

Designer molecules for enhanced emission and photoswitching

Soo Young Park, Department of Materials Science and Engineering, Seoul National University, Seoul 151-744, parksy@snu.ac.kr

In this talk I will introduce most recent and selected designer molecules developed in my group in two different parts. First part is about the water-soluble and highly luminescent AIEE (aggregation-induced enhanced emission) supramolecular polymer. 1D supramolecular polymer with exceptionally high PLQY of 0.91 was obtained and characterized by the host-guest complexation of water-soluble cyanostilbene monomer (Py⁺-CN-MBE) and CB[8] in water.¹ 1D light harvesting system comprising various cyanostilbene monomers was subsequently fabricated and analyzed. Trilateral monomers for 2D supramolecular polymerization with CB[8] were also designed and investigated for enhanced fluorescence, anion sensing, and water splitting. Recently, the development of fluorescence photoswitching system, which can turn on/off fluorescence by light irradiation, has attracted much attention because of its potential in various optoelectronic applications including optical memory, bioimaging, and super-resolution microscopy. Second part of my talk is about developing multi-color fluorescent system showing color-specific fluorescence switching. We have originally designed successful color-specific photoswitching system composed of two excited-state intramolecular proton transfer (ESIPT) fluorophores and a color-specific photoswitchable diarylethene.² We could also design two component system comprising the turn-on type fluorescent diarylethene and one ESIPT dye. This system is far excellent compared to the three component system in terms of the fluorescence on/off ratio and non-destructive read-out capability. Perfect color-specific switching and super-resolution imaging could be demonstrated based on this two-component system.

[References] (1) H. J. Kim et al., *Angew. Chem. Int. Ed.*, **55**, 15915–15919 (2016), (2) D. Kim et al., *Adv. Opt. Mater.*, **4**, 790-797 (2016).

Soo Young Park received his BSc and MSc degrees for polymer chemistry works in textile engineering from Seoul National University in 1980 and 1982, respectively. He earned his PhD degree from Seoul National University for his thesis on the plasma polymerization in 1988. He has been a senior researcher in the Korea Institute of Science and Technology (KIST, Korea) in 1985-1995. He joined Seoul National University as a faculty member in 1995 and was promoted and tenured to the full professor of Materials Science and Engineering in 2004. Since 2015, he is also affiliated to the Osaka University as a guest professor. He has been a director of the Organic Nanophotonics National Research Laboratory (NRL) of Korea during 2004-2009. He is currently a director of the Creative Research Initiative Center for Supramolecular Optoelectronics Materials (CSOM) since 2009. He has been awarded with Shinyang Engineering Award (2005), Samsung Polymer Award (2007), Academic Research Award of Seoul National University (2009), and Sudang Prize (2016). In 2010, he was appointed as the fellow of Korean Academy of Science and Technology (KAST). His research areas include design and synthesis of molecular electronics/photonics materials related to the fluorescence, phosphorescence, electroluminescence, photochromism, sensing, optical recording, and nonlinear optics. He has published ~250 scientific papers which received >10,000 citations with H-index of 50.