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Environmentally Responsive Cholesteric Materials PETR SHIBAEV, CRISTINA SCHLESIER, ROBERT UHRLASS, Fordham University, IGOR YAMINSKY, Moscow State University, MOSCOW STATE UNIVERSITY TEAM — The majority of thermotropic cholesteric liquid crystals are hydrophobic and therefore not suitable for sensing environmental agents present in aqueous media. At the same time thermotropic liquid crystals (including thermotropic monomers) are easily manageable and can form almost ideal highly birefringent planar structures at appropriate temperatures. Thus, it is highly desirable to find new ways in order to modify the properties of thermotropic liquid crystals and make them more hydrophilic in a way that allows to retain their other properties. Two different ways of increasing hydrophilicity are suggested. The first one is a design of novel hydrophilic thermotropic mixtures containing derivatives of benzoic acids and/or cyclohexanoic acids as well as pyridine derivatives The second one is a modification of thermotropic liquid crystal properties by addition of hydrophilic nanoparticles. Both approaches result in highly hydrophilic materials suitable for environmental sensing. The properties of the materials are discussed. Cholesteric sensors sensitive to changes in pH are designed and studied. Higher pH results in a shift of the selective reflection band towards longer wavelength and pronounced color changes. The surface of the sensor analyzed by AFM also changes, which reveals the mechanism of the response. The semiquantitative model of response is suggested and discussed.

Petr Shibaev
Fordham University

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