The 15th European Conference on Liquid Crystals took place in a lovely town of Wrocław from June 30 till 5 July 2019 (Figure 1). This traditional Conference dates back to 1991 and serves as a forum for the dissemination of ideas in the interdisciplinary field of liquid crystals and soft anisotropic materials. This year, the Conference was chaired by Professor Marzena Tykarska from the Military University of Technology with professor Wiktor Piecik and professor Przemysław Kula as co-chairmen. It was a very successful Meeting, indeed. More than two hundred participants from 31 countries attended and contributed to the program with their presentations, lectures and posters (Figure 2).

With five plenary talks and fifteen invited talks, the program was most engaging. It covered a broad spectrum of interdisciplinary areas from the synthesis of liquid crystals to optical and photonic properties and applications in industry, biology, and medicine.

The first day followed by the Opening ceremony, Małgorzata Kaczmarek from the University of Southampton started the first session delivering a talk on smart, hybrid liquid crystal devices. A very inspiring report explored emerging device technologies for nanoelectromechanical systems with liquid crystals. Application of semiconductors and photo-switchable liquid crystals opens the door to great opportunities to design multifunctional hybrid devices such as self-activated modulators as demonstrated in the presentation.

The first session continued on physical properties, including elasto-caloric effect in LC elastomers, complex dynamics in the electro-convection in Hall 1. In the lecture Hall 2, the optical properties of liquid crystals were discussed. In particular, starting with the report on novel optical properties of LC/polymer films (Timothy Bunning), the session continued with the reports on the photo-induced anchoring transitions in cholesteric microdroplets (Sergey Shvetsov).

The second session started with an inspiring talk by Victor Reshetnyak on tuning Tamm plasmons using cholesteric liquid crystals electro-optical and flexoelectric-optical effects, fast-response electro-plasmonics and complex re-orientation of the LC during photoalignment. Among the highlights of the evening session, were the presentations by Evaggelia Zavvou on the dielectric properties relationships in the nematic phases of cyano-biphenyl dimers, a talk by Nándor Éber on light-tunable gratings based on flexoelectric effect and a presentation by Alessandro Pianelli ‘Visualization and characterisation of the switching process in dye-doped dual-frequency nematic mixtures’.

In the evening many participants attended two interesting tutorial lectures delivered by experienced scientists. The first tutorial presented by Mikhail Osipov was devoted to the molecular theory of liquid crystal ordering in rod-coil diblock copolymers. The next tutorial presented by Slobodan Žumer was about the topological soft matter, which leads from confined and colloidal nematics to blue phases.

The second day of the Conference was devoted to chirality and polarity in various liquid crystalline systems. It started with the plenary talk by Frank Gießelmann on new aspects of chirality in lyotropic crystals where various chiral structures were demonstrated in confined lyotropic nematics. The role of chirality in determining the character of the topological defects was particularly impressive. Slobodan Žumer gave a detailed overview ‘Half-skymion lattices in blue phases confined to thin layers by uniform and patterned surfaces’ and Samo Kralj on topological defects in nematic liquid crystals. Maria Helena Godinho demonstrated an exciting aspect of actuating chirality via humidity in her talk ‘Twist-bend cellulose-based ribbons’. Michal Kohout presented in his talk how important are enantiomeric impurities on the physical properties of chiral liquid crystals.

Twist-bend nematic phase is another hot topic on the current chiral-LC research. Christopher Blanc discussed the relation between anchoring conditions and the periodic striped pattern observed in the twist-bend nematic phase. The invited talk by Antal Jáklí stood out for its unusual combination of ionic conductivity and elastomeric matrix. Tony demonstrated how the presence of ionic liquids in an LC elastomer results in a low voltage driven bending of elastomeric beams. The luminescent properties of the liquid crystals were presented by José Luis Serrano in his talk ‘Semiconductor and luminescent materials based on supramolecular liquid crystal organisations’.

Wednesday appeared to be one of the busiest days of the Conference. It started with a stimulating scientific program followed by exciting excursions and the conference
dinner. Lech Longa began the scientific program with his plenary talk on mesoscopic theories and simulations of the nematic structures related to the twist-bend nematic phase. His presentation described the formation of the NTB phase and the spontaneous breaking of the chiral symmetry in great detail using the mesoscopic Landau-de-Gennes theory. One of the most interesting points was the predictions of novel nematic-like structures.

The dielectric losses at the cell electrodes often restrict the application of dielectric spectroscopy in liquid crystals. Paweł Perkowski demonstrated a method to account for the dielectric properties of the cell and drastically expand the measuring range in various types of cells. This technique will undoubtedly be highly demanded by many experimentalists studying polar and dielectric properties of liquid crystals.

The session followed with application-related talks. Efhtima Ramou demonstrated the application of LC-gels as gas sensors for molecular recognition. In her studies, LC-gel droplets readily responded to the level of gas concentration in the environment. Moreover, from the character of the optical response, she succeeded to determine the type of gas using machine-learning techniques.

Photonic and photoswitching properties of liquid crystals and LC elastomers were discussed in the presentations by Yan-Song Zhang, Jarosław Myśliwiec, Mirosław Karpierz. Piotr Wasylczyk demonstrated light-driven soft robots based on photo-switchable LC-elastomers.

An unusual twist in the studying semiconducting properties of LCs was demonstrated in the talk by Masahiro Funahashi. He showed electronic transport in

Figure 1. Streets of Wroclaw (with a new generation of soft matter researchers).

