Synthesis, characterization and properties of naphthalimide-pyrene dyads for organic light-emitting diodes

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Abstract: Owing to their strong fluorescence derivatives of 1,8-naphthalimide have been widely used as colorants in the polymer industry, fluorescent probes for medical and biological purposes, and as n-type materials in organic light-emitting diodes. The fluorescence property can be tuned by modifying at the C-4position with different electron-donating/withdrawing groups. In this work, a series of naphthalimide-pyrene dyads, namely PyN-1, PyN-2 and PyN-3 were designed and investigated. The compounds were synthesized using a combination of alkylation and Pd-catalyzed cross-coupling reactions and chemically characterized by NMR, FT-IR and MS techniques. In solution phase, their maximum absorption wavelength were 350-352 nm and emission wavelengths ranged from 548 to 550 nm. In thin film, their absorption and emission spectra were red shifted. The applications of PyN-1, PyN-2 and PyN-3 as light-emitting materials in OLED devices were investigated.

Keywords: Pyrene; Naphthylimides; Suzuki cross-coupling; Dyad; Organic light-emitting diode