

Liquid crystal microstructures for multi-degree optical field modulation

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Liquid crystals (LCs) have proven their practicality in information displays, yet their adoption into other information technologies remains hindered by three major challenges: the precise construction of microstructures, high-dimensional optical field manipulation, and the extension of working bands and functionalities. To address these issues, we have developed a photo-patterning technique and proposed a biphasic-associated topological evolution, which overcomes the difficulty of precisely constructing entropy-driven LC organizations. Furthermore, we have established a mapping relationship between LC hierarchical structures and optical field parameters, enabling independent modulation of separate degrees of freedom of light. The working band has been extended to the infrared and terahertz regions, and new LC elements have been developed for applications such as beam steering, optical encryption, and green energy. These works pave the way for replacing traditional complex optical paths with single-layer planar optics, offering dynamic and programmable functionalities.

Biography:



Wei Hu received his Ph.D. from Jilin University, China, in 2009. He then joined Nanjing University as a faculty member, where he is currently a Professor of Optical Engineering. His research interests focus on liquid crystal materials and optical devices. He has published over 210 peer-reviewed journal papers with more than 9,300 total citations. He received the Tang Scholar Award in 2017, the Distinguished Young Scholar of Jiangsu Province in 2018, and the National Natural Science Foundation's Outstanding Youth Foundation award in 2019.