

PRESIDENT'S SCIENCE AWARD 2018

Professor Loh Teck Peng

School of Physical & Mathematical Sciences
Nanyang Technological University, Singapore

“For his outstanding research accomplishments in advancing organic chemistry and green chemistry that have far-reaching implications in fields such as pharmaceuticals, biotechnology and nanotechnology”

Professor Loh Teck Peng from the School of Physical & Mathematical Sciences at Nanyang Technological University (NTU), Singapore, is recognised for his novel synthesis processes and his outstanding scientific contributions, which pushes the frontiers of synthetic and green chemistry, and helps to cement Singapore's position as a leader in the field of chemistry.

A world-renowned chemist, Professor Loh's creative and insightful research has resulted in technologies with disruptive impact on the biomedical and pharmaceutical industry. Over the last 20 years, Professor Loh has created dozens of innovative, practical and green methods that can produce synthetic compounds, placing him at the forefront of organic synthesis research and establishing his position as one of its pioneers.

Inspired by nature's efficient ways of making biomolecules, such as in the biological systems found in the human body, Professor Loh has developed efficient bio-inspired synthetic processes that work in water under biocompatible reaction conditions where a cell can survive – for instance, in room temperature and under normal atmospheric pressure, without metals or harmful chemicals, and producing little to no waste.

Demonstrated by Professor Loh through a number of elegant total syntheses – the transformation of biomolecules to a complex compound with a specific function – these newly developed green methods have provided additional strategies for the efficient construction of complex molecules with the potential to be employed by the pharmaceutical sector in the development of new chemotherapy compounds used for cancer and biochemical markers that can bind to targeted cells for bioimaging.

Professor Loh's research is strongly guided by the need to make these processes environmentally-friendly. Conventional manufacturing processes needed to make synthetic compounds such as those used in pharmaceutical and petrochemical industries require the application of organic solvents to extract organic compounds or to synthesise new chemical compounds. Such organic solvents are toxic, flammable, and can be harmful to human health.

Since the early 90s, Professor Loh has developed many green technologies, especially in creating organic reactions in water through the innovative use of various reusable catalysts in water, instead of organic solvents. His latest success is a truly green synthetic method where the products can be easily isolated by simple filtration, without the need for organic solvent extraction and tedious column chromatography.

The process is also atom-economic, where the amount of starting materials and the resulting products are equal with no atoms wasted, while still working under biocompatible reaction conditions. This discovery could revolutionise the way pharmaceuticals are manufactured in industrial plants. The breakthrough is also scientifically significant, as the most abundant compound in the world, water, is found to be a promoter in this reaction. This opens up new avenues for the development of new water-promoted reactions.

Over his 24-year academic career, Professor Loh has published more than 300 papers in international peer-reviewed journals, been granted 10 patents and written five book chapters. His work has been cited more than 11,700 times and the significance and impact of his research have been recognised locally and internationally. He had received best researcher awards from the National University of Singapore (NUS) and Nanyang Technological University, Singapore (NTU Singapore), the GSK-SNIC award in organic chemistry (Singapore), and the Thousand Talent Award (PRC) and the Yoshida Prize (Japan).

Professor Loh is an elected fellow of the Malaysia Academy of Sciences and the Singapore Academy of Sciences. He currently serves as a member of the advisory boards of international journals such as Chemical Communications, Synlett and Synthesis, Heterocycles, Chemical Record and Asian Journal of Organic Chemistry. He is currently an associate editor of the Journal of Organic Chemistry.

For his outstanding research accomplishments in advancing organic chemistry and green chemistry that have far-reaching implications in fields such as pharmaceuticals, biotechnology and nanotechnology, Professor Loh is awarded the 2018 President's Science Award.