

PRESIDENT'S TECHNOLOGY AWARD 2025

Ng Geok Ing

School of Electrical and Electronics Engineering, Nanyang Technological University

**Executive Director, National Semiconductor Translational and Innovation Centre,
Gallium Nitride (NSTIC-GaN)**

“For his groundbreaking work in advancing Singapore's capabilities in radio-frequency Gallium Nitride (GaN) – an advanced III-V compound semiconductor technology – particularly in defence and commercial applications, by enabling local manufacturing capabilities and nurturing talents in this strategic field.”

+++

Professor Ng Geok Ing's contributions to Singapore's semiconductor and defence technology landscape have been instrumental in advancing national capabilities in “III-V compound” semiconductors, especially Gallium Nitride (GaN). Over the past three decades, his work has spanned deep-tech research, talent development, industry translation, and national ecosystem building, culminating in the creation of a national platform that positions Singapore among global leaders in GaN technology.

In the early 1990s, Singapore's semiconductor efforts were focused on silicon-based microelectronics. However, emerging applications in wireless communications, satellite communications, radars and advanced sensing technologies required materials with performance beyond silicon. Compound semiconductors held that promise, but local expertise was scarce. Recognising this strategic imperative, Prof Ng returned from the USA in 1995 to launch a national R&D programme at Nanyang Technological University (NTU).

At NTU, Professor Ng initiated foundational research on GaAs and GaN monolithic microwave integrated circuit (MMIC) technologies. He established Singapore's first III-V infrastructure, built and trained a core team of engineers, and forged long-term

collaborations with DSO National Laboratories. These efforts laid the groundwork for a resilient defence and commercial base in compound semiconductors.

In 2000, Prof Ng co-founded DenseLight Semiconductors, NTU's first semiconductor spin-off. The venture transferred patented InP optoelectronic fabrication processes from lab to industry, establishing Singapore's first III-V device manufacturing plant. Today, DenseLight remains a global supplier of photonics components for sensing and datacom applications.

A strong advocate of national technological self-reliance, Prof Ng led the establishment of the MMIC Design Centre in 2005 with support from MINDEF – Singapore's only dedicated defence R&D laboratory for III-V semiconductors. Under his leadership, the centre developed a qualified GaN MMIC baseline process on 4-inch wafers, achieving performance on par with leading global foundries. The first fully indigenous GaN MMIC power amplifier produced through this platform continues to operate in space onboard a cubesat today, a testament to the robustness of Singapore-grown technology. In recognition of his sustained impact, Prof Ng was awarded the Defence Technology Prize in 2007 for his significant contributions to the MMIC R&D Team (Team R&D Category), and again in 2023 for building up Singapore's indigenous R&D capabilities in Gallium Nitride MMIC technologies for defence applications.

Looking beyond defence, he anticipated GaN's potential across commercial domains such as 5G/6G telecommunications, satellite communications, automotive radars, and advanced instrumentation. As early as 2008, Prof Ng began developing GaN-on-Silicon (GaN-on-Si) technologies at NTU, years before they gained industry traction. Despite limited initial support, he remained committed to pushing the performance boundaries. His group's results have been published in leading journals and conferences, featured in international semiconductor media, and formed part of the foundational intellectual property for Singapore's next-generation GaN platform.

To enable broader deployment, Prof Ng led a multi-agency effort with the Agency for Science, Technology and Research (A*STAR), NTU, and DSO to establish the National

Semiconductor Translation and Innovation Centre for GaN [NSTIC (GaN)] in 2022. The proposal secured S\$123M in Phase 1 funding from the National Research Foundation in 2023. NSTIC(GaN) is the world's first boutique foundry offering both 6-inch GaN-on-SiC and 8-inch GaN-on-Si wafer fabrication. The centre bridges the gap between research and manufacturing, supporting dual-use innovation and anchoring a growing radio-frequency GaN ecosystem in Singapore—from epiwafer suppliers and IC designers to system integrators.

Believing strongly in the dual importance of both groundbreaking discoveries and the ability to build enduring systems, Prof Ng aims to position Singapore not merely as a consumer but a producer and global driver of GaN technologies.