

In situ self-assembled homeotropic alignment layer for fast-switching liquid crystal devices

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We propose a novel method for homeotropic alignment of liquid crystals (LCs) utilising in situ self-assembly of a low concentration of 4-(4-heptylphenyl)benzoic acids that form hydrogen bond with the indium tin oxide (ITO) substrates. Stable homeotropic alignment in the LC device is achieved with a simple mixing process of benzoic acid derivative in LC media, and it yields electro-optical performance similar to that achieved with the conventional alignment method using polyimides. It is experimentally confirmed that an ultrathin self-assembled molecular layer of 4-(4-heptylphenyl)benzoic acid formed by hydrogen bonding on ITO substrate makes it possible to attain a reliable homeotropic alignment of LCs. Furthermore, this simple approach provides a cost-effective and stable LC alignment layer with fast response time and thermal stability.