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Special Issue Reprint

Polymeric Liquid Crystals and Applications

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This Reprint compiles key research articles on polymeric liquid crystals, focusing on their synthesis, characterization, and innovative applications. Liquid crystal polymers combine the self-organization of mesogens with the mechanical integrity of polymers in order to produce materials with stimuli-responsive, optical, and mechanical functionalities. The contributions explore auxetic elastomers, photonic sensors, molecular design, and fabrication techniques, hence revealing an interdisciplinary potential for LCPs in smart materials, sensing, and advanced manufacturing.

The included studies investigate the molecular relaxation dynamics and strain response of auxetic liquid crystal elastomers, present a porous cholesteric polymer film for selective alcohol sensing, and examine how molecular core orientation and heterocycles influence mesophase behavior using experimental and computational approaches. Other works demonstrate the microfabrication of aligned liquid crystalline fibers through spatial confinement, review biological applications of LCEs, introduce solvent-free synthesis methods for Schiff base liquid crystals, and explore LCE-based photoelastic strain sensors with high sensitivity. Further research presents hydrogel-dispersed liquid crystals as a platform for detecting heavy metal ions in water. Collectively, these studies showcase the versatility and promise of polymeric liquid crystals in modern technology and materials science.

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