Crystallization Kinetics in Liquid Crystals with Hexagonal Precursor Phases by Calorimetry

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Z. Naturforsch. **65a,** 733 – 744 (2010); received March 28, 2009 / revised September 10, 2009

Design and characterization of Schiff based liquid crystalline nO.m compounds exhibiting hexagonal smectic phases are reported. Crystallization kinetics investigations are carried out in the liquid crystals (LCs) exhibiting hexagonal ordered orthogonal and tilted precursor LC phases by calorimetry. The Avrami theory is referred and results are analyzed. Influence of molecular ordering, structure, and dimensionality of the LC precursor phase on kinetics is studied. Effect of shape and flexibility of the molecule for nucleation and growth processes is investigated. Varying rate of kinetics reflects upon the transit of the system from constant type to independent type of nucleation. The trends in the Avrami parameter b and exponent n suggest sporadic nucleation. Crystal growth is interpreted as heterogeneous permeation of layered domains (or aggregates) formed by needle shaped calamitic molecules. Calorimetric observations at different crystallization temperatures CT and hold time t infer diffusion mediated crystallization.

Key words: Crystallisation; Kinetics; Hexagonal LC Phases; Precursor; Nucleation; Growth; Diffussion.