Thermally Tunable Surface Structures Using Precise Molecular Alignment Control by Scanning Wave Photopolymerization

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Liquid crystal polymer films that exhibit surface structural changes in response to external stimuli such as heat and light have attracted much attention. Recently, we have proposed a novel alignment technique termed scanning wave photopolymerization (SWaP) [1–3]. In this method, spatiotemporal light irradiation induces the localized polymerization and chemical potential difference, resulting in the directional molecular diffusion and molecular alignment along diffusion direction. In addition, surface structure formation was achieved by patterned photopolymerization. In this work, we design thermally tunable surface structures by a two-step photopolymerization by introducing the heterobifunctional crosslinker to separate the polymerization and crosslinking reactions. Using this material system, we fabricated LCE films with precise molecular alignment and evaluated their thermal actuation behavior.

References

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