SYNTHESIS AND PROPERTIES OF PHENANTHROIMIDAZOLE-BASED COMPOUNDS AS PROMISING EMITTERS FOR OLEDS

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In recent decades, organic light-emitting diodes (OLEDs) have attracted significant attention for their application in solid-state lighting and flat-panel display technologies, owing to their flexibility, cost-effectiveness, and high efficiency. The development of new organic emitters has therefore become essential to meet the increasing demand for high performance OLEDs in next-generation lighting and display applications[1]. Phenanthroimidazole-based fluorophores represent one of the most attractive families of compounds for organic electronic applications, owing to their tunable structures at the N1 and C2 positions. Furthermore, these compounds have rigid molecular skeletons, exhibit high charge-carrier mobilities, excellent thermal stability, and good film-forming properties. They are promising candidates for blue, green, and yellow emitters in high performance OLEDs [2]. Herein, we present the design and synthesis for four new phenanthroimidazole-derivatives prepared through a four-step procedure with high yields. The thermal and photophysical properties of the synthesized compounds are also reported. These compounds exhibit high glass-transition temperatures exceeding 150 °C. Photophysical properties of the solutions and of the solid films of the synthesized compounds were studied. The compounds demonstrated short fluorescence lifetimes, locally excited emission, and ionization potentials of ca.5.65 eV. Overall, the combination of favourable thermal stability, suitable ionization potential, and efficient short-lived emission makes these phenanthroimidazole derivatives promising materials for “fast” OLEDs.

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