

## PRESIDENT'S SCIENCE AWARD 2024

**Liu Bin**

Tan Chin Tuan Centennial Professor  
National University of Singapore

***"For her discovery of the role of carbazole isomers in room temperature phosphorescence of carbazole, and subsequent revelation of the transformative impact of isostructural doping on the optical properties of organic semiconductors, opening new avenues of study and application."***

Professor Liu Bin is a world-renowned researcher in the field of organic functional materials. She specialised in bringing organic semiconductors into aqueous media, with a focus on the exploration of their unique applications in biomedical research, security and electronic devices. In recent years, she has worked on biocompatible luminogens that serve as highly sensitive light-up molecular probes and nanoparticle probes, opening up new horizons for non-invasive tracking of analytes and biological processes in real-time. In 2014, Professor Liu co-founded an NUS start-up company "Luminicell" to commercialise these luminescent probes and serve the biomedical community.

In the quest to develop organic luminogens with extended lifetimes for phosphorescence imaging, Professor Liu's team discovered that a trace amount of carbazole isomer existed in commercial carbazole crucially determines its optical properties. This curiosity-inspired discovery resolves a 95-year debate on carbazole emission reported in the literature and provides alternative insight on the mechanisms behind ultralong organic phosphorescence.

The findings on carbazole isomer subsequently inspired her team to develop an isostructural doping strategy, which can effectively capture and utilise triplet state excitons to yield new materials with bright luminescence and long emission lifetime, opening opportunities for afterglow devices, naked-eye theragnostics, and optical data encryption.

Professor 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, Professor Liu also has a creative and entrepreneurial mindset, which highlights her exceptional talent in the scientific community. Professor Liu is the co-inventor of 31 patents and know-hows on energy and biomedical applications, among which 16 has been licensed to different companies in US, UK, and Asia. Beyond contributions to the research and innovation paradigm, Professor Liu also has an excellent record of national and global engagement and service. She has served the senior leadership roles in NUS and has been invited to serve the editorial board of 18 materials and chemistry journals published by 5 top publishers.

Professor Liu is also passionate about nurturing the next generation research leaders and encouraging more women to pursue careers in engineering and science. So far, she has mentored and supervised over 90 PhD students, postdocs and visiting scientists. More than 50 of them hold professorships in academia and the rest have prominent positions in research labs and industry around the world.

In recognition of her exceptional performance in research, education and service, Professor Liu has been elected to the US National Academy of Engineering, Singapore National Academy of Sciences, Asia-Pacific Academy of Materials, the Academy of Engineering Singapore, and the Royal Society of Chemistry. Professor Liu has also received many prestigious awards, including the National Science and Technology Young Scientist Award 2008 and President's Technology Award 2016, the highest honours bestowed to exceptional scientists and engineers in Singapore; Elsevier Materials in Society Lectureship 2015, American Chemical Society ACS Nano Lectureship Award 2019 and Royal Society Centenary Prize 2021, each was awarded to only three candidates across the globe. Professor Liu is also the winner of the Kabiller Young Investigator Award in nanoscience and nanomedicine 2021 and the IUPAC Distinguished Women in Chemistry or Chemical Engineering Awards 2023. Thomson Reuters and Clarivate Analytics have identified Professor Liu as one of the TOP 1% highly cited researchers in materials or chemistry category and among the World's Most Influential Scientific Minds consecutively since 2014.

For her outstanding research and innovative work on organic functional materials, particularly the iso-structural doping to transform the optical properties of organic semiconductors, Professor Liu Bin is awarded the 2024 President's Science Award.