alignment change of LCs in defect, that further lead to the formation of N* [23]. The N* state would transit to Homeotropic state when applied voltage reaches saturation. For voltage removing process, two different procedures are also carried out. If the voltage is suddenly removed, the LCs restored to original BP state due to the recovery force by polymer network, which is similar with that of traditional PSBPLC. However, when the voltage is slowly decreased, there are some differences. N* appears due to the existence of strong electric field. Keeping decreasing even totally removing the voltage, N* is also very stable, because the single twisted defect-free system prevails the frustration system without the aid of external energy. Thus, the bistability is achieved. We suppose the bistable phenomenon may widely exist in PSBPLC system, however in the traditional PSBPLC, the polymer elastic force is so strong that the applied electric field force is difficult to destroy the defects. Therefore the bistability is hard to be observed. If we appropriately decrease the polymer elastic force through the reasonable molecular design and the preparation condition selections, the bistability may appear. In fact, we have found similar phenomena in other material systems. Further researches are ongoing.

4. Conclusion

In summary, the bistable effect of PSBPLC is found. As the increasing of applied voltage, the BP firstly transits to N* phase, and then forms the homeotropic alignment at a saturation voltage. As the voltage is decreased slowly, the N* reappears, and it is stable even when the voltage is totally removed. However, if the voltage is suddenly applied to or removed from saturation, the N* state is suppressed and the BP appears. The electro-optical performances are tested, and the results indicate that the drive voltage for these transformations is lower. The mechanism of this phenomenon is discussed, according to which we consider the bistability may widely exist in polymer stabilized blue phase liquid crystal systems.

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