

Effect of Confinement on the Structure and Dynamics of two Rod-like Liquid Crystals

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8CB (n-octylcyanobiphenyl) and 8OCB (n-octyloxycyanobiphenyl) are two rod-like mesogens belonging to the cyanobiphenyl liquid crystal group, structurally different in the addition of an oxygen atom in the latter. We investigate 8CB and 8OCB, firstly, in the bulk by means of X-ray diffraction and Polarizing Optical Microscopy to determine the unit cell structure and liquid crystalline textures respectively. Self-ordered nanoporous AAO templates with pore diameters ranging from 25 nm to 400 nm are used as a confining medium. Differential Scanning Calorimetry (DSC) and Dielectric Spectroscopy (DS) are employed in identifying phase transitions from the heat of fusion and temperature dependence of the dielectric permittivity, respectively, both in the bulk and in confinement. Comparison of the bulk transition temperatures and the dynamic order parameter, S , obtained from DS implies greater order in 8OCB than 8CB. The effect of confinement is investigated with respect to changes of the phase transition temperatures and molecular dynamics and is further discussed in view of previous experimental [1], [2] and computational results [3], [4].

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[3] Rounding of Phase Transitions in Cylindrical Pores, D. Wilms, A. Winkler, P. Virnau, K. Binder, Phys. Rev. Lett. 105, 045701 (2010)

[4] Computer Simulation Study of a Liquid Crystal Confined to a Spherical Cavity, Y. Trukhina, T. Schilling, Phys. Rev. E, 77, 011701 (2008)