The influence of anisotropic nanoparticles on blue phase stabilisation

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Blue phase (BP) stabilisation attracts a great interest in the last 10 years, due to several envisioned applications in displays industry and photonics. Nanoparticle-induced stabilization has been established as one of the most prominent approaches. The first studies focused mainly on the effects of spherical nanoparticles and quantum dots dispersed in chiral liquid crystals. More recently, anisotropic nanoparticles have been also exploited as BP stabilisation agents.

Here we report on the role of anisotropic nanoparticles on BP stabilisation. Various types of them have been used, such as graphene, laponite and molybdenum sulphide. All these nanoplatelets are surface-functionalised with flexible chains that enhance their dispersion in the liquid crystal host. High-resolution calorimetry has been used in order to obtain the precise temperature range of BPs, whilst the textures were identified by means of polarising optical microscopy. Contrary to the smaller (isotropic) spherical nanoparticles that affect mostly BPIII, the larger (anisotropic) nanoplatelets target the more ordered, cubic structure of BPI.

The experimental results will be presented, accompanied by a brief theoretical model that explains the observed behaviour.

References:

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