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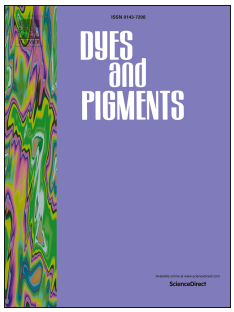

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Tetraphenylethylene-Substituted Phenothiazine-based AIEgens for Non-doped Deep-Blue Organic Light-Emitting Diodes with Negligible Efficiency Roll-Off

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Abstract:

Deep-blue organic light-emitting diodes (OLEDs) with low efficiency roll-off and high color purity are critical for the tetraphenylethylene-based AIEgens derivative. In this work, the novel blue emitter, 3-(1-phenyl-1*H*-phenanthro[9,10-d]imidazol-2-yl)-10-(4-(1,2,2-triphenylvinyl)phenyl)-10H-phenothiazine (TPEPPI), was designed and synthesized to develop a new material possessing aggregation-induced emission (AIE) characteristics and deep-blue emission. The TPEPPI hardly emits fluorescence in tetrahydrofuran (THF), the luminescence intensity increased by 5.5 times when the water content reaches 95%, showing strong fluorescence in aggregated state. Three different non-doped device structures were fabricated, all of the OLEDs showed deep-blue emission (~460 nm). The optimized device Ⅲ exhibited an emission peak at 467 nm, a maximum current efficiency of 4.25 cd A^{-1}, a maximum power efficiency of 3.35 lm W^{-1}, a maximum luminance of 16750 cd m^{-2}, a maximum external quantum efficiency of 2.36%, and the essentially negligible efficiency roll-off of 3.3%, which is the first observation of