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Editorial

Patterned-Liquid-Crystal for Novel Displays

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The "Patterned-Liquid-Crystal for Novel Displays" is a Special Issue focused on new insights and explorations in the field of liquid crystals arranged in a periodic patterned way. Recent advances in patterning methods allowed development of fine structures that can be used for building up novel optical elements based on liquid crystal materials. The possibility to develop compact elements efficiently manipulating the optical phase makes liquid crystals highly attractive for the construction of new kinds of display devices, including AR/VR/mixed reality as well as head-up displays.

This Special Issue aims to present various aspects of research in the field of pattern-aligned liquid crystals and their application in novel display systems., i.e., to generate a new LC alignment pattern by applying SLM, to explore the applications of novel LC devices in near-eye displays, to mathematically show LC molecular dynamic simulations, to combine LC with nanoparticles, and to investigate novel materials for fast response time and high stability.

Researchers from Austria, China, France, South Korea, Spain, Taiwan, the UK, and USA have contributed to this Issue. Below you will find eight original articles and one review paper devoted to theoretical and experimental research works:

P. Oswald [1] provided an interesting review on the study of dynamical properties of dislocations in Smectic A LC film using a mathematical model and experimentally. The dislocation mobility in LC cells as well as in free-standing film was studied for pure and nanoparticle-doped Smectic A.

C.P. Chen et al. [2] prepared a PDLC device with LC droplets of uniform size via membrane emulsification technology. This new approach allowed the improvement of properties of transmissive colorfilterless PDLC display.

J. Ignés-Mullol with their colleagues [3] studied the formation of stable and metastable states in chromonic nematic droplets. Under a magnetic field, they can form patterns of nematic gems that can exist after the field is switched off. Additionally, the influence of rotating field and boundary conditions onto LC director distribution is described.

Q. Yang et al. [4] described the physical properties of a new LC mixture for LCOS spatial light modulators application featuring fast switching. With no sign of photodegradation, it withstands total dosages exceeding 400 MJ/cm^2 at a wavelength of 465 nm.

J. F. Algorri and colleagues [5] demonstrated an approach of shaping the electrodes for the design of adaptive-focus LC phase lens built with patterned transparent electrodes. The simulated shape of the driving electrodes onto the electric field distribution reveals a simplified approach to the versatile design of new LC lenses.

G. López-Morales et al. [6] performed a Mueller matrix imaging analysis of two commercial optical components usually employed to generate and manipulate vector beams—a radial polarizer and a liquid-crystal q-plate. The estimation of the sophisticated optical component quality is useful both for manufacturers and users.

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Using polarizing optical microscopy P. Bao et al. [7] studied the director fields adopted by nematic liquid crystals confined by the surface with modulated surface energy to form long thin stripes. The director field at various top surface boundary conditions is reconstructed from the images.

Z. He and co-authors [8] designed Dammann grating capable of improving the near-eye display uniformity and efficiency. The enlarged eye-box strongly enhances the usability of the Maxwellian view display for AR/VR/MR displays which is demonstrated by the prototype.

Using molecular dynamic simulations G. P. Shrivastav [9] studied self-assembly of magnetic nanoparticles in an LC field at equimolar approximation. The author showed that at some densities the nanospheres form chains were aligned by the LC director field. Despite this, the macroscopic magnetization of the mixture remains very low.

We believe that this collection of papers will bring inspiration to *Crystals* readers for further research work in patterned liquid crystal devices and potential applications.

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