

FULL PAPERS

苯并菲盘状液晶的合成、亲氟效应及分子对称性对介晶性的影响

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摘要 盘状液晶通过分子自组装形成高度有序的六方柱状液晶相, 可作为光导材料、有机发光二极管材料、光伏太阳能电池材料, 具有巨大的应用前景。本文报道对称和不对称取代的三烷氧基三己氧基苯并菲盘状液晶的合成, 并通过热台偏光显微镜、示差扫描量热仪、X-射线等手段对化合物的介晶性进行了研究。其中, 对称和不对称取代的三-(4,4,4-三氟丁氧基)-三己氧基苯并菲**5**, **9**比其无氟代对应化合物**6**, **10**具有较高的熔点和清亮点, 这意味着它们在形成柱状液晶相时存在“亲氟效应”, 并对柱状相具有稳定作用。苯并菲芳核周围有两种不同长度的烷氧链的化合物与只有一种烷氧链但总碳原子数相同的苯并菲盘状液晶相比, 有较低的熔点和清亮点。有较长烷氧链的化合物**14-17**在室温呈现柱状液晶相。

关键词 [苯并菲](#), [盘状液晶](#), [柱状相](#), [亲氟效应](#), [分子对称性](#)

分类号

Synthesis of New Triphenylene-containing Discotic Liquid Crystals and the Influence of Fluorophilic Effect and Molecular Symmetry on Mesomorphism

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Abstract New symmetrical and asymmetrical triphenylene-containing discotic liquid crystals with two different peripheral alkyl chains, known as *sym*-TP(OC₆H₁₃)₃(OR)₃ and *asym*-TP(OC₆H₁₃)₃(OR)₃, were synthesized. Their thermotropic liquid crystal properties were investigated through polarizing optical microscopy (POM), differential scanning calorimetry (DSC) and X-ray diffraction (XRD) analyses. The asymmetrical discogens are 2,6,11-trialkoxy-3,7,10-trihexyloxytriphenylenes, with the alkyl chain carbon numbers varying from 3—10, 12, and 14, while the symmetrical compounds are 2,6,10-trialkoxy-3,7,11-trihexyloxytriphenylene. Two fluoroalkoxy substituted triphenylene discogens, 2,6,10-tri(4,4,4-trifluorobutoxy)-3,7,11-trihexyloxytriphenylene and its asymmetrical isomer 2,6,11-tri(4,4,4-trifluorobutoxy)-3,7,10-trihexyloxytriphenylenewere prepared. These two compounds show higher melting and clearing points than their alkoxy analogs, which implies that fluorophilic effect exists in the formation and stabilization of discotic columnar mesophase. The triphenylene derivatives TP(OC₆H₁₃)₃(OR)₃ with two different peripheral chains, symmetrically or asymmetrically attached on triphenylene cores, have lower melting points and clearing points than those of the higher symmetrical compounds TP(OR)₆ with the same total chain carbon numbers. The mixed-chain-triphenylenes with longer alkoxy chains (*n*=9, 10, 12, 14) show columnar mesophase at room temperature.

Key words [triphenylene](#) [discotic liquid crystal](#) [columnar](#) [molecular symmetry](#) [fluorophilic effect](#)

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