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Liquid Crystalline Compositions as Gas Sensors PETR SHIBAEV, JOHN MURRAY, ANTHONY TANTILLO, MADISON WENZLICK, Fordham University, JORDAN HOWARD-JENNINGS, Bronx Science High School — Droplets and films of nematic and cholesteric liquid crystalline mixtures were studied as promising detectors of volatile organic compounds (VOCs) in the air. Under increasing concentration of VOC in the air the detection may rely on each of the following effects sequentially observed one after the other due to the diffusion of VOC inside liquid crystalline matrix: i. slight changes in orientation and order parameter of liquid crystal, ii. formation of bubbles on the top of the liquid crystalline droplet due to the mass transfer between the areas with different order parameter, iii. complete isotropisation of the liquid crystal. All three stages can be easily monitored by optical microscopy and photo camera. Detection limits corresponding to the first stage are typically lower by a factor of 3-6 than detection limits corresponding to the beginning of mass transfer and isotropisation. The prototype of a compact sensor sensitive to the presence of organic solvents in the air is described in detail. The detection limits of the sensor is significantly lower than VOC exposure standards. The qualitative model is presented to account for the observed changes related to the diffusion, changes of order parameter and isotropisation.

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