

Distinguished Lecture Series

Engineering Enhanced Molecular Light Sources by Controlling Physical Structure and Environment



20 May 2021 (Thursday)

3:30-4:30 p.m. GMT+8 (Hong Kong Time)



Online via Zoom

(Meeting ID: 951 1286 7706)



ABSTRACT

The nature of the light emission properties of molecular chromophores is characteristic of their chemical structure and environment. This well-known property forms the basis for many spectroscopic tools in chemical and biological analysis. Physical structure and environment can equally be controlled to engineer the emission from molecular chromophores, making use of different interactions between the optical transition dipoles and their surroundings. For many applications we would like to be able to control the spatial (e.g. directionality), temporal (e.g. decay time) and spectral (e.g. colour hue and saturation) characteristics of the light source, together with its emission efficiency and polarisation. This talk will explore the use of engineered physical structures to achieve this, including liquid crystalline oriented films, controlled molecular conformations, and patterned dielectric and metallic photonic structures. In terms of materials, the focus will be on conjugated molecules including polymers, oligomers and small molecules, as widely used in organic light emitting diode (OLED) displays, lighting and lasers.

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Professor Bradley studied Physics at Imperial College, and received his PhD at the Cavendish Laboratory in Cambridge. He holds honorary DSc degrees from Hong Kong Baptist University and the University of Sheffield, and an Honorary Fellowship from Churchill College Cambridge. Other awards and prizes received include the Royal Society Bakerian Medal, E-MRS Jan Czocharlski Gold Medal, IET Faraday Medal, IOP Faraday Gold Medal and the SID Jan Rajchman, EU Descartes and ESF European Latsis Prizes. He made seminal contributions to the understanding and utilisation of soluble-semiconductors to numerous technology developments. He is a Fellow of the Royal Society and was appointed Commander of the Order of the British Empire (CBE) in 2010. Before moving to KAUST, Professor Bradley held faculty and senior positions in Physics and Engineering at Oxford, Imperial, Sheffield, and Cambridge. He was the Vice-Provost for Research at Imperial College, and the Head of the Mathematical, Physical and Life Sciences Division at Oxford. He is also a prolific inventor and entrepreneur, working closely with industry through multiple collaborative research projects and as a technical consultant.