D-printed bandages for wound management such as those for diabetic wounds.

[^]Based on Nestlé's List of Public-Private Science & Research Partnerships (July 2018)

COLLABORATE WITH US



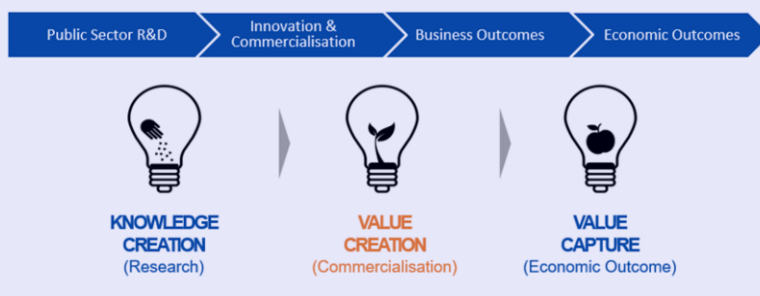
A*STAR engages the industry in R&D to drive innovation and advance technology that may be translated to products and services to yield economic benefit. There are different approaches to working with industry partners depending on the research needs and capability areas. Below are some initiatives and programmes that companies can tap on to scale up, stay relevant and be more competitive.

PROGRAMMES FOR LOCAL ENTERPRISES

- Tech Depot
- Tech Access
- Technical Capability Upgrade: OTR, Get-Up/ T-Up
- A*STAR Collaborative Commerce Marketplace (ACCM)
- Simplified Licensing
- Headstart

A*ccelerate

is A*STAR's marketing and technology commercialisation arm, supporting it in transforming the economy by driving innovation and commercialising its research outcomes.



A*STARTCentral

is an open innovation community that inspires, trains and supports researcher-entrepreneurs in building successful deep tech ventures.



If we only spend on research and innovation without enterprise, we will not get very far. And our enterprises need to make use of all the research and innovation outcomes to grow their enterprises so that we have more resources to put back into further research, further innovation, further enterprise, and the loop must continue."

Mr Chan Chun Sing, Minister for Trade and Industry at the SME Technology and Innovation Day 2018



Scan here and learn how you can tap on A*STAR's technologies for your business.