

Collective Motion of Liquid Crystalline Actuators

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In nature, the transition from individual movement to swarm intelligence is driven by the subtle inter-communications between active members. While these principles have inspired various soft robotic designs, achieving sophisticated collective modulation in synthetic soft matter remains a key challenge. We investigated the collective behavior of multiple liquid crystalline network (LCN) active units coupled through a shared mechanical interface. By driving these responsive units with continuous light, we explore how their mutual physical interactions dictate the overall temporal behavior of the ensemble. We find that as the number of coupled units increases, the system undergoes a transition from independent activity to a highly coordinated state. This study offers a versatile strategy for designing responsive soft matter systems with tunable collective outputs, providing a foundation for developing future soft robotic swarms with enhanced coordination and adaptive capabilities.

Biography:



Wei Feng is a tenure-track professor at the University of Science and Technology of China under National Overseas High-level Young Talent plan. His research focuses on intelligent soft materials and surface/interface science. He completed his Ph.D. under the supervision of Prof. Dirk Broer and Prof. Danqing Liu. Dr. Feng has been awarded several fellowships, including the German Humboldt Postdoctoral Fellowship (host: Prof. Metin Sitti) and the Hong Kong Research Grants Council Postdoctoral Fellowship (host: Prof. Li Zhang, awarded to only 50 individuals annually). His academic honors include the Best Poster Award at the 2019 International Conference on Liquid Crystal Photonics and the Best Paper Award at the 2021 International Workshop on Bionic Engineering. He has published research papers in leading journals such as *Advanced Materials*, *PNAS Nexus*, and *Nature Communications*.