

## Nematic and Cholesteric Elastomers with Locally Oblate Conformation

N. Dadivanyan, H. Finkelmann

Institut für Makromolekulare Chemie, Albert-Ludwig-Universität  
Stefan-Meier-Str. 31, 79104 Freiburg, Germany

natalia.dadivanyan@makro.uni-freiburg.de

Cholesteric liquid crystalline elastomers (CLCE) with a locally oblate conformation are of special interest since in this case the mechanical field can be applied in the direction of the helix. This allows investigations on the coupling between the cholesteric supramolecular structure and the network.

Locally oblate systems with three carbon atoms in the spacer have already been studied in detail (1). However, not all mesogens were aligned perpendicular to the polymer chain due to  $\beta$ -addition during the polyaddition reaction (2).

Our aim was to create a nematic polymer system with a locally oblate conformation using molecules with a six-atom spacer. To prevent crystallization several new mesogens with differently substituted aromatic cores were synthesized, one of which is presented in Figure 1. Depending on the chemical structure of the mesogens not only nematic but also smectic phase was observed.

A cholesterol-based chiral comonomer with the same spacer length was obtained to induce a chiral nematic phase.

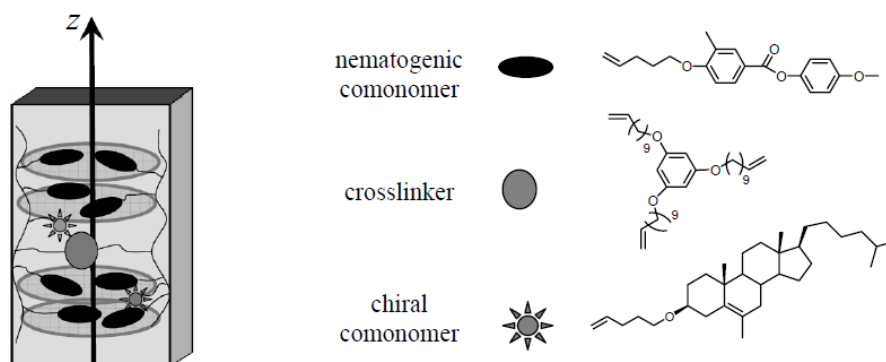


Figure 1. Scheme of Cholesteric Elastomer.

Until now the only biaxial extension of cholesteric films perpendicular to the helix has been performed (3).

We investigated mechanical properties of chiral nematic networks during uniaxial stretching along cholesteric helix. The results of the thermoelastic and stress-strain experiments on such samples were compared to the ones obtained on nematic systems. An essential difference in mechanical behavior was observed.

### References

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- (3) S.T. Kim, H. Finkelmann *Macromol. Rapid. Commun.* **2001**, 22, 429.