Influence of molecular structure on ferro- and antiferroelectric properties of liquid crystals

Monika Marzec

Institute of Physics, Jagiellonian University, Reymonta 4, 30-059 Kraków, Poland

The aim of this work is to analyze how the molecular structure influences ferro- and antiferroelectric properties of liquid crystals. Physical properties of several chiral compounds, analogues of the first known antiferroelectric liquid crystal MHPOBC [1], will be presented. Molecular structures of two series studied are presented in Figure 1. The rigid core of both series is identical but the side chains are interchanged what causes different coupling of the net dipole with the chiral centre and has a great impact upon dielectric and electrooptic behaviour.

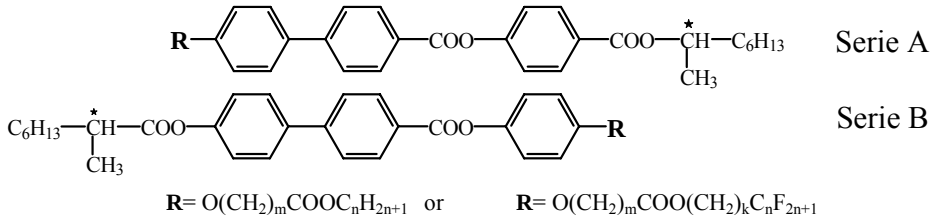

Fig. 1 Molecular structure of two series of compounds studied

Different experimental methods have been applied to study properties of the compounds. Using DSC calorimetry method the phase transition temperatures could be obtained [2]. Texture observation by means of the polarizing microscopy allowed to identify liquid crystalline phases and establish the transition temperatures as well [3]. Spontaneous polarization measurements versus temperature gave an answer into the question what kind of the transition is between ferro- and paraelectric phases [4]. Based on dielectric spectroscopy data the molecular and collective dynamics of different phases is discussed [5].

References

(1) A. D. L. Chandani, E. Górecka, Y. Ouchi, H. Takezoe, A. Fukuda, *Jpn. J. Appl. Phys.* **1989**, *28*, L1265

(2) T. Hatakeyama, F.X. Quinn, *Thermal Analysis*, *J. Wiley & Sons Ltd, Chichester, England,* **1999**

(3) I. Dierking, *Textures of Liquid Crystals, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim,* **2003**

(4) F. Gieβelman, in *Selforgnization in chiral liquid crystals*, *Scientific Publishers OWN, Poznań*, *Edt. W. Kuczyński*, **1997**, 7-34

(5) M. Marzec, A. Mikułko, S. Wróbel, W. Haase, in *Dielectric Properties of Liquid Crystals*, *Transworld Research Network*, *Edts. Z. Galewski, L. Sobczyk*, **2007**, 83-101