Scanning probe microscopy on liquid crystals and heterogeneous organic structures

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The scope of this thesis was the investigation of liquid crystals and heterogeneous organic structures with scanning probe techniques, like scanning force microscopy, scanning near-field optical microscopy and confocal microscopy.

The defects in a nematic liquid crystal were observed. At the same time the optical appearance and the topography were obtained.

On the focal conics texture in the chloesteric phase the well-known double spirals and heretofore unknown inverse spirals were observed. The B7 Phase of bent molecules shows steps and periodic structures, which indicate a layer structure and a helical superstructure.

It has been found, that the solar cells based on a poly-phenylene-vinylene derivate and fullerene derivate show a heterogeneous structure depending on preparation conditions. The exiction diffusionlength in the poly-phenylene-vinylene derivate was determined. A new method to modify the interface between the electron-acceptor and-donator was developed.

The pores of macroporous silicon were filled with a glassy-state nematic liquid crystal. After etching the silicone, the director field was determined by confocal microscopy. Polymer monodisperse nanoparticels were synthesized to obtain photonic crystals.