INFLUENCE OF PERIPHERAL PHENYLS TO EXCITED STATE RELAXATION AND AGGREGATION INDUCED FLUORESCENCE IN NITRILE COMPOUNDS

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Fluorescent nanoparticles attract great interest in the field of technological applications. They were found to be suitable for constructing OLEDs, OFETs and other optoelectronic systems. They are also fit for tailoring biological probes for bio-sensing and bio-imaging. Fluorescent organic nanoparticles are usually composed of non-planar geometry molecules experiencing the aggregation induced emission (AIE) phenomenon. [1]

Three nitrile-based compounds with different number of peripheral phenyl moieties are studied in this work (Fig. 1). The compounds are designed to show AIE properties. The cyano-vinylene bridge is intentionally introduced into the core to provide a steric twist in the molecules. The pyrazole groups have the ability to deliver high fluorescence efficiency in addition to causing strong intermolecular hydrogen bonds and π-π interactions, which are important for supramolecular constructions. [2]

Fig. 1. The chemical structures of investigated compounds.

Optical properties of the compounds assessed in diluted solutions revealed that peripheral phenyl rings improve compound conjugation and significantly shorten excited state radiative decay time. Interestingly, the peripheral phenyls were found to not affect non-radiative decay time. It was also deduced that the central phenyl moiety is the main source of intramolecular vibrations/torsions, and therefore, is responsible for extremely weak fluorescence quantum yield in solutions.