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Mesogenic properties of cycloalkylmethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate

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Preliminary communication

Mesogenic properties of cycloalkylmethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate

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Four analogous compounds, cyclohexylmethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**2**), cyclopentylmethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**3**), cyclobutylmethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**4**) and cyclopropylmethyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate (**5**) were prepared. They all exhibit SmA, SmC and SmX phases.

Recently we have pointed out that benzyl 4-(4'-octoxybiphenyl-4-carboxyloxy)benzoate, compound **1**, has the phase sequence I–SmA–SmC–SmX–Cr [1]. It is important and interesting to know the ring structure effect of the terminal benzyl group on the formation of the SmC phase. Therefore, four analogous compounds **2–5** of compound **1** were prepared and studied.

Their structures and mesogenic data are shown in the figure and summarized in the table, respectively. They all possess SmA, SmC and SmX phases. The temperature ranges of the SmA and SmC phases are extremely wide: 33–91°C for the SmA phase and 30–79°C for the SmC phase. While the compounds with the three- or four-membered rings have the widest SmA phase, those with the five- or six-membered rings has the widest SmC phase. The structure of the cycloalkyl ring in compounds **2–5** does not affect the formation of the SmC phase, although both ring size and ring strain of these cycloalkyl rings vary widely.

Gray and Harrison have also used cyclohexylmethyl alcohol to provide the terminal group in liquid crystal materials [2]. Their results indicated that compounds containing this terminal group exhibit either pure nematic or pure smectic mesophases. However, no detailed smectic subphases were seen.

To summarize, cyclohexylmethanol, cyclopentylmethanol, cyclobutylmethanol and cyclopropylmethanol

can be used to provide terminal groups effective for the formation of liquid crystals exhibiting SmC phases. Further investigation of the preparation of homologues and analogues is in progress.

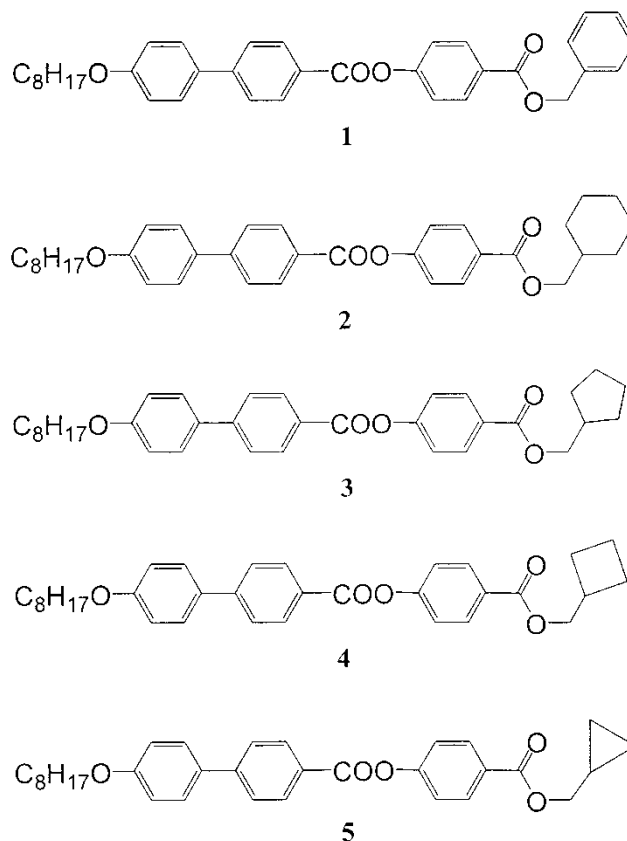


Figure. Structures of compounds **1–5**.

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

Compound	1	SmA	SmC	SmX ₁	SmX ₂	Cr					
2	•	173.1	•	140.2	•	61.5	•	25.1			•
3	•	181.8	•	125.1	•	46.3	•	34.8			•
4	•	194.1	•	125.6	•	69.7	•	35.1			•
5	•	200.1	•	109.4	•	79.7	•	54.4	•	48.2	•

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