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PRECISELY TUNING HELICAL TWISTING POWER VIA PHOTOISOMERIZATION KINETICS OF DOPANTS IN CHIRAL NEMATIC LIQUID CRYSTALS

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t has been paid much attention to improve the helical twisting power (β) of dopants in chiral nematic liquid crystal (CLC). However, the correlations between the ß value and the molecular structures as well as the interaction with nematic LCs are far from clear. In this work, a series of reversibly photo-switchable axially chiral dopants with different lengths of alkyl or alkoxyl have been successfully synthesized through nucleophilic substituent and the thiol-ene click reaction. Then, the effect of miscibility between these dopants and nematic LCs on the ß values, as well as the time-dependent decay/growth of the β value upon irradiation, has been investigated. The theoretical Teas solubility parameter shows that the miscibility between dopants and nematic LCs decreases with increasing of the length of substituent groups from dopant 1 to dopant 4. The ß value of chiral dopants in nematic LCs decreases from dopant 1 to dopant 4 both at the visible light photostationary state (PSS) and at the UV PSS after UV irradiation. With increasing of the length of substituent groups, the photoisomerization rate constant of dopants increases for trans-cis transformation upon UV irradiation and decrease for the reverse process upon visible light irradiation either in isotropic ethyl acetate or in anisotropic LCs, although the constant in ethyl is several times larger than the corresponding value in LCs. Also, the color of the CLCs could be tuned upon light irradiations. These results enable the precise tuning of the pitch and selective reflection wavelength/color of CLCs, which paves the way to the applications in electro-optic devices, information storage, high-tech anti-counterfeit, and so forth.



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- 4. Bi S G (2013) High modulus and low-voltage driving nematic liquid-crystalline physical gels for lightscattering display. Soft Matter. 9(13):7718-7725.

Biography

Yonggui Liao is a Full Professor of Polymer Physics and Chemistry at School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, China. His current research activities focuses on multiphase and multi-component polymers/supramolecules, ordered functional polymeric/supramolecular composites, physical behaviors of polymers/supramolecules under specific conditions, etc.

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