

## 2013 PSTA WINNER CITATIONS

### PRESIDENT'S SCIENCE AND TECHNOLOGY MEDAL 2013



#### **Professor Freddy Boey**

**Deputy President and Provost  
Nanyang Technological University**

***“For his distinguished contributions to Singapore’s science and engineering landscape, particularly in advancing the bioengineering and nanomedical sector through R&D and his role in nurturing young research talent”***

Professor Freddy Boey, Nanyang Technological University (NTU) Deputy President and Provost, has a sterling track record of breakthrough commercial applications that have given the “made in Singapore” label pride of place on the international stage. Before becoming Provost, he served as the Chair of NTU’s School of Materials Science and Engineering from 2005 to 2010. He was instrumental in leading its transformation into one of the world’s largest materials engineering institutions with about 1,000 undergraduates and close to 250 research students. Through his efforts, the school has developed a solid reputation for materials science research, generating industry leading technologies that can be commercialised.

After 27 years at NTU, Professor Boey has witnessed its transformation from a teaching university into a research-intensive university. He has graduated 33 PhDs to date and mentored 15 post-doctorates. For Professor Boey, who received the Public Administration Medal (Silver) in 2010, the best ideas are always global. That is why he prefers NTU’s PhD students to do part of their research overseas. His current biomedical research team comprises 12 PhDs and more than 10 post-doctorates and Senior Research Fellows. Under his exemplary mentorship, about 15 of his past and current students and staff have been or are now involved in their own or his start-up companies. Indeed, Professor Boey’s own research in biomaterials for medical devices has contributed to the school’s and NTU’s growing global profile and standing, besides generating a buzz in international healthcare.

Professor Boey’s spirit of experimentation is matched by a prolific output and paired with the belief that his work should improve the lives of others. He also believes in teamwork – each of his inventions involves collaboration with other professors, graduate students and research staff. His first invention is a piezoelectric heart pump that was the world’s smallest when it was unveiled in 2003. At 50 grams, the pump is four times lighter and uses less power than conventional heart pumps. His second in 2004 is a fully biodegradable coronary stent, co-developed with Professor Subbu Venkatraman from NTU, which has been successfully implanted in human patients in Colombia for the past nine months, with no adverse events. His current inventions, again

with Professor Subbu Venkatraman, include a fully biodegradable device that helps to plug heart defects like a hole in the heart as well as an injectable nano-liposome based device to treat Glaucoma, developed in collaboration with Dr Tina Wong from the Singapore Eye Research Institute. The latter has recently been successfully implanted into several patients in Singapore, showing excellent results.

An exceptional materials science and engineering pioneer, Professor Boey has developed 30 original patents, the majority of which have been licensed. These patents have also resulted in several spin-off companies, which he founded to commercialise some of his biomedical inventions. Several of his biomedical devices have received US Food and Drug Administration (FDA) approval for sale and the Conformité Européenne (CE) mark. These include a surgical tissue retractor that has been sold in the US, India, Japan and Europe as well as a customisable hernia mesh that uses a new functional material to lower the risks of inflammation and infection, the first such surgical mesh approved by the US FDA.

Research and education remain Professor Boey's abiding passions. He has won more than S\$42 million in competitive funding for research including a prestigious S\$10 million individual grant under the National Research Foundation's (NRF) Competitive Research Programme to develop fully biodegradable cardiovascular implants for hole-in-the-heart conditions. He has also clinched a S\$20 million NRF Technion-Singapore grant for his research in nanomedicine for cardiovascular diseases, and a S\$1.25 million grant from the NRF Translational Flagship Project. Professor Boey has published 344 top journal papers with a citation of 7,436 and an H-Index of 44.

Professor Boey's sustained contributions to Singapore's research and development (R&D) scene are not just in academic and scientific research. He serves as Director on the boards of the Intellectual Property Office of Singapore and the DSO National Laboratories, and is a founding Fellow of the Singapore Academy of Engineers. He is also on the boards of several nationally funded research centres. He was also an appointed member of both the University Blue Ribbon Commission and the Blue Ribbon Implementation Commission.

Professor Boey was conferred the prestigious Imperial College London Fellowship in the Faculty of Medicine in 2012, for his exceptional achievements in medical technology and his outstanding contribution in developing the Lee Kong Chian School of Medicine, a joint medical school between Imperial College and NTU. He was also conferred an honorary doctorate from Loughborough University in December 2011 for his outstanding achievements as an engineer and academic leader. In November the same year, he received the Distinguished Alumni of the Year Award from Monash University in recognition of his achievements as a teacher, researcher and innovator, including his exceptional contributions to nanomedicine, as well as his volunteer work since his student days. In September 2013, Professor Boey was awarded an honorary professorship from Nanjing University of Technology, in recognition of his academic and scientific leadership in NTU.

For his distinguished, continuous and relentless contributions to Singapore's science and engineering landscape, particularly in advancing the bioengineering and nanomedical sector through R&D and his role in nurturing young research talent, as well as his contributions in developing NTU into a global University with a strong focus on world-class education, research and innovation, Professor Freddy Boey is awarded the 2013 President's Science and Technology Medal.