

Optical properties of double pyrene-anthrylvinylene-fullerene-C₆₀ or pyrene-OPV- fullerene C₆₀ triads

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In recent years, organic nanomaterials have inspired growing research efforts due to the great diversity of available organic π -conjugated macromolecules, their good thermal and chemical stability and electrical conductivity. Recently, the photovoltaic properties have been reported for anthrylvinylenes and conjugated oligophenylenevinylenes (OPV) blended with fullerene. In other works, pyrene, styrene or its derivatives have also been widely used as a fluorescence probe molecule due to the strong fluorescence and electron donor effect. On the contrary, fullerene C₆₀ is known to be a strong electron-acceptor group, usually used for solar cells based on conjugated molecules. In the present work we report on the optical properties in solution of pyrene-anthrylvinylene-C₆₀ and pyrene-OPV-Fullerene triads. Pyrene-containing anthracene and 4-styryl units were chosen as donor groups and fullerene C₆₀ as acceptor.

The UV-Vis spectra show the pyrene electronic transition with an absorption band extending from 400 to 800 nm due to the combination of the π - π electronic transition of the antrylvinylene or OPV moiety and the C₆₀ band, regardless the extension of the anthrylvinylene or OPV fragment. However, the emission is almost mirror-like with respect to the absorption bands of pyrene, suggesting that the HOMO and LUMO are more localized on this substituent. All the obtained compounds were characterized by ¹H and ¹³C NMR, FTIR, UV-Vis, fluorescence spectroscopy, MALDI-TOF, Electrospray or FAB+ mass spectrometry, and elemental analysis.

