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Liquid Crystals

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New smectic C mesogens containing the benzyl, phenylethyl or phenylpropyl moiety

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Online publication date: 19 May 2010

To cite this Article Tsai, Wen-Liang , Lee, Hui-Chen , Hong, Ming-Yung , Chen, Li-Nien , Hu, Mei-Yueh and Hsu, Fang-Ming(2004) 'New smectic C mesogens containing the benzyl, phenylethyl or phenylpropyl moiety', *Liquid Crystals*, 31: 2, 301 – 302

To link to this Article: DOI: 10.1080/02678290410001648688

URL: <http://dx.doi.org/10.1080/02678290410001648688>

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Preliminary communication

New smectic C mesogens containing the benzyl, phenylethyl or phenylpropyl moiety

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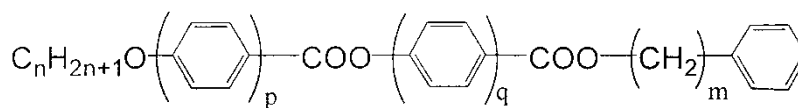
(Received 1 July 2003; accepted 27 October 2003)

A series of compounds, benzyl 4-(4'-alkoxybiphenyl-4-carboxyloxy)benzoates (**1–10**), and the two analogous compounds phenylethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**11**) and phenylpropyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**12**), were prepared. The compounds **6–12** exhibit a SmC phase in addition to other smectic phases. Compound **11**, exhibits a nematic phase.

In the course of our studies of the synthesis of ferroelectric liquid crystals we have synthesized the compound benzyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**8**), according to a published procedure of the Hull group [1]. A melting point of 95–99°C was reported for compound **8** in that work. But our primary DSC data suggest that this compound possesses mesogenic properties. After further analysis, we observed that compound **8** shows the phase sequence I–SmC–SmA–SmX–Cr; analytical data for compound **1** are as follows. ¹³C NMR (CDCl₃) 14.09, 22.64, 26.02, 29.22, 29.33, 31.79, 66.80, 68.13, 114.95, 121.81, 126.61, 126.90, 127.63, 128.17, 128.27, 128.36, 128.60, 130.76, 131.33, 131.76, 135.91, 146.24, 154.76, 159.61, 164.57, 165.68. MS *m/z* (relative intensity): 537(M⁺, 10.1). Elemental analysis for C₃₅H₃₆O₅: calc. C 78.36, H 6.72; found C 78.35, H 6.83%.

The benzyl group is a well known protecting group in organic and material chemistry. The work of Gray and Harrison [2, 3] has shown that it can be used as a terminal group in liquid crystal materials. Smectic phases without SmC phase were identified in those compounds synthesized. When a substituted benzyl group instead of benzyl group was used in those compounds, no SmC phase could be found [4].

In order to study the structural effect of terminal groups, benzyl and alkoxy groups, on the SmC phase formation, a series of homologous compounds and two analogous compounds of **8** were synthesized and investigated. Their structures and mesogenic data are shown in the figure and summarized in the table, respectively. The compounds **6–12** exhibit a SmC phase and other smectic phases. Compound **11** possesses an additional N phase. This structural effect was also



1–10 : $n=1-10$, $p=2$, $q=1$, $m=1$

11 : $n=8$, $p=2$, $q=1$, $m=2$

12 : $n=8$, $p=2$, $q=1$, $m=3$

Figure. Structures of compounds **1–12**.

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Table. Liquid crystal phases and phase transition temperature (°C).

Compound	I	N	SmA	SmC	SmX	SmE	Cr
1	•	149.3	•	130.6			•
2	•	182.2	•	118.3			•
3	•	174.8	•	127.4			•
4	•	176.3	•	110.1		•	100.1
5	•	170.7	•	99.5			•
6	•	165.3	•	100.0	•	91.0	•
7	•	159.2	•	117.0	•	79.2	•
8	•	156.1	•	114.1	•	69.2	•
9	•	151.1	•	116.1	•	54.1	•
10	•	150.6	•	115.9	•	64.9	•
11	•	207.5	•	125.7	•	97.0	•
12	•	153.3	•	121.1	•	83.1	•

been found in the results of Gray and Harrison [2, 3]. The temperature range of SmC phase varies from 9 to 62°C. Within the series of homologous compounds, the compound **9** has the widest SmC phase, up to 62°C. It also has the lowest thermal stability of the SmC phases.

In summary, benzyl alcohol, 2-phenylethanol and 3-phenyl-1-propanol can be used to provide terminal groups effective in the formation of liquid crystals exhibiting SmC phases. Further investigation on the preparation of homologues and analogues with a chiral centre are in progress.

We thank the National Science Council (Grant No. NSC 89-2113-M-017-005 and 90-2113-M-017-003) and

the Ministry of Education for financial support. The authors are grateful to Prof. N. Clark for reminding us of the early publications of G. W. Gray and his coworkers.

References

- [1] CHAN, L. K. M., GRAY, G. W., LACEY, D., SCROWSTON, R. M., SHENOUDA, I. G., and TOYNE, K. J., 1989, *Mol. Cryst. liq. Cryst.*, **172**, 125.
- [2] GRAY, G. W., and HARRISON, K. J., 1971, *Mol. Cryst. liq. Cryst.*, **13**, 37.
- [3] GRAY, G. W., and HARRISON, K. J., 1971, *Sym. chem. Soc. Faraday Div.*, **5**, 54.
- [4] COATES, D., and GRAY, G. W., 1975, *J. Phys. (Paris), Colloq.*, **1**, 365.