

VISCOUS CHIRAL COMPOUNDS AS THE BASIS FOR THE DEVELOPMENT OF COMPOSITIONS FOR FAST-SWITCHING LCD'S

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Until now, the establishment of effective high-speed liquid crystal display units is limited by low speed of reorientation of nematic liquid crystal material (the time of the reorientation is not less than 8 ms), as well as the lack of a stable orientation of the known ferroelectric liquid crystal materials in the devices. Usage of ferroelectric liquid crystal materials as a working environment allow to create LCD displays with a total switching time of not more than 400 microseconds. However, in this case there was an unresolved problem of the lack of a stable orientation in time and its destruction by even a slight mechanical action.

We achieved the desired result by solving the following tasks:

- a new approach was proposed to the creation of defect-free ferroelectric LC materials stable to mechanical and thermal influence at the expense of establishing the boundary conditions between the visco-elastic properties of the non-chiral and chiral compounds, on the basis of these investigations a model of the formation of highly ordered layers on the basis of these materials was created [1-2];

- time of reorientation of molecules in the liquid crystal devices, depending on the nature of chiral molecules and their helical twisted power, the anchoring energy and pretilt angle of the alignment materials was observed experimentally and simulated by numerical calculation. The features of changes in their optical and electro-optical properties were discovered;

- new chiral nematic compositions were developed and a new effect based on them, which allows to reach time-off less than 1ms was studied. Their electro-optical characteristics were investigated.

[1] V. Lapanik, V. Bezborodov, A. Minko, G. Sasnouski, W. Haase, A. Lapanik. Defect-free FLC's with high optical quality based upon new FLS's, *Ferroelectrics*, vol.344, pp.205-211, 2006.

[2] V. Lapanik, V. Bezborodov, S. Timofeev, W. Haase. Shock-free ferroelectric liquid displays with high optical contrast, *Applied Physics Letters*, vol.97, pp.251913-251916, 2010.