

2012 PSTA WINNER CITATIONS

PRESIDENT'S SCIENCE AND TECHNOLOGY MEDAL 2012



Professor Dim-Lee Kwong
Executive Director, Institute of Microelectronics
Agency for Science, Technology and Research

“For his distinguished, sustained and exceptional contributions to Singapore’s science and engineering landscape, particularly in advancing the semiconductor industry through R&D and the forging of strategic research partnerships between industry and public sector agencies”

Professor Dim-Lee Kwong, the Executive Director of the Institute of Microelectronics (IME), has played a pivotal role in developing the science and engineering landscape in Singapore since 2001. An exceptional researcher and research leader, he has contributed extensively to cultivating a vibrant microelectronics research environment that has raised the level of public sector R&D in Singapore. He is instrumental in fostering important industry collaborations, bridging the gap between the laboratory and industry, and between the public and private sectors, as well as developing highly skilled R&D talent for the semiconductor industry. Through his efforts he has reaped significant benefits for Singapore.

Prof Kwong’s sustained contributions to Singapore’s R&D scene began in 2001 when he was appointed the Temasek Professor at the National University of Singapore (NUS). Then, he was tasked to set up the Silicon Nano Device Laboratory (SNDL). Under his capable leadership, SNDL was publishing and presenting papers in top journals and conferences respectively in a mere two years. It ranked top three in the world, which greatly boosted the reputation of NUS and Singapore.

When he took the helm at IME in 2005, he worked steadily to transform the research institute into a world class institute. His efforts were recognised internationally by the Institute of Electrical and Electronics Engineers (IEEE), which presented him with the prestigious IEEE Frederik Philips Award for his “leadership in silicon technology and excellence in the management of microelectronics R&D”.

Prof Kwong believes that R&D has to meet the needs of industry so that the economy of the country can be boosted as a result. He is convinced that the key to attracting industry investments to Singapore is to ensure that the R&D carried out here is the top of the league. To that end, he has been leading IME to constantly push the envelope. He systematically developed multi-disciplinary research programmes that would establish core competencies in emerging areas of microelectromechanical systems (MEMS), three-dimensional integrated circuits (3D ICs), silicon photonics, bioelectronics and miniaturised medical devices.

Under his able leadership, IME's research has become leading-edge. IME researchers clinched the coveted IEEE awards such as the IEEE George E. Smith Award, the IEEE Electron Device Society Paul Rappaport Award and the IEEE Roger A. Haken Best Student Paper Award. Winning these prestigious international awards placed IME firmly on the world map. On the home front, IME researchers also won the National Technology Award 2008 and President's Technology Award 2010.

A major outcome of IME's research is the establishment of the US\$100 million Centre of Excellence (COE) in Advanced Packaging in Singapore in 2012. This COE is jointly established by IME and Applied Materials Inc., and it is the first R&D facility that Applied set up outside of the United States. The COE will not only tap into IME's research capabilities in complex high value manufacturing, but will also create jobs for locals over the next five years, including high value jobs and other non-technical jobs. That Applied chose to set up a centre here in Singapore is indeed a nod to IME's R&D capabilities and Prof Kwong's leadership and vision.

In addition to Applied, Prof Kwong has also led IME to foster strategic partnerships with more than 50 multinational companies, ranging from multi-billion dollar Japanese conglomerates to Forbes 500 companies, with his innovative three-party R&D foundry business model.

In this model, IME provides these semiconductor companies with access to cutting-edge foundry-compatible technologies developed at IME and helps them prototype small scale pilot runs. Upon the success of the pilot runs, IME also connects these companies with foundries established in Singapore for mass production. This model not only makes it possible for the companies to shorten the product development cycle and bring their products to market quickly, but it also generates new businesses and manufacturing activities for Singapore foundries, which in turn creates jobs. A case in point is Lightwire, Inc., a US-based provider of high-bandwidth interconnects. Lightwire's silicon photonics process was jointly developed with IME and GLOBALFOUNDRIES Singapore to produce ultra-high speed devices of 10 to 100 Gbps. This new silicon photonics process was transferred from IME's development fabrication to GLOBALFOUNDRIES' manufacturing facility, opening the door for GLOBALFOUNDRIES to participate in the high-volume markets for ultra-high speed silicon photonic devices. This new technology would meet the high-speed, low-power and low-cost requirements of high-performance interconnects for computing and communications.

Besides engaging MNCs, Prof Kwong has also devoted much of his efforts in integrating companies across the semiconductor supply chain. He piloted key consortium programmes in 3-D Through-Silicon Via (3D TSV) and Micro-Electro-Mechanical-Systems (MEMS), as well as strengthened the Electronic Packaging Research Consortium. The consortia integrate key companies across Singapore's semiconductor supply chain and promote pre-competitive collaborations among industry, research organizations and academia. They are vital first-steps to establishing and catalysing new industry value-chains in Singapore and generate sufficient critical mass for Singapore to be a launch pad for emerging technologies. To date, more than 53 companies including Singapore-based companies have benefited from IME's consortia.

A firm believer in the importance of talent development for R&D and industry, Prof Kwong has been relentless in training promising young people for industry. Since 2005, IME has also trained more than 90 PhD students who are cognizant of the latest industry trends and standards, and spun out 15-20% of its staff to the local industry.

For his distinguished, sustained and exceptional contributions to Singapore's science and engineering landscape, particularly in advancing the semiconductor industry through R&D and the

forging of strategic research partnerships between industry and public sector agencies, Professor Dim-Lee Kwong is awarded the 2012 President's Science and Technology Medal.