Corona patterns around inclusions of smectic films

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Inclusions in freely suspended smectic films can interact with the surroundings by capillary forces as well as by orientational elasticity of the film material, i.e. the *c*-director in tilted smectic phases. Such inclusions, like solid glass or polymer beads or liquid droplets of micrometer sizes can self-organize to various structures on a thin, uniform film. Particles or droplets with sufficient elevation over the film surface are surrounded by a meniscus. This meniscus is often decorated with a radial, ray-like texture (corona) [1]. We measure characteristic optical and geometrical features of these coronae and discuss their structure and physical origin [2].

A comparison with stripe textures in the outer menisci of free standing smectic C films shows that both structures have the same origin. We identify them as splay domains [3]. The corona textures are found in the smectic C phase and in smectic A films above such a smectic C phase. They disappear, for example, at the transition into the lower temperature smectic B phases, and at sufficiently high temperatures in the smectic A phase. Even though the physical origin of the patterns has been identified early by Meyer and Pershan as surface induced splay, several questions remain unsolved, concerning the orientation of the stripes along the film thickness gradient and their absence in films of uniform thickness.

(1) M. Conradi, P. Ziherl, A. Sarlah, and I.Musevic *Eur. Phys. J. E* **2006** *20* 231
(2) K. Harth and R. Stannarius *Eur. Phys. J. E* **2009**, *in press*
(3) R. B. Meyer and P. S. Pershan *Solid State Comm.* **1973** *13* 989

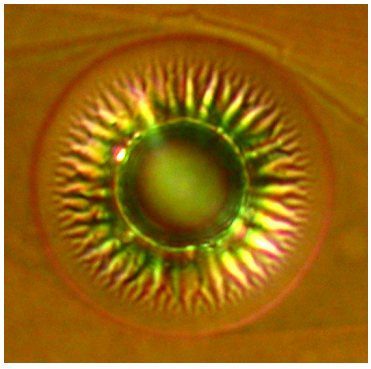

Figure: Corona texture around a glycerol droplet in a smectic C* free standing film (material Felix 16-100) under crossed polarizers. The image size is approximately 65×65 µm.