

Book Review

Alignment technologies and applications of liquid crystal devices

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Liquid crystal displays (LCDs) have been developed to the most frequently used passive displays because of their low driving voltage, extremely low power consumption, CMOS compatibility, design flexibility and flatness. Particularly, the active matrix addressing by thin film transistors (TFT) led to the availability of a high resolution and a high contrast which made it possible to reproduce fine, clear and vivid images of TV pictures. Displays on the basis of liquid crystals require a uniform molecular alignment at the glass surfaces; that means an orientation of the molecules parallel, perpendicular or tilted with respect to the bounding glass surfaces. The alignment at the liquid crystalline materials strongly influences the electro-optical performance of the displays such as contrast ratio, switching speed or viewing angle. The alignment of the molecules is controlled by the interaction of the molecules with the alignment surface because the orientation and interaction at the boundaries is transferred to the bulk due to the elastic properties of the liquid crystalline materials. The alignment layers can be varied by chemical treatment or physical methods (rubbing techniques; photoalignment by UV light irradiated to UV curable resins).

The book demonstrates both the fundamental and the practical aspects of the different alignment phenomena. It should be emphasized that the different kinds of nematic LCDs (TN, STN, IPS, MVA) which were described in detail demand also specific alignment techniques. The same is true for the LCDs based on smectic liquid crystals which are treated in the second part of the book. The reader becomes acquainted not only with the theoretical and practical aspects of the distinct alignment techniques but he can also learn a lot about the principal mechanism and the sophisticated addressing methods of the different LCD types.

This book will be of interest for researchers and engineers working in the display industry, but also for all physicist or chemists who investigate liquid crystal materials.

Gerhard Pelzl