Polymer Surfaces and Interfaces: Characterization, Modification and Application, pp. 239–250
K. L. Mittal and K.-W. Lee (Eds)

Effect of conductive polymer alignment layers on the orientational response of a liquid crystal

W. S. AHN,* Y. C. KIM, D. Y. KIM and C. Y. KIM†

Polymer Materials Laboratory, Korea Institute of Science and Technology, P.O. Box 131, Cheongryang, Seoul, Korea

Revised version received 20 March 1996

Abstract—Chemically synthesized soluble polyaniline (PAn) was dissolved in *m*-cresol and cast on a glass plate which was used both as an electrode and as an alignment layer for a liquid crystal (LC) cell. PAn was also blended with certain nonconductive polymers such as poly(diisopropyl fumarate) (PDF), amorphous nylon (Nylon), polystyrene (PS), and poly(methyl methacrylate) (PMMA) to give good adhesion to the glass plate without losing electrical conductivity or light transmittance. The LC cells with PAn, PAn/2% PDF, and PAn/2% Nylon as the alignment layers gave a response time (τ_{on}) of *c.* 6 ms on applying a bias potential of 10 V. The cells with PAn/2% PS and PAn/2% PMMA showed τ_{on} of 13.5 and 15.9 ms, respectively, while the cell with indium tin oxide–polyimide (ITO–PI) as the alignment layer gave a τ_{on} of 2.0 ms. However, the decay times (τ_{dec}) of the cells with PAn and its blend alignment layers ranged from 12.7 to 20.1 ms, much shorter than the τ_{dec} of 47.0 ms for the cell with ITO–PI.

Keywords: Soluble polyaniline; polymer blends; alignment layer; optical response; interfacial interaction.

1. INTRODUCTION

Twisted nematic (TN) and super-twisted nematic (STN) liquid crystal displays (LCDs) are being used for small-size television sets and lap-top computers. It is expected that LCDs larger than 14 in. will be on the market in the near future [1]. At present, an increase in the size of the LCD panel is mainly controlled by the technology of thin film transistors. However, there is still room for improvement in other parts of the panel.

TN- and STN-LCD panels consist of two indium tin oxide (ITO)-coated glass plates, alignment layers on the plates, and a liquid crystal (LC). ITO glass has a transmittance of about 85% of the incident light intensity and a surface resistivity of around

*Present address: Department of Chemical Engineering, Keimyung University, 1000 Sindang-Dong, Talseo-Gu, Taegu, Korea.

†To whom correspondence should be addressed.