Lyotropic Liquid Crystal Based on Nonionic Surfactants as Media for Encapsulation of Bioactive Molecules

N.M. Selivanova*, Y.G. Galyametdinov
Kazan National Research Technological University, Kazan, Russia

**natsel@mail.ru*

In the last decade increasing interest in the use of lyotropic mesophases as matrices for delivery and controlled release of drugs and bioactive substances has been. The fact that many of the lyotropic liquid crystalline phases (in particular reverse hexagonal and cubic) have a priori nanoscale pore space with an ordered distribution in the bulk mesophase, provides high and uniform loading of the drug. LLCs based on nonionic surfactant are self-assembled into a large variety of morphologies that exist between isotropic liquid and solid crystalline. The dendrimers have gained interest in various applications in pharmaceuticals and biomedical systems, especially in the treatment of cancer. These macromolecules have a unique well defined "treelike" branching structure, which spreads out from a central core under systematic introduction of branching sites. The combination of dendrimer with LLCs may provide an advantageous drug delivery system.

In the present work, we demonstrate for the first time a complex prospective drug delivery system, based on a third generation poly(propylene imine) dendrimer (DAB-16) solubilized in the aqueous domains of lamellar mesophases $C_{12}EO_4$/La(III)/H_2O. Liquid crystal properties and structure parameters of LLC were established by methods of POM and SAXS.

The structure of complex was determined by FTIR and UV adsorption. The DAB-16 encapsulation concentration into structure to the two basic systems $C_{12}EO_4$/La(III)/H_2O with a water content of 36 wt. % and 63 wt. % were found. According to SAXS the incorporation of dendrimer molecules into the bilayer structure was proved. Fourier transform infrared were utilized to study the structural behavior of the mesophases, the localization of DAB-16 within the system, and the interactions between the guest molecule and the system's components. Based on results of spectral studies the interaction between lanthanum ions and dendrimer functional groups was established.

Acknowledgements N.S. thanks to the grant of RFBR (14-03-00109), Yu.G. thanks to the grant of RSF (14-13-00758).