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Chiral Liquid Crystals of Different Viscosities and the Detection of Volatile Organic Compounds LEE ANNE VIGILIA, DANIEL CARROZZI, WILLIAM CHARLES, VIOLET GUZMAN, XIAOYURUI WANG, PETR SHIBAYEV, American Institute of Physics, FORDHAM UNIVERSITY STUDENTS OF UNDERGRADUATE PHYSICS (FUSOUP) TEAM — Cholesteric and nematic liquid crystals (LCs) confined in different geometries such as rectangular, triangular and spherical grooves, as well as prepared as thin films and droplets were studied as promising gas sensors for volatile organic compounds (VOCs), namely ethanol, toluene, cyclohexane, and acetic acid. A variety of illuminating conditions was used to find an optimal configuration that provided the best sensitivity and selectivity of LCs to the VOCs. Differences in responses were studied for planar and homeotropic orientation of LCs on the substrates. It was found that waveguide geometry has a number of advantages for detecting small concentrations of VOCs well before LCs undergo isotropization transition. The light propagation in the waveguides was analyzed. The sequence of transitions previously discovered in [1] (change of order parameter on the surface of LC, mass transfer between areas of LC with different order parameter and isotropization) was confirmed for LCs with relatively low viscosities (c.a. 102). The prototype of the VOCs smelling nose was built in order to selectively detect the presence of VOCs in the air. Its characteristics, functioning and optimization were analyzed.

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