World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:12, No:06, 2018

An Efficient Emitting Supramolecular Material Derived from Calixarene: Synthesis, Optical and Electrochemical Features

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Abstract : High attention on the organic light-emitting diodes has been paid since their efficient properties in the flat panel displays, and solid-state lighting was realized. Because of their high efficient electroluminescence, brightness and providing eminent in the emission range, organic light emitting diodes have been preferred a material compared with the other materials consisting of the liquid crystal. Calixarenes obtained from the reaction of p-tert-butyl phenol and formaldehyde in a suitable base have been potentially used in various research area such as catalysis, enzyme immobilization, and applications, ion carrier, sensors, nanoscience, etc. In addition, their tremendous frameworks, as well as their easily functionalization, make them an effective candidate in the applied chemistry. Herein, a calix[4]arene derivative has been synthesized, and its structure has been fully characterized using Fourier Transform Infrared Spectrophotometer (FTIR), proton nuclear magnetic resonance (^{1}H-NMR), carbon-13 nuclear magnetic resonance (^{13}C-NMR), liquid chromatography-mass spectrometry (LC-MS), and elemental analysis techniques. The calixarene derivative has been employed as an emitting layer in the fabrication of the organic light-emitting diodes. The optical and electrochemical features of calixarane-contained organic light-emitting diodes (Clx-OLED) have been also performed. The results showed that Clx-OLED exhibited blue emission and high external quantum efficacy. As a conclusion obtained results attributed that the synthesized calixarane derivative is a promising chromophore with efficient fluorescent quantum yield that provides it an attractive candidate for fabricating effective materials for fluorescent probes and labeling studies. This study was financially supported by the Scientific and Technological Research Council of Turkey (TUBITAK Grant no. 117Z402).

Keywords : calixarene, OLED, supramolecular chemistry, synthesis
Conference Title : ICMSC 2018 : International Conference on Macromolecular and Supramolecular Chemistry
Conference Location : Vienna, Austria
Conference Dates : June 14-15, 2018