NEW FLUORESCENT EMITTERS EXHIBITING AGGREGATION INDUCED EMISSION FOR OLEDs

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Luminogenic materials with unique Aggregation Induced Emission (AIE) have attracted growing attention as materials with broad spectrum of application in various technological fields [1]. Conventional luminescent materials used in the field of organic electronics, especially in organic light emitting diodes (OLEDs), transistors, organic lasers, as well as fluorescent sensors or probes have suffered from aggregation caused quenching (ACQ) due to intermolecular interactions when their molecules are in the close proximity [1,2]. In the field of OLEDs, aggregation is inhibited e.g. by so-called host-guest systems when small-molecule emitters are dispersed in a polymer matrix [3]. It forces us to use emitters with very high quantum yields and with specified HOMO/LUMO levels to interact with the matrix [4].

In sharp contrast to destructive ACQ, aggregation-induced emission (AIE) enables active utilization of the aggregation process, instead of passively working against it. AIE refers to the group of luminogenic materials which emission is poor once they are dissolved in appropriate solvents but become significantly increased when aggregates are formed in solid state or in the thin layer. The most possible working mechanism involved in this highly unique and useful process is called restriction of intramolecular rotation (RIR) which could be achieved through bulky substitutions, metal chelation or strong hydrogen bonding [1,2].

We present the synthesis and use of new small-molecule organic compounds in the fabrication of AIE fluorescent thin layers. We have designed the target molecules to connect highly fluorescent core with long and/or branched alkyl chains (Fig. 1.). Modifications around the core of the designed systems make them applicable to the production of fluorescent thin layers which can be used in organic devices like OLEDs as well as other organic semiconducting materials. It is particularly important to obtain derivatives that will be solution processable to implement the inkjet printing techniques for the fabrication of the thin layers. For the received systems, the photophysical properties as well as the ability to produce thin films were tested.

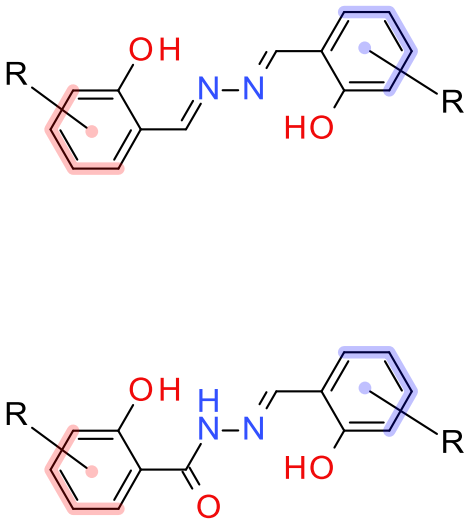

Fig. 1. Structure of new AIE compounds.

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