

New thienylpyrrolyl-cyanoacetic acid derivatives: synthesis and evaluation of the optical and solvatochromic properties

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Abstract:

Among the organic molecules, the so called push-pull or dipolar molecules (D- π -A) offer versatility of synthesis and ability to modulate their photophysical and photochemical properties.

The cyanoacetic acid moiety has been used extensively as the acceptor group in D- π -A molecules motivated by its easy/inexpensive synthesis and ability to simultaneously act as a strong electron withdrawing moiety, as well as a stable anchoring group in dye-sensitized solar cells (DSSCs).^[1]

Our previous work on the synthesis and characterization of D- π -A chromophores in which the donor part (D) is represented by a π -excessive five-membered heteroaromatic system (pyrrole or thiophene) functionalized by electron donor groups and the acceptor part (A) is a strong electron acceptor group (“classical” or an electron-deficient heterocycle) has shown that they exhibit excellent solvatochromic, photochromic, emissive properties, good photovoltaic efficiencies, exceptional thermal stabilities and good to excellent NLO responses.^[2]

In this work, we report the synthesis of new D- π -A chromophores functionalized with cyanoacetic acid as acceptor group, linked to the thienylpyrrole heterocyclic system, which plays the dual role of π -bridge and auxiliary donor group. Thienylpyrrolyl-cyanoacetic acid derivatives were obtained in excellent yields through a simple Knoevenagel condensation of the corresponding precursor aldehydes with cyanoacetic acid in acetonitrile at reflux, using piperidine as catalyst, and the optical and solvatochromic properties of the novel push-pull systems were evaluated.

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