A new carbazole-based helically chiral architecture: Synthesis and physical properties

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A new carbazole-based helically chiral architecture: Synthesis and physical properties

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Abstract- A short and efficient synthesis leading to a new helically chiral heptacyclic system, containing a carbazole unit, was achieved *via* a Knoevenagel condensation-photocyclization strategy. The optical properties of the carbazole-based material were investigated by UV-visible absorption and photoluminescence spectroscopy and an emission in the visible region was observed. From the cyclic voltammetry analysis, the electrochemical band gap of the target organic material was estimated to be 2.38 eV indicating that it might be a good candidate for electron-injection hole-blocking layers in organic light-emitting diodes.

Keywords: Chirality, Azahelicenes, Carbazole, Fused-rings, Knoevenagel condensation, Photocyclization.

Helicenes have been investigated since 1956 as aromatic molecules in which the *ortho*-condensed ring system gives rise to a helical structure.[1] Thirty years later, numerous studies on the synthesis and physico-chemical properties of helicenes have been published.[2] More recently, helicenes have sparked interest due to the use of their intrinsic properties (e.g. chirality, strong rotatory power) in various fields such as catalysis,[3] non-linear optics,[4] circulary polarized luminescence[5] and organic light-emitting materials.[6] Besides typical carbohelicenes composed of an all-carbon ring framework, heterohelicenes incorporating one or more heteroaromatic units in the skeleton have also gained increasing attention due to their additional propreties.[7] Pyridohelicenes, as a kind of typical azahelicenes, are prime examples.[8] However, the pyrrole-alternatives have been rarely focused on.[9] That is partially because pyrrolohelicenes, with a low number of fused aromatic rings (<6), are supposed to be stereochemically less stable resulting from the small overlap at the terminal aromatic nuclei.[10]