

Stokes-polarimetry of the UV-induced pitch changes in nematic LCs with chiral dopant

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For the first time effect of UV irradiation ($\lambda = 253.7\text{nm}$) on the optical properties of the nematic liquid crystal (MLC-6815, Merck) doped by chiral molecules of 7-dehydrocholesterol (7-DHC, provitamin D₃) was studied using Stokes-polarimetry. As is known, 7-DHC is a chiral photosensitive molecule which under UV irradiation is transformed into previtamin D by hexadiene ring opening. Previtamin D, in turn, undergoes a number of photoconversions with most efficient *cis-trans* isomerization into tachysterol [1, 2]. These photoinduced changes in molecular geometric structure result in the changes of optical properties of the LC.

The relation between the ellipticity of transmitted light and the cholesteric macrohelix parameters (the sign and pitch value) is calculated for the case of normal incidence of the light beam ($\lambda = 0.633\text{ nm}$) and the fixed thickness of the planar liquid crystal layer (19 μm) [3, 4].

The changes of the spiral wave vector sign under UV irradiation were observed experimentally, and the strong correlation between the wave vector sign changes and the photoinduced formation of *trans*-isomer tachysterol was found [5].

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References

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