# Der Photorefraktive Effekt an Polymer-eingebetteten Flüssigkristallen

# (The photorefractive effect on polymer-dispersed liquid crystals)

Lutz Paelke

Abstract:

In this work, several organic photoconductors, sensitizers and liquid crystals have been studied concerning their suitability as components of a photorefractive polymer dispersed liquid crystal system.
From each of these groups, one substance was chosen: poly-[methyl-3--(9-carbazolyl)propyl)siloxane] as photoconducting matrix, Buckminsterfullerene $C_{60}$ as sensitizer and the nematic liquid crystalline mixture TL202 as electrooptic component.
In order to study the photorefractive behavior of the selected system, a holographic apparatus has been constructed. With this set up, time-dependent two-beam-coupling experiments to determine the gain $\Gamma$ and four-wave-mixing experiments to determine the diffraction efficiency $\eta$ can be performed simultaneously. The moving grating experiment to determine the phaseshift $\varphi$ of the written grating can also be performed.
Furthermore, a method for calculating the strength of the induced space-charge field from the measured modulation $\Delta n$ of the refractive index has been developed.
With the selected system, a gain of $\Gamma$ = 100 $cm^{-1}$ has been measured at an applied field of $E_e$ = 16 V/$\mu$m with the rise time of the grating formation beeing $\tau$ = 0,18 s.