Figure 2. A group-photo of the attendees.
a ferroelectric LC exhibiting the anomalous photovoltaic effect where the internal electric field produced by the spontaneous polarisation in the LC promotes the generation and transport of photocarriers.

The highlight of the afternoon was the visit to the Wrocław University Hall. The reception was given by the Rector of the University professor Adam Jeziwerski in "Oratorium Marianum". This was a concert hall in the time (before the University of Wrocław) when the building belonged to the Jesuit Academy. Not only did Professor Adam Jeziwerski take us on an unforgettable tour around the building, but he also performed a piece of Bach on the organ. Magnificent "Aula Leopoldina", located on the top floor, was built in the eighteenth century to the honour of the emperor Leopold I of the House of Austria, King of Hungary and Bohemia who founded the University in 1702. The reception was followed by the lecture of Professor Paweł Pierański "Story of Liquid Crystals in Poland". The history of liquid crystal studies by Polish scientist began at the beginning of the XX century. This year, the prestigious Freederiksz Medal of the Russian Liquid Crystal Society was awarded to Professor Slobodan Žumer for his contribution in the field of Physics of Liquid Crystals (Figure 3).

After the awarding ceremony, we were taken on a lovely tour around the old streets of Wrocław. Although the trip was a bit lengthy, many of us could enjoy local beers and food in cosy pubs. A gorgeous dinner on a river cruise boat culminated this evening.

Thursday started with the topic of chirality and its manifestation on different levels of self-organisation in the opening talk by Ewa Górecka. This took us inevitably to the twist-bend phases: nematic and not only. Nataša Vaupotić continued this topic, demonstrating complex heliconical structures of smectic phases formed by achiral mesogens. A bit more complexity on the chemical side came from Matthias Lehmann who talked about nanosegregation and space-filling driving self-assembly. He used intrinsic voids as a design tool to create complex LC structures. In the last few years, there was a growing interest in understanding the interactions between liquid crystals and living organisms. Active systems, biosensors, medicine-related applications is a very dynamic field of research. Tigran Galstian, in his talk, gave a very inspiring overview of current activities in this area and his on-going work exploring the mechanisms of the sensitivity of liquid crystals to various stimuli.

The ability to easily manipulate the optical properties of liquid crystals make them promising for applications in optics. A ‘smart’ lens is perhaps one of the essential devices needed in everyday life in mini-cameras or adaptive contact lenses. But the design of tunable LC lenses is not simple. José Manuel Otón, in his lecture, showed a liquid crystal spiral diffraction lens developed in his lab with independent azimuthal and radial phase-wrapping.

The rest of the talks were devoted to various nanocomposite materials. Cellulose nanocrystals (CNC) were intensively discussed at the Meeting. Susete Fernandes showed how to control the optical response of millimetric drop-casted CNC films by adjusting the substrate wettability and drying condition with successful suppression of the coffee-stain effect. Dispersion of CNCs in ferroelectric bent-core liquid crystal results in the formation of helical microstructures as demonstrated in the presentation by Rafaela da Rosa.

A magnificent Conference Dinner concluded the scientific program of Thursday.

The last day of the Conference was highlighted by several talks on applications of liquid crystals. Kristiaan Neyts discussed differences between LCD and OLED.
technologies and recent advances in both technologies. The effect of the LC matrix on self-organisation of quantum rods was presented in the talk by Tetiana Dudka. Dispersions of carbon nanotubes (CNTs) in a nematic matrix attracted much scientific attention for their perspective applications in displays and sensors. The character of the matrix and the type of CNTs strongly influences the orientation transfer between the nematic host and CNTs. Giusy Scalia, in her talk, discussed alignment aspects of CNTs in nematics and showed how the CNT networks could be useful in display and sensing applications.

The talk by Fumito Araoka stood out in his session. He demonstrated motile solitons in planarly aligned nematic cells which are generated by the application of AC voltage. He proposed an idea that the frustration caused by the positive dielectric and negative conduction anisotropies is responsible for the generation of these structures.

With many engaging and inspiring talks, the 15th European Liquid Crystal Conference in Wroclaw was undoubtedly a big success both in scientific content and organisation. In particular, the contributions from young scientists determined the innovating character of the Meeting. Three oral presentations: ‘Giant electrocaloric response in smectic liquid crystals with direct smectic-isotropic transition’ by Eva Klemenčič (University of Maribor), ‘Reflective flat optical components using photo-patterned chiral liquid crystal’ by Migle Stebryte (Ghent University), ‘Liquid crystal trimers and tetramers exhibiting twist-bend nematic behavior’ by Ewan Forsyth (University of Aberdeen) and three posters: ‘Lyotropic liquid crystals of biological significance doped with anisotropic gold nanoparticles’ by Dominika Benkowska (Wroclaw University of Science and Technology), ‘New Hybrid Nanosystems Including Silver Nanoparticles and Cholesteric Ligands and Their Physico-Chemical Properties’ by Yana Gromova (Moscow State University), ‘Ultra performance chromatographic methods for optical purity control of chiral liquid crystals’ by Petra Vaňkátová (Institute of Physics, Czech Academy of Science) were awarded with generous Prizes sponsored by Military University of Technology Warsaw (Figure 4).

At the closing ceremony, Wei Lee shortly summed up the ECLC 2019 and thanked the organisers for such a fruitful conference. We are looking forward to meeting again in 2021 at the next ECLC.

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