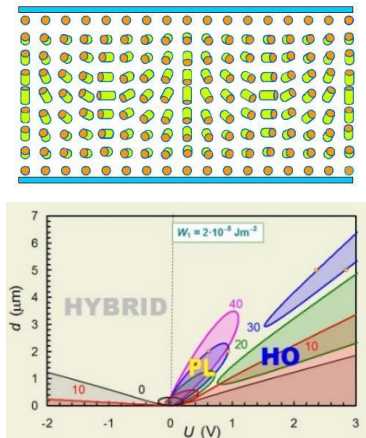
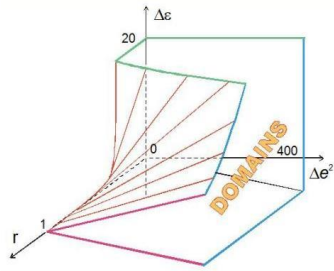




POLISH NATIONAL AGENCY  
FOR ACADEMIC EXCHANGE



STER  
PROGRAMME

<p>name of the unit:</p> <p style="text-align: center;"><b>LIQUID CRYSTALS PHYSICS GROUP</b></p> <p style="text-align: center;">Institute of Physics, Lodz University of Technology</p>		<p>symbol:</p> <p style="text-align: center;"><b>I-71</b></p> <p style="text-align: center;"><a href="https://www.fizyka.p.lodz.pl/en/">https://www.fizyka.p.lodz.pl/en/</a></p>
<p>head of the unit:</p> <p style="text-align: center;">Mariola Buczkowska PhD, DSc, TUL Prof.</p>	<p>potential promoters:</p> <p style="text-align: center;">Mariola Buczkowska, PhD, DSc, TUL Prof.</p>	<p>contact person:</p> <p style="text-align: center;">Mariola Buczkowska PhD, DSc phone: 48-42-631-39-67 mariola.buczkowska@p.lodz.pl</p>
<p>scope of activities:</p> <p>The subject of scientific activity is physics of liquid crystals. Works concerns the electric field induced deformations of director field occurring in layers of nematic liquid crystals. The interactions of liquid crystals with external electric field are due to dielectric anisotropy as well as to flexoelectric properties. The elastic deformations arising under the action of electric field are fundamental for applications in liquid crystal devices. The deformations of nematic layers are described by a set of complicated nonlinear differential equations which cannot be resolved analytically. Therefore the numerical methods must be used. Such approach allows to check the role of parameters from wide ranges which can indicate new fields of syntheses and experimental investigations. The results of such computations yield information which is impossible or difficult to achieve in real experiments or theoretical consideration.</p>		
<p>present activities:</p> <p>Research concern one- and two-dimensional deformations of director field as well as changes of optical transmission of liquid crystal layers. Effects of this kind are fundamental for every application of liquid crystals. Numerical models used for simulations are based on continuum theory which is very well confirmed by experiments. They take into account the charge transport in nematic material and flows of nematic liquid connected with deformations. The aim of numerical simulations is to find out what is the influence of parameters (e.g. dielectric anisotropy, flexoelectricity, ion concentration, anchoring strength) on elastic, rheological, electrical and optical properties of nematic layers.</p>		
<p>future activities:</p> <p>The aims of research as follows:</p> <ul style="list-style-type: none"> <li>• complex investigations of influence of chosen material parameters of liquid crystals on the elastic deformations of nematic layers occurring under the action of electric field,</li> <li>• obtaining the results which are useful as indications what properties should a nematic material possess to be suitable for practical applications,</li> <li>• checking, what possibilities are offered by the nematics possessing flexoelectric properties in the field of applications of electro-optic effects.</li> </ul>		
<p>publications/patents, awards, projects:</p> <ul style="list-style-type: none"> <li>• M. Buczkowska: Influence of parameters on flexoelectro-optic effect in cholesteric liquid crystals, Acta Physica Polonica A, 140, (3) 258-264 (2021). DOI: 10.12693/APhysPolA.140.258</li> </ul>		



POLISH NATIONAL AGENCY  
FOR ACADEMIC EXCHANGE



STER  
PROGRAMME

- M. Buczkowska: Spatially periodic deformations in hybrid aligned flexoelectric nematic layers, Liquid Crystals, published online: 27 Jul 2021, DOI: 10.1080/02678292.2021.1957165
- M. Buczkowska, M. Szmigielski: Spatially periodic patterns of flexoelectric origin in twisted nematic layers with negative dielectric anisotropy, Liquid Crystals, 48, (4) 537-541 (2020) DOI: 10.1080/02678292.2020.1794068

keywords:

deformations of nematic liquid crystals, flexoelectric properties, optical transmission, numerical simulations

list of internship proposal in this research team:

Simulations of static structures as well as dynamics of them.

Research of optical transmission of nematic liquid crystal layers.