Synthesis and Mesomorphic Properties of Novel Acenequinone Derivatives

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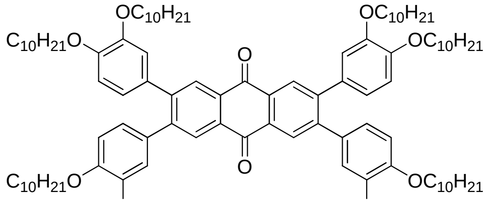
Anthraquinones are ubiquitous electron acceptors, making them potentially useful as n-type semiconducting materials. Self-organization of anthraquinones in the mesophase would facilitate charge transport through increased π stacking interactions. While anthraquinone derivatives are well known to form columnar mesophases,[1] most anthraquinone liquid crystals are prepared by selective alkylation of rufigallol. Consequently, there is an impetus for the synthesis of anthraquinone liquid crystals with distinctly different structures in order explore their mesomorphic properties.

Recently, larger acenequinones such as tetracenequinone and pentacenequinone have garnered attention for their potential utility as charge transporting materials.[2] However, liquid crystalline acenequinones based on tetracene and pentacene have received little attention. Here we present the synthesis and mesophase characterization of tetraaryl anthraquinone (**1**) and pentacenequinone (**2**), as well as dibenzopentacenequinone derivatives **3-6**. All of these compounds exhibit columnar hexagonal mesophases. For compounds **3-6**, electron-withdrawing substituents result in a higher clearing point, consistent with a stabilization of the mesophase.

The effects of structural variations on mesomorphic properties will be discussed, as well as the stacking arrangement of these compounds in the columnar phase.



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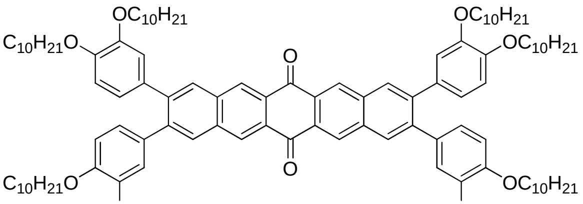

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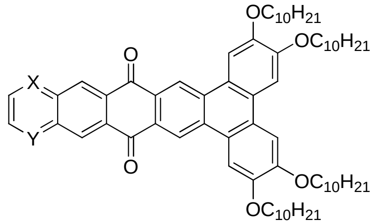
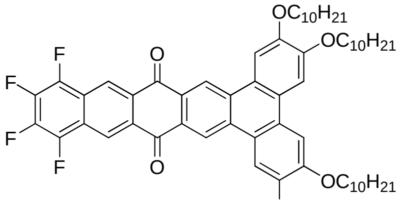


3 X = Y= CH
4 X = CH, Y = N
5 X = Y = N



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References:
[1] For recent examples: M. Mamada, J.-i. Nishida, S. Tokito and Y. Yamashita, *Chem. Commun.* **2009**, 2177; A. E. Murschell and T. C. Sutherland, *Langmuir*, **2010**, *26*, 12859; A. E. Murschell, W. H. Kan, V. Thangadurai and T. C. Sutherland, *Phys. Chem. Chem. Phys.*, **2012**, *14*, 4626.
[2] Z. X. Liang, Q. Tang, J. Liu, J. H. Li, F. Yan and Q. A. Miao, *Chemistry of Mater.*, **2010**, *22*, 6438; Q. Miao, *Synlett*, **2012**, 326.

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