

# Accepted Manuscript

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PII: S1386-1425(18)30379-2  
DOI: doi:[10.1016/j.saa.2018.04.067](https://doi.org/10.1016/j.saa.2018.04.067)  
Reference: SAA 16052

To appear in: *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*

Received date: 28 July 2017  
Revised date: 17 April 2018  
Accepted date: 29 April 2018

Please cite this article as: Lixia Guo, Xiaoju Wang, Liheng Feng , Synthesis, photophysical and electrochemical properties of a blue emitter with binaphthalene and carbazole units. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Saa(2017), doi:[10.1016/j.saa.2018.04.067](https://doi.org/10.1016/j.saa.2018.04.067)

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# Synthesis, photophysical and electrochemical properties of a blue emitter with binaphthalene and carbazole units

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**Abstract:** A blue emitter, 3,3'-(2,2'-dimethoxy-[1,1'-binaphthalene]-6,6'-diyl)bis(9-benzyl-9H-carbazole), was synthesized by Suzuki coupling reaction. The photophysical properties of the emitter in solution were firstly investigated by UV-Vis absorption and fluorescence emission techniques. The results indicate that the emitter has excellent optical and electron transfer properties. The maximum absorption and emission peaks of the emitter are 302 nm and 406 nm with 67.4 % fluorescence quantum yield in chloroform, respectively. Thermal stability study reveals that the emitter has a good thermal stability ( $T_d > 330$  °C,  $T_g > 160$  °C). Electrochemical Redox properties of the emitters were measured by cyclic voltammetry, and the energy gaps of highest occupied molecular orbital and the lowest unoccupied molecular orbital levels are in good agreement with the results of theoretical calculation. Furthermore, the multilayer electrochemical device with the emitter was fabricated and its properties were explored. The wavelength of electroluminescence for the device with this emitter locates at 428 nm. These results indicate the emitter as a deep blue-emitting material has promising application in organic light-emitting diode devices.

**Keywords:** Blue emitter, Property, Suzuki reaction, Naphthalene, Carbazole

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