

Network structures formed in polymer stabilised liquid crystals with defects

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Polymer stabilised liquid crystals (PSLC) [1] consist of a relatively low concentration of a photo-polymerised monomer (typically less than 10%wt) which is phase separated from the continuous liquid crystal medium. The resultant polymer forms a cross-linked network in the general direction of the liquid crystal director (see fig. 1(a)). When the host liquid crystal has a highly twisted defect state (for example the oily streak defect in cholesteric liquid crystals) the photoreactive monomer appears to be excluded from the defect region during polymerisation. Thus on photo-polymerisation of the sample no polymer network forms in the highly twisted defect region.

This effect of polymer network expulsion has been examined by both optical and scanning electron microscopy on several different systems including a cholesteric phase with oily streak defects and a twist grain boundary like phase. For the case of the network formed in the twist grain boundary like phase the array of defects forms a twisted discrete layered network which may be interesting for photonic applications [2] (see fig. 1(b)).

[1] I. Dierking, *Adv. Mater.*, **2000**, *12*, 167

[2] P. Archer, I. Dierking, *Soft Matter* **2009**, in press

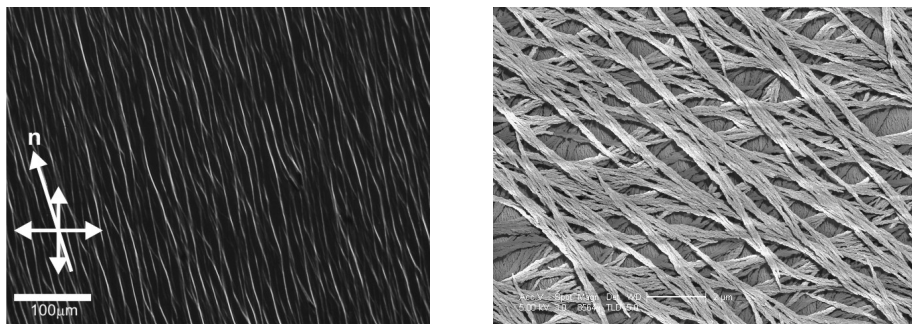


Fig 1(a). Optical texture in the isotropic phase of a polymer network formed in the SmA* phase. (b) Scanning electron microscopy image of a polymer network formed in a twist grain boundary like phase.