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Freely Suspended Smectic Films in Aqueous Environment
KARTHIK PEDDIREDDY, CHRISTIAN BAHR, Max Planck Institute for Dynamics and Self Organization — Smectic liquid crystals easily form thin films which are freely suspended on a solid frame in air. These systems have been thoroughly studied for various purposes such as structural studies of smectic phases, investigating phase transitions in two-dimensional systems, and studying various physical properties of liquid crystals. In the present study, we explore the preparation of freely suspended smectic films in water. A prerequisite is the presence of a surfactant which accumulates at the liquid-crystal/water interface and induces a homeotropic anchoring of the director, so that the smectic layers align parallel to the two film surfaces. The presence of the surfactant might also serve as a handle to tune properties such as the surface tension of the films (which is hardly possible for freely suspended films in air). We study the formation of films in water using different frames and different surfactants, and we focus especially on the thinning behaviour which occurs when the temperature is increased towards the smectic - nematic or smectic - isotropic transition.

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