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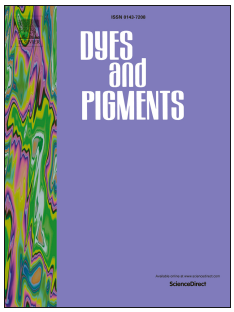

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Synthesis and spectral properties of probes based on pyrene and 2,2,6,6-tetramethylpiperidine-1-H- or 1-oxyl

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Abstract

The spectral properties of novel pyrene-piperidine/pyrene-piperidine-1-oxyl adducts with varying linkers differing in electronic conjugation between these two functionalities were investigated in solvents of different polarity. Tuning their fluorescence efficiency *via* structure modification is discussed in terms of increased conjugation, solvent polarity effect, main non-radiative de-excitation pathways and static/dynamic excimer or solute-solvent exciplex fluorescence. Compared to parent pyrene molecule, the main additional non-radiative de-excitation pathways leading to significant fluorescence quenching were studied using time-resolved fluorescence spectroscopy and quantum-chemical DFT (Density Functional Theory) calculations and were identified as reductive photo-induced electron transfer and intramolecular paramagnetic quenching.

Key words: pyrene, sterically hindered amines, imine linker, solute-solvent exciplex, intra- and intermolecular paramagnetic quenching, photo-induced electron transfer