

Structure and local order of lyotropic cholesteric calamitic phases: The effect of the chiral molecule

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We investigate a lyotropic mixture presenting in the calamitic nematic phase (N_C) and its corresponding calamitic cholesteric phase (Ch_C), where a small amount of the chiral agent (brucine sulfate) was added. Different experimental techniques (polarized optical microscopy and laser conoscopy) were used to characterize the phases. The main technique employed in the analysis of the structure and local ordering at nanoscale is the Small-Angle X-ray Scattering, where advanced modeling analysis were applied. The lyotropic nematic mixtures were composed of potassium laurate/potassium sulfate/dodecanol/water and the cholesteric phases were obtained from these mixtures, by adding the chiral molecule, brucine sulfate. From an advanced modeling analysis, we show that the micellar overall shape is not modified by the doping with brucine. However, the presence of the brucine between micelles in the Ch_C phase imposes a higher correlation between micelles along the direction of the pseudo-lamellar ordering. Finally, the order parameter $\langle P_2 \rangle$ was calculated and these values for the phases N_C and Ch_C are 0.8133(6) and 0.747(2), respectively, indicating a slightly higher orientational ordering in the N_C phase.

Acknowledgements: Financial support INCT/CNPq (Grant No.: 465259/2014-6), INCT/FAPESP (Grant No.:14/50983-3), INCT/CAPES (Grant No.: 88887.136373/2017-00), FAPESP (Grant 2016/24531-3), INCT-FCx, and CNPq Scholarships - Brazil (169199/2018-5 and 303001/2019-4).

References:

[1] O. Rodrigues et al., *Journal of Molecular Liquids*, in the press.

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