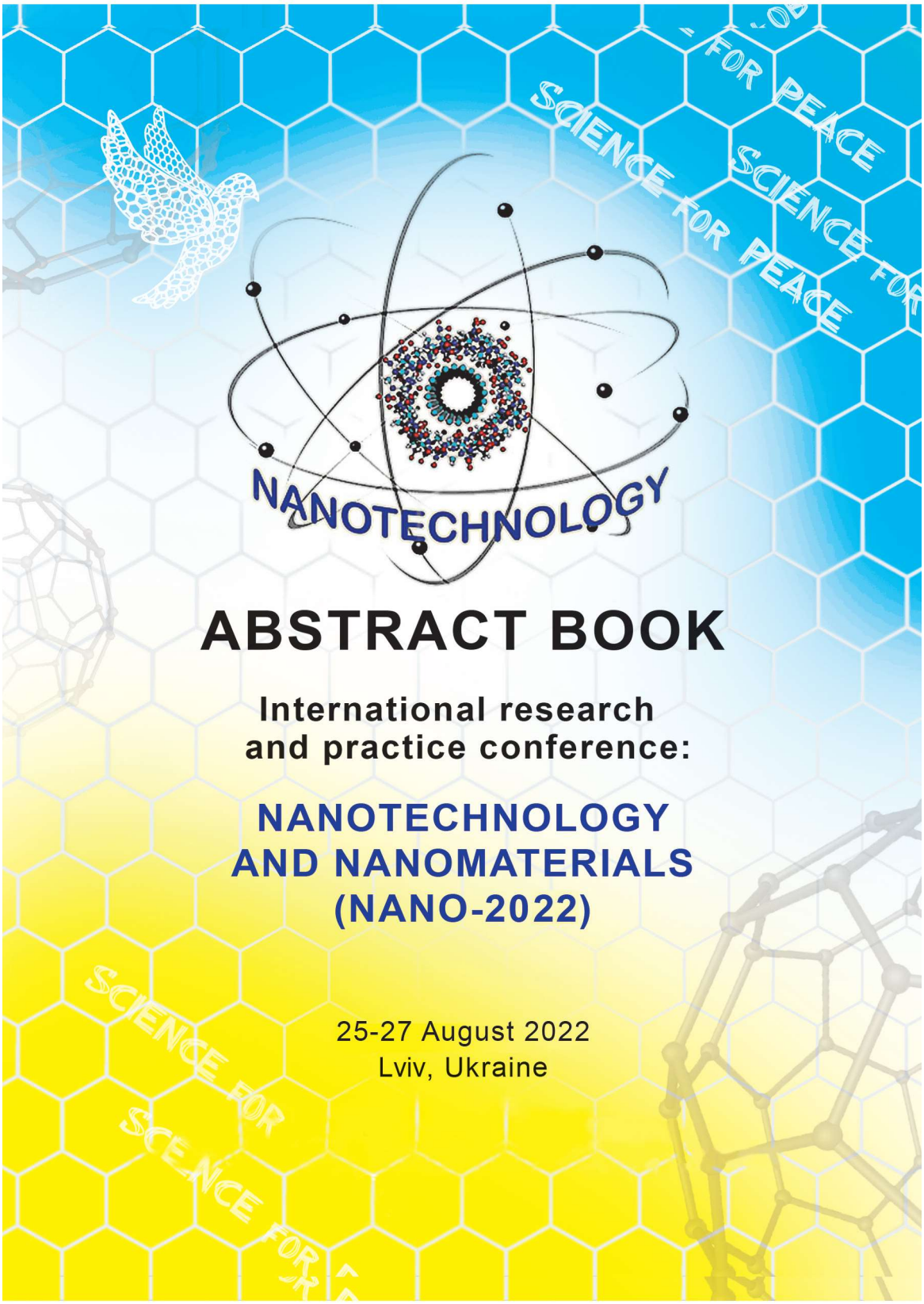

ABSTRACT BOOK

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Surface plasmon oscillations control by nematic liquid crystal reorientation

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We present the study of the surface plasmon polariton propagation properties control by imposing a reorientation in the adjacently located nematic liquid crystal. A plane nematic liquid crystal cell, initially oriented homeothropically, is placed into a static electric field parallel to the substrates. Due to the influence of the electric field the liquid crystal starts to deviate from the initial orientation, posing a change in the dielectric function of the liquid crystal cell. One of the substrates of the liquid crystal cell contacts with a thin metal coating, on the interface with which the surface plasmon polariton can propagate. The properties of the surface plasmon polariton (most importantly the effective refraction index) are reflecting the change of the liquid crystal orientation.

The calculation of the surface plasmon polariton properties in such structure were performed both analytically, using an adapted perturbation technique presented in [1], as well as by direct numeric solution of the Maxwell's equations. The dielectric function of the investigated structure is determined by the principal values of the dielectric permittivities as well as by the director profile of the liquid crystal. The latter is calculated by minimizing the free energy of the liquid crystal cell, as described in [2].

The performed calculations show that the effective refraction index of the surface plasmon polariton as a function of the external electric field strength can possess a hysteresis-like behavior. That is, the effective refractive index is an ambiguous function of the electric field strength, and its value is highly influenced by the previous states of the system. The parameters and criteria for such hysteresis to occur are calculated. Such phenomenon is likely to prove useful in constructing plasmonic switches and basic memory units.

*1. Daly K., Abbott S., D'Alessandro G., Smith D., Kaczmarek M. Theory of hybrid photorefractive plasmonic liquid crystal cells // J. Opt. Soc. Am. B.-2011.-**28**.-P. 1874-1881.*

2. Yang D.-K., Wu S.-T. Fundamentals of Liquid Crystal Devices // John Wiley and Sons.-2015.