This article was downloaded by: [Tomsk State University of Control Systems and Radio]

On: 23 February 2013, At: 04:26

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office:

Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Molecular Crystals and Liquid Crystals

Publication details, including instructions for authors and subscription information:

http://www.tandfonline.com/loi/gmcl16

Another Type of "Discotic Phases"

H. Kelker ^a & U. G. Wirzing ^a

^a Hoechst AG Frankfurt (M), Germany

Version of record first published: 20 Apr 2011.

To cite this article: H. Kelker & U. G. Wirzing (1979): Another Type of "Discotic Phases", Molecular

Crystals and Liquid Crystals, 49:6, 175-177

To link to this article: http://dx.doi.org/10.1080/00268947908070456

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: http://www.tandfonline.com/page/terms-and-conditions

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Mol. Cryst. Liq. Cryst. Vol. 49 (Letters), pp. 175-177 © 1979, Gordon and Breach Science Publishers Ltd. Printed in the United States of America

ANOTHER TYPE OF "DISCOTIC PHASES"

H. KELKER, U.G. WIRZING Hoechst AG Frankfurt (M), Germany

(Submitted for publication December 15, 1978)

Typical properties of "discotic phases" as a type of mesophase have been reported by Billard, ¹ Chandrasekhar² and others. ³ Whereas Chandrasekhar does not refer to the optical sign of a uniaxial oriented phase of those disc-like molecules, Billard stated clearly that such a "discotic phase" shows optical negative double refraction, this being a typical feature of this texture. The substance was, as in the case of Chandrasekhar, a monomolecular compound (alkoxy derivatives of triphenylene). ³ We recently found, when inspecting a series of polymeric mesophases of the type

that is some cases an optical negative character of the mesomorphic phases appeared. However, only a few members of this new class of compounds, synthesized by Ringsdorf et al. were of the optical negative type. A typical example is the polymer with n=2 and R=0CH $_3$. The substance has a relatively sharp transition point at 100° C, a mesophase being formed, which has been designed as "nematic" by Ringsdorf et al. (see table).

Under the heating microscope, between glass slides and with crossed Nicols, this mesophase shows the typical droplets and interference patterns that resemble a nematic phase. Spherulites exhibited an optical positive character under orthoscopic conditions and using a half wavelength plate.

Heating to higher temperatures (>~130°C) leads to the vanishing of spontaneous double refraction. Within the mesomorphic range and applying pressure, homeotropy with a negative sign could be induced. This state was conserved completely if the sample was cooled down, a pseudomorphosis of the uniaxial mesophase texture being formed.

			1 77 1			
Substance Nº.	ance n =	N CC	phases, note 1) transitions	p	Opt.character of droplets (Orthoscopic, obeserv.)	Opt. char, of the homoeotro- pic phase (Conoscopic observ.)
Ξ	و		sm 164 n 184 i	ı	1	+
[5]	2	-осн ₃	g 100 n 121 i	2,3	+	-
(3)	9	-0-CH ₃	g 95 n 105 i	2,1		+
(4)	Copolymer with (2) and a chiral group:	# &	g 180 ch >230 i	to be published by Ringsdorf et. al.	+	ı
(5)	9	-0C ₆ H ₁₃	g 60 sm 115 i	15,5		none
(9)	3	-C ₆ H ₁₃	g∼100 sm 120 i	8′9	1	none
6	9	-сн ₃	g √ 70 n 84 i	1,3	+	1

phase designations, transition temperatures and enthalpy values for the transition mesophase/isotropic phase as given by Ringsdorf et. al.
g: glassy; n: "nematic"; sm: "smectic"; i: "isotropic"; ch: "cholesteric"

This way, glassy samples of about 10-50 μ m thickness are easily prepared, which show a perfect homogeneity of negative uniaxial character (conoscopic conditions, $\lambda/2$ -plate being used).

The behavior resembles strongly a "discotic" phase but also to the well known transformation phenomenon of an "undisturbed" focal conic cholesteric texture into the Grandjean texture by touching the cover slide. Like the Grandjean texture the new phase formed by applying pressure, shows negative double refraction, but there is no optical activity. In the case of substance (4) an optical active typical Grandjean cholesteric phase texture is formed.

Other "Ringsdorf polymers" being inspected in the same manner showed different behavior which can be summed up as follows:

A negative uniaxial mesophase being conserved in the glassy state and persistent at room temperature could be produced with substance Nos. (2), (4), and (7); Nos. (1) and (3) yielded glasses with positive sign (see table). Nos. (5) and (6) did not give double refracting glasses, but solidified under pressure forming microcrystalline phases.

We shall not speculate about possible relations between constitution and optical behavior. More experimental work is necessary and being done in close cooperation with the Rings-dorf Group.

REFERENCES

- J. Billard, J.C. Dubois, Nguyen Huu Tinh, and A. Zann, Nouveau J. de Chimie, 2, 535 (1978).
- S. Chandrasekhar, B.K. Sadashiva, and K.A. Suresh, Pramana, 9, 471 (1977).
- Nguyen Huu Tinh, J.C. Dubois, J. Malthete, and Ch. Destrade, C.R. Acad. Sc. Paris, t. 286 (1978) Série C, 463.
- 4. H. Finkelmann, M. Happ, M. Portugal, and H. Ringsdorf, Makromol. Chem., 179, 2541 (1978).