123rd MSS-Seminar
Wednesday, November 7th,
15:30 hrs, Nägelsbachstr. 49b.

Slippery When Wet: viscosity-reduced substrates for the high performance liquid crystal display

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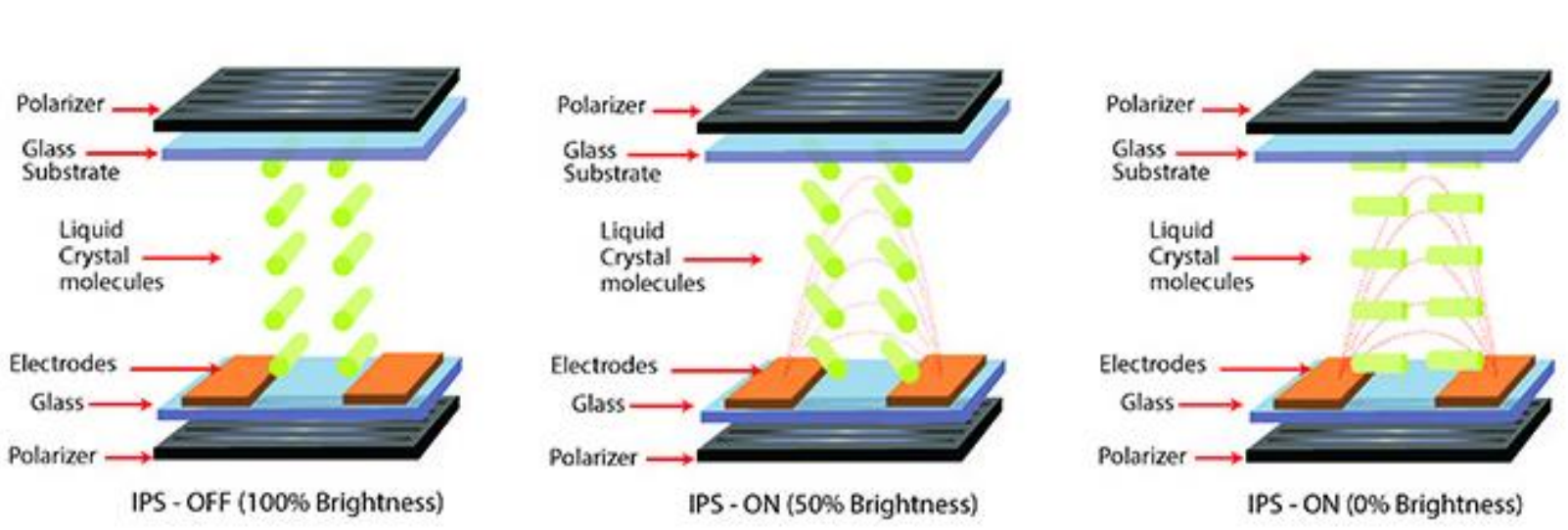

The conventional liquid crystal technology (LCD) has been dominating the display market for decades, until recent years. New types of optical device, such as solid-state organic light-emitting diode (OLED), have been challenging the long-established with a desired faster material response (LCD: 5ms vs OLED: 0.1ms). Facing the life-and-death situation, high performance LCD is expected to achieve fast response by reduced LC rotational viscosity on the substrates, hence it would also need smaller driving voltage for this new device. The new types of substrates are being prepared for the use in next generation LCD technology. The proposed concept has been proved for its practicability, first by polymer-coating on glass substrates, for which it leads to a slippery surface with reduced rotational viscosity. In addition, a second type of slippery substrates is also achieved by adding impurity dyes in LC samples. The accumulation of dye molecules on substrates, for which it is a wetting process, isolates the original anchoring effect from substrates hence creates free rotational environment for LC molecules. As a counterpart study to the experiments, we also use a modified mesoscopic liquid crystal Q-tensor model to simulate the LC dynamics under external rotational fields. In our simulation the polymer-coated/impurity-induced slippery surfaces are modeled by a numerical polymer layer, and this approach gives us informations of the substrate conditions when compare with experimental data. The extended applications of this technology will also be discussed in the talk.

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