

Mesomorphism in a Binary Mixture of Non-mesogens: A Dielectric Spectroscopy Investigation

A. K. George, D. M. Potukuchi^a, S. H. Al-Harhi, and C. Carboni

Department of Physics, College of Science, Sultan Qaboos University,
P.O. Box 36, Al-Khod 123, Muscat, Sultanate of Oman

^a Department of Physics, Jawaharlal Nehru Technological University (JNTU),
College of Engineering, Kakinada – 533 003, India

Reprint requests to Dr. A. K. G.; E-mail: akgeorge@squ.edu.om; Fax: (+968) 514228.

Z. Naturforsch. **59a**, 659 – 664 (2004); received June 14, 2004

We report on thermal microscopy and low frequency dielectric relaxation of a liquid crystal formed by mixing cholesterol with 1-hexadecanol. Though both components are non-mesogenic, the mixture is found to exhibit a smectic A phase. A 1 V_{p-p} a. c signal of 100 kHz was used to study the dielectric response, while the frequency was varied from 5 Hz to 10 MHz for relaxation studies. The dielectric loss in the smectic A phase exhibits a single Debye-type off-centered relaxation in the MHz region. The temperature variation of the relaxation frequency is presented by Arrhenius plots, and the corresponding activation energy is estimated. The temperature variation of the dielectric strength ($\Delta\epsilon = \epsilon_0 - \epsilon_\infty$) and the distribution parameter α in the smectic phase are estimated. The mesomorphic behavior of binary systems, where both components are non-mesomorphic, is discussed.

Key words: Smectic Liquid Crystals; Dielectric Permittivity; Dielectric Relaxation.