

President's Technology Award 2016

CITATION

Professor LIU Bin

Department of Chemical & Biomolecular Engineering, Faculty of Engineering, NUS

Institute of Materials Research and Engineering, A*STAR

One-line Citation

“For her outstanding research on organic nanomaterials for environmental and biomedical applications”

Full Citation

Professor Liu Bin has made major contributions to the field of organic nanomaterials. She specialises in bringing organic soluble materials into aqueous media, with a focus on the exploration of their unique applications in biomedical research, environmental monitoring and electronic devices. Prof Liu’s research in organic fluorescent materials provides important solutions to vital problems presented in the areas of healthcare and environmental monitoring for example in our everyday life.

Since 2011, Prof Liu's research had focused on a unique luminescent material with aggregation-induced emission (AIE). AIE refers to a unique photophysical phenomenon: fluorogens that are non-emissive in dilute solutions could be induced to emit intensively in aggregates. The behaviour of AIE is opposite to the conventional dyes and inorganic nanomaterials, which provides a unique opportunity to revolutionise the field of fluorescent probes. The simple design and fluorescence turn-on feature of the molecular AIE bioprobes offer direct visualisation of specific analytes (e.g. cancer cell markers) and biological processes (e.g. cellular apoptosis) with higher sensitivity and better accuracy than commercial fluorescent probes.

The AIE nanoparticle probes with different formulations and surface functionalities show advanced features over commercial quantum dots (QD) and small molecule dyes, which enable longer term cell tracing and tumour imaging in a non-invasive and high contrast manner. This is timely as the technology addresses the urgent demand for reagents that could be used in real-time non-invasive cell imaging and tracing, amid the rapid development of cancer research and cell-based therapies. Furthermore, the technology can contribute towards the evaluation of cosmetics, healthcare, drugs and therapeutics, which are emerging or growing industry sectors in Singapore and around the world.

In 2014, Prof Liu co-founded an NUS start-up company "Luminicell" to commercialise the AIE probe technology. Luminicell is in partnership with potential international and local bio-tech companies to further develop and advance its technology. Luminicell has regular customers from Singapore, USA and China.

Prof Liu’s research has also gained worldwide recognition. Her work has been cited by researchers in more than 30 countries. She has been invited to serve as a member of the Editorial Board of 15 international refereed journals published by five publishers. Prof Liu has also received many prestigious awards, including the NUS Young Investigator Award in 2006, Singapore National Academy of Science Young Scientist Award in 2008, L’Oréal Women in Science National Fellowship in 2011, NUS Young Researcher Award in 2013, Asia Rising Star in 2013, Invited Lecturer of Asia Excellence, Japanese Polymer Society in

2013, Dean's Chair Professorship in Faculty of Engineering, NUS in 2014, Singapore National Institute of Chemistry-BASF Materials Award in 2014, Singapore National Research Foundation Investigatorship in 2014, and Materials in Society Lectureship (Elsevier) in 2015. She was recently named as The World's Most Influential Minds and the Top 1% Highly Cited Researchers in Materials Science by Thomson Reuters. Prof Liu was elected as the Fellow of the Royal Society of Chemistry in 2016. Prof Liu has 26 patents, of which 14 are licensed to companies across the US, UK and Asia.

As a faculty member of the National University of Singapore's Faculty of Engineering, Prof Liu is also passionate about nurturing the next generation research leaders and encouraging more women to pursue careers in engineering and science. In the past 10 years, Prof Liu has provided training to 23 doctoral students as well as 35 post-doctoral fellows, and nurtured more than 20 professors. Prof Liu also has a joint appointment with the Institute of Materials Research and Engineering, A*STAR, where she leads a research team working on conjugated polymer nanoparticles for fluorescence and photoacoustic imaging.

Prof Liu represents a rare example of a passionate scientist whose dedication and perseverance have given rise to scientific discoveries that have a profound impact on our lives. Besides being a prolific researcher, Prof Liu also has a creative and entrepreneurial mindset, which highlights her exceptional talent in the scientific community.

For her outstanding research and innovative work on organic materials, particularly fluorogens with aggregation-induced emission which have a broad range of applications in the fields of healthcare and environmental monitoring, Professor Liu Bin is awarded the 2016 President's Technology Award.