Hands-on experiments with liquid crystals

Jerneja Pavlin, Katarina Susman, Sasa Ziherl, Maja Pecar, Natasa Vaupotic, Mojca Cepic

Liquid crystals are materials, on which a number of modern devices or their parts like displays, iPhones etc. are based. As they are so common, it is worth to introduce them into physics lecture. Therefore we prepared the workshop, which uses easily available materials or materials synthesized in the school laboratory for experiments explaining the basic properties of liquid crystals used in applications.

Liquid crystals are materials which have at least one liquid crystalline phase. The important properties of liquid crystal are optical – birefringence and colours – and the electrical one.

The hands-on fabricated liquid crystalline cells shown in the workshop are used to demonstrate some optical properties of liquid crystals. The cells can be made of a microscope glass, cover glass and tape. The cells are filled by the MBBA liquid crystal, which can be synthesized in a school lab.

First a cell with uniform thickness is made and filled by liquid crystal. The cell is put between two crossed polarizing foils and observed under the school microscope. One can observe colours. By rubbing the cover glass by velvet one can also prepare a cell in which the orientation of molecules in the cell is defined by the surface anchoring. The colours and the orientation of molecules disappear if the cells are heated by a hairdryer.

Birefringence of liquid crystals can be demonstrated by using a wedge cell. Polarizing foils are used to check the polarization of the ordinary and extraordinary beam. When the wedge cell is heated by a hairdryer one of the rays disappears.

Contact information
Ms. Jerneja Pavlin
University of Ljubljana
Faculty of Education
Slovenia
E-mail: jerneja.pavlin@pef.uni-lj.si