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Field-Induced Alignment of Polar Bent-Ccore Smectic A Liquid Crystals[1] YONGQIANG SHEN, LISA GOODHEW, RENFAN SHAO, JOSEPH MACLENNAN, NOEL CLARK, Department of Physics, and the Liquid Crystal Materials Research Center, University of Colorado at Boulder, PER RUDQUIST, Microtechnology and Nanoscience, Chalmers University of Technology — The $SmAP_F$ phase is a promising phase modulator mode. To use the $SmAP_F$ materials for applications, we need to obtain uniform, large-area alignment of the samples. However, bent-core liquid crystals are notoriously difficult to align with conventional surface treatment methods because most of them have no nematic phase. We have developed a powerful, new method using in-plane applied electric fields that allows us to create a perfect bookshelf alignment of orthogonal bent-core smectics. By using an interdigitated, finger-like electrode arrangement on one of the cell surfaces, we can align the materials by applying in-plane electric fields. This stripe geometry, which produces curved field lines, allows for only one smectic layer orientation, normal both to the cell walls and to the finger electrodes. After alignment, the cell can be operated in the conventional way by connecting the finger electrodes together to make one effective electrode, opposing continuous, common electrode on the opposite side of the cell. This alignment method opens up the use of these materials in perfectly aligned cells for both amplitude and phase-only modulation applications.

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