Electrically driven and dynamically manipulated three dimensional solitons in an orientationally ordered soft matter

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The orientational order of soft matter results in rich and amazing anisotropies in physical properties, enabling the formation of topologically beautiful and scientifically interesting microstructures through various effects, from self-assembly to pattern formation induced by external fields. Achieving high-dimensional and stable solitons (localized microstructures) is a challenging task. Here, we demonstrate that (1) simply applying electric fields allows for the experimental production of three-dimensional stable and propagatable solitons that exhibit a localized distortion of liquid crystal molecular orientation; (2) utilizing the photopatterning technique enables the manipulation of solitons, including the generation of both unidirectional and bidirectional solitons at specific locations and times, confinement within micron-scaled patterns of various shapes, and directed propagation along predefined trajectories. Our discoveries open up new avenues for fundamental research and offer promising opportunities in areas such as micro-cargo transportation and optical information processing.

Short Bio:

Bing-Xiang Li received his Ph.D. degree in Chemical Physics from Advanced Materials and Liquid Crystal Institute at Kent State University, USA. Li is the winner of National Youth Talent Project and the winner of high-level talent project from National Ministry of Human Resources and Social Security. He is currently a Huali Talent professor and vice dean of College of Electronic and Optical Engineering & College of Flexible Electronics (Future Technology), the director of Soft Matter Interdisciplinary Research Center, at Nanjing University of Posts and Telecommunications. His current research spans from stimuli-responsive soft matter, soft matter photonics, active matter, to biological physics. The related research results have been published in *Light: Science & Applications*, *Nature*

Communications, *Science Advances*, and other journals. Li is also young editorial board members of *Chinese Journal of Liquid Crystals and Displays* and *Responsive Materials*.