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材料物理和化学

大分子引发剂的主链柔性对PDLC电光性能的影响

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摘要: 引入4种玻璃化温度不同的单体,通过可逆加成-断裂链转移和引发转移终止剂活性自由基聚合相结合的方法制备出不同主链柔性的活性接枝大分子引发剂MI,并用其制备了聚合物分散液晶膜,研究了MI的主链柔性对接枝聚合物为基体的PDLC电光性能的影响。研究发现,随着MI主链柔性增加,PDLC的关闭状态透光率、液晶微滴的粒径都是先减小后增大,并都在大分子引发剂为RAFT-P(BMA-co-CMSI)时有最小值;阈值电压、饱和电压均呈现了先增大后减小的变化趋势;但是滞后的变化却表现出多元化,这是由于滞后受到多种因素综合影响导致的。

关键词: 接枝聚合物 主链柔性 活性自由基聚合 聚合物分散液晶 电光性能

Effect of Main-Chain Flexibility of Macro-Initiator on Electro-Optical Properties of Polymer Dispersed Liquid Crystal

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Abstract: Polymer dispersed liquid crystal (PDLC) films were prepared with living graft macro-initiator (MI) with different main-chain flexibility, synthesized by reversible addition-fragmentation chain transfer (RAFT) and iniferter polymerization with four kinds of monomers with different glass transition temperature. The effect of main-chain flexibility of MIs on morphologies, transmittance, switching voltage and hysteresis of PDLC films based on graft polymer had been investigated. It was observed that the OFF-state transmittance (T_{OFF}) and the size of LC droplet decreased at first and then increased with the increase in main-chain flexibility of MIs, and both showed the lowest value when MI was RAFT-P(BMA-co-CMSI). However, V_{th} and V_{sat} showed an opposite trend. It was found that the V_{th} value first increased from 8.0 V to 17.7 V and then decreased to 7.3 V, while the V_{sat} value first increased from 25.6 V to 32.9 V and then decreased to 20.2 V. In addition, the hysteresis showed complex changes, due to a variety of factors. Therefore, the change of main-chain flexibility of MIs successfully improved the electro-optical properties of PDLC films based on graft polymer.

Keywords: graft polymer main-chain flexibility living radical polymerization polymer dispersed liquid crystal electro-optical property

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