Abstract

The present thesis focuses on the study of chemical materials through thermal lens techniques with femtosecond laser pulse train. To study chemical materials, I utilized two main experimental set-ups that were constructed and aligned in our laboratory. One of the setups is based on the two-color pump-probe mode-mismatched thermal lens Z-scan technique, and the other one is based on the Time resolved thermal lens technique. TL signal of a homologous series of primary alcohols shows unusual behavior along the alcohol series when compared to the expected TL signal calculated from physical parameters. Time resolved TL studies indicate the importance of convective mode of heat transfer for highly absorbing samples. The inclusion of the convection term in the TL study, gives an insight of the molecular properties of the system. The molecular heat convection strongly depends on molecular size and structure. This thesis has also included the Soret phenomenon, which is a very important physical phenomenon. Our study shows that the Soret effect depends on the molecular structure as well as on the molecular mass of the constituent components.