

## ON LIQUID CRYSTALS AND LIQUID CRYSTAL DISPERSIONS

Doina MĂNĂILĂ-MAXIMEAN<sup>1</sup>, Viorel CÎRCU<sup>2</sup>

**Rezumat.** *Aceast articol de tip „short review” prezintă câteva aspecte importante ale cristalelor lichide și compozitelor cu cristale lichide. Sunt prezentate metodele de preparare a filmelor cu cristale lichide cu polimer dispersat (PDLC), structura rezultată și utilizarea lor principală ca valvă optică. În ultimul deceniu, domeniul a cunoscut o revitalizare accentuată, datorită nanodopajului, care are ca rezultat o îmbunătățire a performanței în lucru ale dispozitivelor.*

**Abstract.** *This short review paper presents some important aspects of liquid crystal and liquid crystal composites. Preparation methods of polymer dispersed liquid crystal films (PDLC), the obtained structure and their main application as light valve are shown. In the last decade, the field has experienced a sharp revitalization, due to nanodoping, which results in an improvement in work performance.*

**Keywords:** liquid crystal composites, crystals, nanoparticle doped composites; polymer dispersed liquid crystals, encapsulated liquid crystals

**DOI** <https://doi.org/10.56082/annalsarscipphyschem.2022.1.88>

### 1. Introduction in liquid crystals

When the external conditions vary (temperature, electric and / or magnetic fields), many substances, mainly organic, do not have a single transition between solid and liquid, but a series of transitions. There are states with intermediate properties of crystal and liquid. They were first discovered by Reinitzer [1], were called liquid crystals (LCs) by Lehman [2] and Friedel introduced thy mesomorphic terminology [3]. Reference works in the field of liquid crystals belong to the authors: V. Freedericksz and V. Zolina [4], P. Oswald, P. Pieranski [5], I.C. Khoo [6], M. Maier and A. Saupe [7], P.J. Collins and M. Hird [8], L. Blinov [9], D. Demus, L. Richter [10], S. Chandrasekar [11], Pierre-Gilles de Gennes (Nobel Prize 1991) [12], Yang and Wu [13].

A crystal is characterized by a regular succession of basic units: atoms, ions or molecules, in a periodic three-dimensional network. LCs are characterized by the presence of an orientational order of molecules and by the total or partial absence of the positional order, as presented in Figure 1, while plastic crystals are characterized by the presence of positional order and the absence of orientational order.

---

<sup>1</sup>Prof., Department of Physics, University “Politehnica” of Bucharest, Bucharest, Romania, (doina.manaila@upb.ro).

<sup>2</sup> Prof., Department of Inorganic Chemistry, University of Bucharest, Bucharest, Romania, (viorel.circu@chimie.unibuc.ro)