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Synthesis and photophysical properties of blue-emitting fluorescence dyes derived from naphthalimide derivatives containing a diacetylene linkage group

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Abstract

Four naphthalimide-based dyes with a diacetylene linkage at the 3- or 4-position were synthesized to improve the thermal stability of the fluorescence dye as well as the efficiency of fluorescent emission at blue region. The absorption and fluorescence properties of the synthesized dyes were also investigated. The geometries and molecular orbitals of the dyes prepared were simulated using by density functional theory and time-dependent density functional theory using Gaussian 09. Furthermore, the suitability of the dyes for application in light-conversion films was examined. *N*-Phenyl groups were found to have a greater effect on the fluorescence of naphthalimide-based dyes than analogue containing an *N*-alkyl group. In addition, investigation of the effect of diacetylene linkages at the 3- or 4-positions of naphthalimide-based dyes showed that the fluorescence was influenced by the electron-donating effect of the diacetylene linkage which could afford more conjugation of π orbitals of the dyes. Four blue fluorescence dyes derived from 1,8-naphthalimide containing a diacetylene linkage were synthesized and then coated in PE film. The photophysical properties were analyzed using density

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