P R Alapati et al., J Material Sci Eng 2015, 4:3
http://dx.doi.org/10.4172/2169-0022.C1.031

OMICS International
conferenceseries.com

International Conference and Exhibition on
Mesoscopic & Condensed Matter Physics
June 22-24, 2015 Boston, USA

Study of molecular dynamics in two liquid crystal dimers using laser Raman spectroscopy

P R Alapati[1], D Bhuyan[1], T Kiranmala Devi[2], B Gogoi[3] and A Bhattacharjee[2]
[1]North Eastern Regional Institute of Science and Technology, India
[2]National Institute of Technology, India
[3]Tinsukia College, India

We report here the study of molecular dynamics in two liquid crystal dimer compounds of the homologous series α, ω – bis (4 – alkyl aniline benzylidene 4' –oxy) alkane series (m.OnO.m) using Raman Spectroscopy in the spectral region 1000-1735 cm-1 as a function of temperature. The compounds 6.O6O.6 and 6.O12O.6 were synthesized following a standard procedure available in literature and characterized using Differential Scanning Calorimetry and Polarizing Thermal Microscopy. The Raman spectra of these compounds were recorded at different temperatures using a Triaxmonochromator equipped with a CCD detector in the 1000-1735 cm-1 region. The spectra were recorded over a wide range of temperature starting from room temperature (crystalline phase) to 180°C (isotropic phase) for 6.O6O.6 and to 132°C for 6.O12O.6 at intervals of 0.1°C near the phase transition temperature and at 2°C elsewhere. The compound 6.O6O.6 exhibits SmA and SmF phases, whereas compound 6.O12O.6 exhibits the nematic phase. The precise values of peak positions, integrated intensities and line widths of some selected Raman bands have been obtained by curve fitting and deconvolution using GRAMS software. The changes in the molecular alignment and its effect on inter/intra molecular interactions at different phase transitions have been discussed and compared in this paper on the basis of variations in the Raman parameters with temperature. An important finding from our studies is that the compound 6.O6O.6 exhibits a rigidity that is similar to monomeric liquid crystalline systems like MBBA or TBBA, but very much unlike other dimmers, which possibly could explain the phase behavior of these symmetric dimers in comparison with liquid crystal monomers.

Biography

Dr. P.R Alapati obtained his Ph. D degree in Physics during 1988 from Nagarjuna University, India by working in the field of Liquid Crystals for my thesis on structural and phase transition studies in Schiff base liquid crystal monomers. After carrying out postdoctoral research at the university of Southampton, The United Kingdom on a Commonwealth scholarship and SERC, UK fellowship for two years, he joined North Eastern Regional Institute of Science and Technology, Itanagar, Arunachal Pradesh, India (a Deemed to be university established and fully funded by Government of India) as a lecturer in 1991. Now working as professor since 2009.

snigsam@yahoo.co.in

Notes: