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Benzo[rst]pentaphene derivatives as building blocks for 2D material with intense ECL emission

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Planar and curved polycyclic aromatic hydrocarbons (PAHs) constitute a large class of organic molecules with an extended and delocalized π-system that provides interesting properties for optoelectronic [1] and energy storage applications [2]. In the framework of our recent work on corannulene oligomerization [3], we investigated a series of rationally designed benzo[rst]pentaphene (BPP) derivatives which, in principle, could lead to an extension of the aromatic π-system through an anodic oligomerization on the electrode followed by an electrochemically induced cyclodehydrogenation reaction.

In this study, we report the electrochemical characterization by cyclic voltammetry of a family of pristine and mesitylen-substituted mono- and dimeric BPP. The presence of bulky and non-linear side groups, as mesitylene (Mes), provides a more stable electrochemical behavior, as well as prevents the π-π stacking in solid state films, which is generally deleterious for light emitting devices (OLED) [4]. Furthermore, the interesting optical properties of BPP and derivatives have been investigated by electrochemiluminescence (ECL) in solution.

References

[1] Kim S. et al., J. Mater. Chem., 2008, 18, 3376-3384
[2] Bachman J.C. et al., Nat. Commun., 6, 7040 (2015)
[3] Bruno C. et al., Chem. Sci. 2021, 12, 8048-8057
[4] Cho H.J. et al., J. Mater. Chem. C, 2020, 8, 17289-17296

Figure

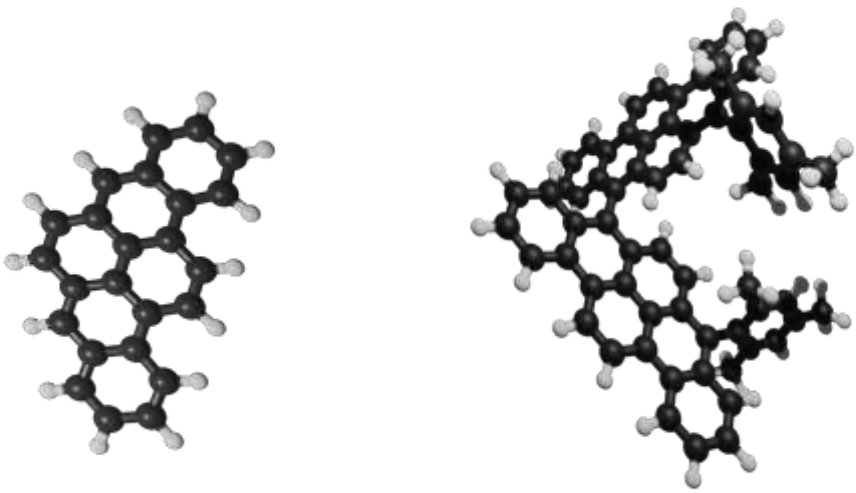

Figure 1: Molecular structure of BPP (left) and mesitylen-substituted dimer (right)