

Donor-acceptor oligothiophene-fullerenes triad: synthesis and preliminary photophysical characterization.

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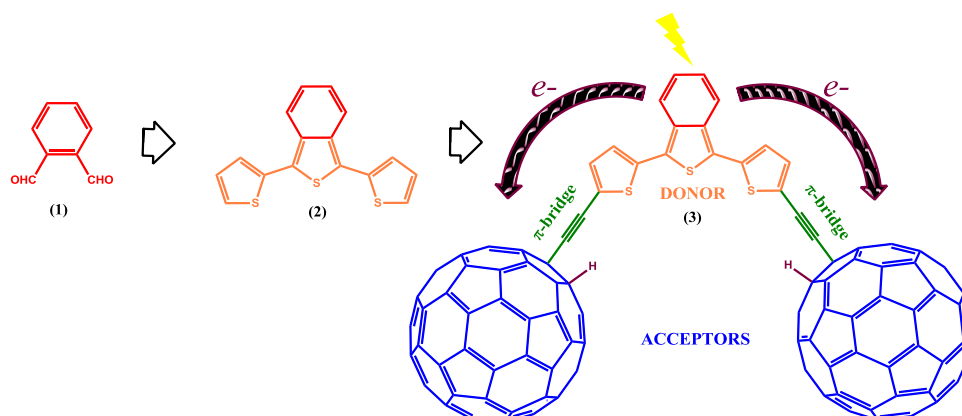
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A new organic donor- π -bridge-acceptor symmetric triad composed of an oligothiophene donor covalently linked to two Buckminsterfullerene C₆₀ acceptor moieties by ethynyl bridges **3** has been synthesized. The synthesis consists of a few steps and versatile synthetic approach [1] starting from the commercially available and cheap *o*-phthalaldehyde **1** passing through a versatile oligothiophene intermediate **2** (Scheme 1):



Scheme 1 - Synthetic approach to donor-acceptor system.

Our preliminary DFT/B3LYP/6-31G+(d,p) theoretical calculations concerning the system **3** by which the HOMO at -0.17177 H is mainly characterized by the DTBT part of the molecule; while the LUMO at 0.11032 H is delocalized on the fullerene moieties. These support the hypothesis about the likely occurrence of an electron transfer process in this triad donor-acceptor system during its photoexcitation. In order to verify experimentally if an electron transfer could occur in such a system we performed preliminary studies. In order to investigate the photophysical behaviour it has been adopted the approach of a time-resolved pump-probe ultrafast technique performed in solution as a function of the solvent polarity in which the donor-acceptor system has been dissolved. The first results have evidenced how the photoinduced intramolecular charge transfer from the electron-donor moiety (DTBT) to the electron-acceptor counterpart (C₆₀) of triad system **3** could take place in more polar solvents involving a Charge Separation State (CSS).

[1] D'Auria M., Guarnaccio A., Racioppi R., Santagata A., Teghil R. *Synlett* **2013**, 24(8), 943-946.