TADF OLEDs with Circularly Polarized Luminescence

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Organic Light-Emitting Diodes (OLEDs) based displays have already entered the mass production market thank to their outstanding properties such as light weight, fast response time, low power consumption and wide color gamut. However, the request in the market continues to grow for lower cost and more efficient devices. Direct emission of circularly polarized light from OLEDs can improve the contrast of the OLED display [1] and simplify device architecture [2]. Circularly polarized luminescence (CPL) emitters represent an important family of molecule, where high syntheses yield, efficient CPL and dissymmetry factors are key challenges [3]. The development of thermally activated delayed fluorescence (TADF) materials for optoelectronic applications is an active area of recent research [4]. TADF emitters are a class of fluorophore that enable harvesting triplet states for fluorescent emission by a reverse intersystem-crossing phenomenon. This allows maximal emission efficiencies, especially in organic electroluminescent devices (OLEDs) that generate 75% triplet exciton.
We have recently developed a class of purely organic luminophore that combines CPL with TADF in a simple modular design [5]. This presentation will discuss the concept, preparation, and properties of this new class of molecules and present their application in OLED devices. The importance of the structure-property relationships will be also discussed.

This work was supported by National Grant LabEx Charm3at (ANR-11-LABEX-0039, CEA, Minority Biomedical Research Support (grant 1 SC3 GM089589-06), Henry Dresfus Teacher-Scholar and SJSU RISE program (NIH grant 5R25GM71381).

References

[1] R. Singh, K. N. N. Unni, A. Solanki and Deepak, *Optical Materials*, **34**, 716 (2012).
[2] M. Grell, M. Oda, K. S. Whitehead, A. Asimakis, D. Neher, and D.D.C. Bradley, *Adv. Mater.*, **13**, 577 (2001).
[3] E. M. Sanchez-Carnerero, A. R. Agarrabeitia, F. Moreno, B. L. Maroto, G. Muller, M. J. Ortiz, and S. de la Moya, *Chem. Eur. J.*, **21** 13488 (2015).
[4] Y. Tao, K. Yuan, T. Chen, P. Xu, H. Li, R. Chen, C. Zheng, L. Zhang, and W. Huang, *Adv. Mater.*, **26**, 7931 (2014).
[5] S. Feuillastre, M. Pauton, L. Gao, A. Desmarchelier, A. J. Riives, D. Prim, D. Tondelier, B. Geffroy, G. Muller, G. Clavier, and G. Pieters, *J. Am. Chem. Soc.,* **138**, 3990 (2016).