Thermal Properties Changes in a Ferroelectric and Photosensitive Liquid Crystal under UV Light Irradiation

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Photosensitive liquid crystals are characterized by reversible photoinduced shape transformation of the molecules containing the photochromic azogroups from the trans form to the cis form. Upon absorption of ultraviolet (UV) light, the energetically more stable trans (E configuration) isomer with an elongated rodlike molecular form changes into a bent-shape less-stable cis (Z configuration) isomer. The reverse transformation (cis to trans) can be brought about either by irradiation of visible light or spontaneously by the thermal back relaxation process in the dark. The photo-isomerization, reversible in liquid crystals, allows the use of light as an external stimulus or control triggers changes in physical properties. Dielectric, electro-optical and thermodynamic behaviours of azobenzene based systems under UV illumination have been reported by different groups. In this work we investigate the effects of the UV light on the thermal properties of a ferroelectric and photosensitive liquid crystal in the chiral smectic C (SmC*) phase. In this phase, the liquid crystal exhibits both ferroelectric and pyroelectric properties. The thermal parameters were obtained from the analysis of the phase or the amplitude of the pyroelectric signal generated by the sample itself when it is periodically heated by a laser beam. The UV light irradiation effect on the thermal parameters is observed and related to the changes in molecular geometry.