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Principles and Applications of Aggregation-Induced Emission



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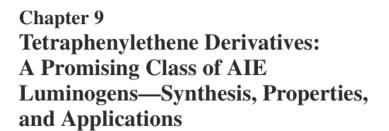
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Abstract To overcome the aggregation-caused quenching (ACQ) effect in the aggregated state new photoluminescent materials are required. Among planar aromatic molecules, naphthalene, anthracene, phenanthrene, fluoranthene, fluorine, pyrene, perylene, carbazole, triphenylamine, fluorescein, phenothiazine, cyanine, diketopyrrolopyrrole, perylene diimide, naphthalene diimide, and porphyrins have all been used for a range of important applications; however, they suffer from the ACQ effect. In 2001, a new phenomenon was described—so called aggregationinduced-emission (AIE), where typically small organic molecules, which are weak emitters when fully dissolved in solvents such as toluene, THF, and chloroform, become highly luminescent in the supramolecular aggregated state, as well as in solid films. Among the AIE-active luminophores developed, tetraphenylethene (TPE) derivatives have attracted significant attention due to their weak intermolecular interactions and excellent solubility in organic solvents, with a structure that is susceptible to functionalization on the planar phenyl groups, which may lead to AIE activity. In this chapter, we described in detail the synthesis, properties, and applications of AIE-active TPE derivatives.

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