

Electro-optical effect in a nano-sized PDLC film

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Nano-sized polymer dispersed liquid crystals (PDLCs) are interesting electro-optic materials for optical communication systems (1, 2). We present the electro-optical properties of nano-sized PDLC films formed by rapid polymerization of a free-radical monomer. In our experiments the nano-sized PDLCs made by the mixture of a pre-polymer (DPHPA) and liquid crystal (E7) were prepared under various UV curing conditions (3). The nano-sized PDLC films showed a fast response to the applied electric field. The magnitudes of the response times were in the range of milliseconds. The observed response behavior was explained in terms of resistive and dielectric properties of the PDLC film. Because the response time is inversely proportional to the amplitude of the applied electric field, space-charge build-up increases with decreasing frequency of the applied field, thus the response time increases with decreasing frequency. Figure 1 shows a typical response of the nano-sized PDLC film. The optical transmittance of the films showed 90% due to low scattering of nano-sized droplets for visible wavelengths. These nano-sized PDLC films can be used for switchable displays and light modulators.

References

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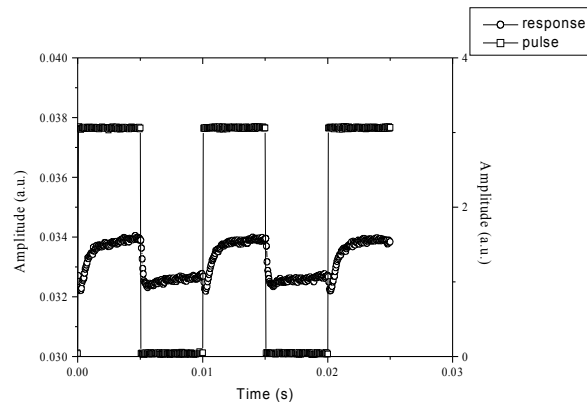


Figure 1.