

2014 PSTA WINNER CITATIONS

PRESIDENT'S SCIENCE AWARD 2014



Professor Loh Kian Ping
Department of Chemistry
National University of
Singapore

“For his outstanding research on graphene chemistry”

Professor Loh Kian Ping is a pioneer and a world leader in the area of graphene chemistry research. In the last decade, Professor Loh spearheaded an internationally acclaimed research effort on advanced carbon materials. He is one of the key driving forces behind carbon research efforts at the National University of Singapore (NUS) and in Singapore generally. His research focuses on the growth, processing and application of diamond and graphene with a view towards technological applications.

Graphene is a one atom thick carbon sheet with huge technological potential. In 2010, the Nobel Prize in Physics was awarded for graphene research and since then, worldwide research efforts to study the properties and applications of this wonder material have intensified. Professor Loh's outstanding work in this field has contributed significantly to Singapore's position as a world leader in this hot research area.

Over the past seven years, Professor Loh and his team have made fundamental breakthroughs in graphene research. These discoveries include controlling the electronic properties of graphene by applying varying degrees of strain; using graphene as an optical material to generate high energy laser pulses; using nano-graphene oxide to seed the growth of ice at room temperature; and using graphene as a platform for the growth of stem cells. Prof Loh's work on graphene photonics was even highlighted by Prof Kostya S. Novoselov, winner of the 2010 Nobel Prize in Physics, in his Nobel Lecture.

Beyond fundamental studies, Professor Loh's work addresses engineering challenges such as the large scale synthesis of graphene. His team recently pioneered the growth and transfer of high quality graphene on silicon wafer in a single step, solving a major challenge critical for graphene commercialisation. This breakthrough was published in the highly prestigious scientific journal Nature in January 2014, winning recognition in the scientific community worldwide. Most importantly, the direct growth and spontaneous attachment of graphene on the silicon substrate is amenable to batch processing in a semiconductor production line, thus speeding up the technological application of graphene.

A prolific scientist, Professor Loh also invented a method to electrochemically exfoliate graphene flakes from graphite mineral. Unlike conventional methods, his novel method does not use oxidising

agents or concentrated acids, thus bypassing the tedious and dangerous steps used in conventional methods. To commercialise this invention, Professor Loh founded a spin-off company in 2012 for bulk synthesis of high quality graphene for applications in batteries and composites.

Trained as a physical scientist, Professor Loh's work has a strong focus on applications. Out of the 10 patents that he has filed, five have been licensed and spawned three start-ups that secured more than USD 3 million in overseas venture funds.

In 2008, Professor Loh was awarded a National Research Foundation Competitive Research Programme (CRP) for research on graphene and related materials. This highly successful programme led by him has contributed to the establishment of the Graphene Research Centre at NUS Faculty of Science. By 2013, research arising largely from this CRP had propelled NUS to be one of the top universities in the world for graphene research.

Over the last three years, Professor Loh had published more than 10 papers in Nature and its sister journals, among many other high impact papers. These achievements have contributed towards strengthening NUS' international reputation and research rankings.

Professor Loh has won many accolades for his outstanding research achievements. In 2008, he received the NUS Young Research award and in 2012, he was conferred the NUS Outstanding Researcher Award. Professor Loh was also presented with the highly prestigious American Chemical Society Nano Lectureship award in 2013. He is currently the associate editor of the American Chemical Society Journal, Chemistry of Materials.

For his outstanding research on graphene chemistry, Professor Loh Kian Ping has been awarded the 2014 President's Science Award.