SYNTHESIS AND STUDIES OF TETRASUBSTITUTED CARBAZOLE DERIVATIVES

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Carbazoles are prevalent as structural motifs in various synthetic materials. As is well known, the properties of carbazole derivatives are closely related to their molecular structures [1]. In the previous papers, the derivatives of carbazole unit as central core were commonly prepared by functionalizing at its 3,6- [2], 2,7- [3] or 9- [4] positions. The as-prepared compounds with thermally and morphologically stable properties can expand the application of carbazole in organic light-emitting devices (OLEDs). Due to their thermal stability, good film-forming properties and high luminescence, the starburst molecules have attracted much more attention to the application in OLEDs, photovoltaics and field effect transistors [5].

In this study, we report a carbazole derivative by using carbazole as the central core and functionalizing at its 1,3,6,8-positions with ethenylaryl moieties and investigation of their thermal, optical, photophysical and electrochemical properties of the synthesized compounds.

The synthesized compound exhibit thermal stability with 5% weight loss temperature exceeding 412 °C. The ionization potential, electron affinity values were estimated by cyclic voltammetry. The analysis revealed that compound with 2-ethenylnaphthalenyl substituents exhibited higher thermal stability than compounds with 1-ethenyl-2,3,4,5,6-pentafluorophenyl and 4-ethenylpyridinyl moieties. The synthesized compounds form glasses with glass transition temperatures of 59-134 ºC. The dilute solutions of the synthesized derivatives exhibit absorption maxima in the range of 355-380 nm, and fluorescence intensity maxima in the range of 400-470 nm. The ionization potential values of the synthesized materials range from 5.27 to 5.58 eV.

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