Measurement of the Converse Flexoelectric Effect in A Bent-Core Nematic Liquid Crystal

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Flexoelectricity is a linear coupling between bend or splay distortions and electric polarization[1]. It is a unique property of orientationally ordered materials of which liquid crystals are the best known example. It has been shown that the bend flexoelectric coefficient in "banana" bent-core liquid crystals is three orders of magnitude higher than the effect found in calamitic liquid crystals.[2] Using a Mirau interferometer attached to the objective port of a microscope, we were able to measure the converse effect. This polarity dependent flexing of a thin cell yielded displacements of 100nm when 100V DC was applied to a 1cm x 2cm x 25µm cell filled with the bent-core nematic liquid crystal 4-chloro-1,3-phenylene bis 4-[4'-(9-decenyloxy) benzoyloxy] benzoate (ClPbis10BB). The substrates were 100µm thick Mylar with ITO as a conducting layer. These preliminary experiments show the promise of new types of soft actuators or beam steering devices.

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References:

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