Liquid crystal alignment by photoinduced azodye nanolayers

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Photoalignment possesses obvious advantages in comparison with the usually "rubbing" treatment of the substrates of liquid crystal display (LCD) cells [1]. The liquid crystal photoalignment is nano-technology, as the thickness of the alignment layer is about 2-15 nm. The azodye photoalignment materials has been developed in HKUST and can be very useful for the new generation of the liquid crystals displays and photonics devices [1].

Photoalignment possesses obvious advantages in comparison with the usually "rubbing" treatment of the substrates of liquid crystal display (LCD) cells. Possible benefits for using this technique include:

(i) Potential increase of manufacturing yield, especially in LCDs with active matrix addressing, where fine tiny pixels of a high resolution LCD screen are driven by thin film transistors on a silicone substrate;

(ii) New advanced applications of LC in fiber communications, optical data processing, holography and other fields, where the traditional rubbing LC alignment is not possible due to the sophisticated geometry of LC cell and/or high spatial resolution of the processing system;

(iii) Ability for efficient LC alignment on curved and flexible substrates;

(iv) Manufacturing of new optical elements for LC technology, such as patterned polarizers and phase retarders, high resolution optical sensors, tunable optical filters, polarization non-sensitive optical lenses, with voltage controllable focal distance, patterned nano-rods structures etc.

Nanolayer azodye photoalignment can be very useful for the new generation of the liquid crystals devices as well as in new LC applications. Examples of such applications are nano-rods, q-plates, lenses, windows with the voltage controllable transparency, security films and optical waveguides LC elements, such as variable optical attenuators, switches and add/drop filters.

The physical mechanisms and characterization of the azodye photoaligning technique, as well as the application for liquid crystal devices, including displays and photonic devices will be reviewed.

References

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

Speaker Biography

Vladimir G. Chigrinov is Professor of Hong Kong University of Science and Technology since 1999. He is an Expert in Flat Panel Technology in Russia, recognized by the World Technology Evaluation Centre, 1994, and SID Fellow since 2008. He is an author of 6 books, 25 reviews and book chapters, about 267 journal papers, more than 588 Conference presentations, and 102 patents and patent applications including 20 US patents in the field of liquid crystals since 1974. He got Excellent Research Award of HKUST School of Engineering in 2012.