Molecular Interactions Driven Pyridoindole Based Materials for Switchable Fluorescence and Chemo/ Bio-Sensing

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Development of new functional molecules and materials with pre-defined properties employing simple chemical methods is significant both from fundamental and application perspectives.[1] Our earlier study established biologically important heterocycle, pyrido[1,2-a]indoles (PI), as a new class of fluorophore with promising potential in cell imaging.[2] However, this molecule shows complete quenching of fluorescence in water as well as in aggregated phase. To augment the fluorescence properties of PI in the solid state, we coupled it with a classic aggregation induced emission (AIE) active core of tetraphenylethylene (TE). A simple Schiff base condensation involving PI and TE unit results strongπ-π stacked non-fluorescent PITE1 (Fig. 1a). Circumventing the problem of planarity and π-π stackingin PITE1, we synthesized a C-C coupled molecule, PITE2 (Fig. 1b), exhibiting strong emission in the solution, nanoparticle, and solidstate. The crystal structure analysis of PITE2 indicates multiple C-H…π and C-H…H-Cintra/intermolecular interactions rigidifying the molecule in aggregated state leading to strong fluorescence.[3]The lone pair of electrons on nitrogen in PITE2 involve in conjugation and responsible for pH-sensitive fluorescence.The presence of four propyl groups and multiple phenyl rings make PITE2 substantially hydrophobic and established it as lipid droplets (LDs)targetingbioprobe in multiple cell lines.Thus, PITE2 is a promising molecular optical material for pH-based sensing and lipid droplets tracking.

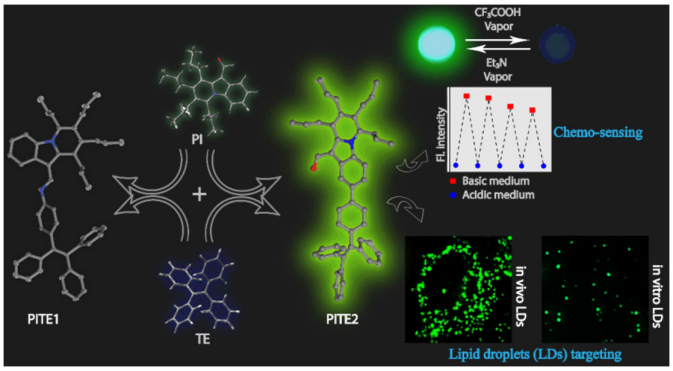

Fig 1: Schematic illustration of pyridoindole based molecules and their applications.

References:

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