

Liquid crystal photoalignment: a new challenge

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We consider the novel azo-dye photo-aligning technology: including its perspectives for future applications in liquid crystal (LC) devices [1]. Azo-dye materials can provide a perfect uniform alignment with a sufficiently high polar and azimuthal anchoring energy, VHR and appropriate pretilt angles. We will review the diffusion model of azo-dye photoalignment and the relations between order parameter and anchoring energy. The stabilized azo-dye aligning layers are thermo and UV stable. Patterned LC alignment in LCP films and LC alignment in superthin tubes and 3D surface becomes possible. Photoaligned ferroelectric, π -BTN, and optically rewritable memory will be reviewed. We will provide examples of photoalignment applications in Photonics and Optics, which is a “hot topic” of research.

The advantages of LC photoalignment technology in comparison with common “rubbing” alignment methods tend to the continuation of the research in this field. Almost all the criteria of perfect LC alignment are met in case of azo-dye layers. Nowadays azo-dye alignment materials can be already used in LCD manufacturing, e.g. for the alignment of monomers in LCP films for new generations of phase retarders, polarizers and color filters. Roll-to-roll process is possible due to the high sensitivity of azo-dye films. We will have a possibility to tune the alignment properties like (anchoring energy, ability of align LC materials, image sticking, light sensitivity, photo stability, reorientation speed etc.) by preparing the proper weight ratio of the azo-dye compound. Thus having the limited number of basic azo-dyes structures the continuous range of different alignment properties can be covered.

We are sure, that the common rubbing alignment technology will be totally replaced by a photoalignment in the near future, thus increasing the quality of LCD [2].

[1] V.G. Chigrinov, V.M. Kozenkov, H.S. Kwok, Photoalignment of Liquid Crystalline Materials: Physics and Applications, 248 pp., Wiley, August 2008.

[2] <http://sharp-world.com/corporate/news/090916.html>

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