

Fast-switching electro-optical films based on polymer encapsulated liquid crystal and carbon nanotube

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The objective of this research is to explore fast-switching electro-optical films (EOFs) based on polymer encapsulated liquid crystal¹ and carbon nanotube. EOF are made by using the polymerization-induced phase separation method with an initially homogeneous mixture of pre-polymer, liquid crystal and a small amount of carbon nanotubes (CNTs). The effects of the concentrations of CNTs and liquid crystals on the electro optical properties of the EOFs are studied. The rise times for the CNT-containing EOFs is around 200 μs at 6V/ μm , while the fall time is around 30ms at 6V/ μm twice as fast as that of the EOF without CNTs. The dielectric measurements show that the relaxation frequency of the EOFs increases with the increase of CNT doping, indicating the decrease in droplets size. The morphology of EOFs is confirmed with SEM morphological studies. With the increase of the concentration of CNT or liquid crystal, the threshold voltages of the EOFs are decreased, and the response time are faster (Figs. 1-4).

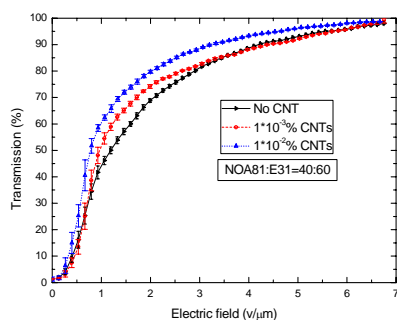


Figure 1 The transmission-voltage curves of EOFs with different CNTs concentration.

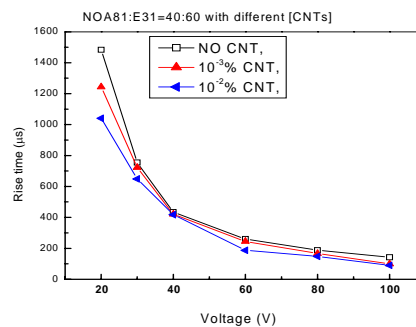


Figure 2 The response times of different EOFs with different CNTs concentration.

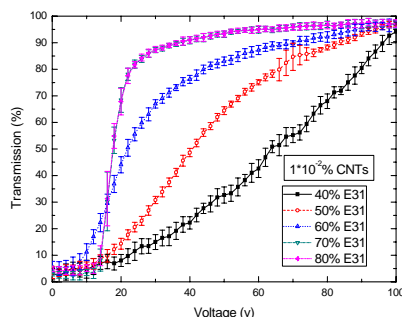


Figure 3 The effect of LC concentration on the transmission-voltage curves of EOFs.

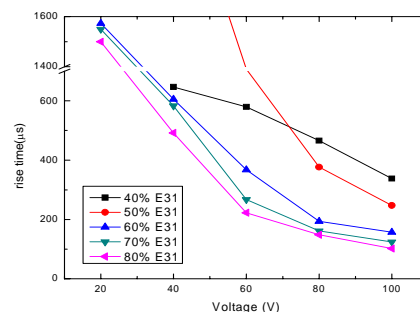


Figure 4 The effect of LC concentration on the rise times of EOFs.

References

1. P. Drzaic, *Liquid crystal dispersions*, World Scientific, 1995, Singapore.