NEW STRUCTURES TADF EMITTERS FOR THIRD GENERATION ORGANIC LIGHT EMITTING DIODES

Raminta Beresneviciute[1*], Saulius Grigalevicius[1], Gintare Krucaite[1], Dovydas Blazevicius[1], Mangey Ram Nagar[2], Jwo Huei Jou[2]

[1] *Department of Polymer Chemistry and Technology, Kaunas University of Technology, Kaunas, Lithuania*
[2] *Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, 30013, Taiwan*
** raminta.beresneviciute@ktu.edu*

Nowadays, there has been a lot of interest in third-generation organic light-emitting diodes characterized by thermally activated delayed fluorescence (TADF) [1]. This mechanism has been recently discovered and this is why the search for TADF materials and the formation of OLEDs using them are relevant in modern optoelectronics [2].

In this study, a new generation of electroactive compounds containing a 1,8-naphtalimide moiety were synthesized and characterized. These compounds were used in the emitting layers of organic light-emitting diodes as emitters. The structures of materials **1–3** are shown in Figure 1.

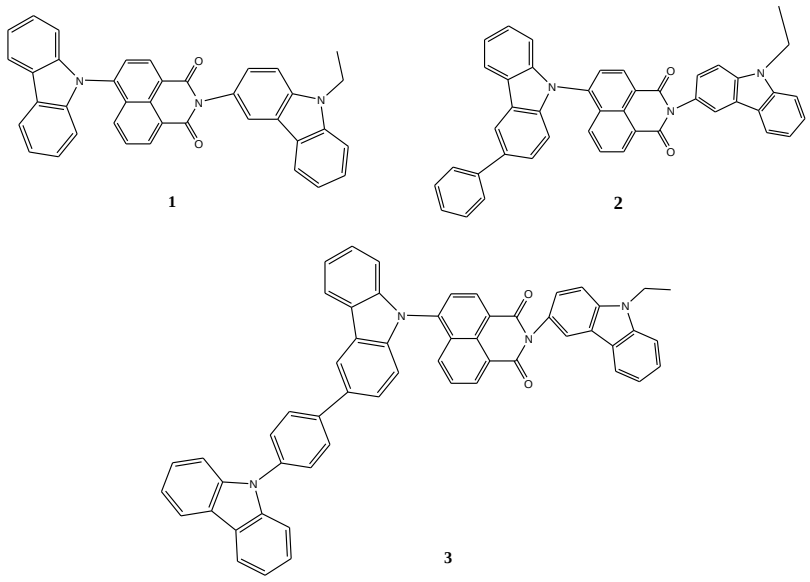

Fig. 1. Structures of compounds **1–3**.

The materials demonstrated high thermal stability (246-366 °C) and their glass transition temperatures ranged from 133 to 160 °C. The compounds have been tested as emitters in organic light emitting diodes with a commercial host of di(N-carbazolyl)biphenyl (CBP). Between all the prepared devices, the best prototype was OLED using CBP host in the emissive layer and 7.5% of N-(9-ethylcarbazol-3-yl)-4-{3-[4-(carbazol-9-yl)phenyl]carbazol-9-yl}-1,8-naphthalimide as TADF emitter. The device has demonstrated a maximum luminance of 2377 cd/m^2, achieved 10 cd/A current efficiency, 9 lm/W power efficiency and 2.39 % maximum external quantum efficiency.

Acknowledgements. The OLED materials were developed in the frame of project funded by the Research Council of Lithuania (grant No. S-LLT-19-2) and by MOST (Taiwan).

References

1. T. Huang, W. Jang, L. Duan. J. Mater. C. 2018,**6**, 5577-5596.
2. B. Wex, B. R. Kaafarani. J. Mater. Chem. C. 2017, **5**, 8622-8653.