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BOOK OF ABSTRACTS

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The NANO-2017 Conference was organized by the Institute of Physics of NAS of Ukraine with the participation of the Yuriy Fedkovych Chernivtsi National University (Ukraine), University of Tartu (Estonia), University of Turin (Italy), Pierre and Marie Curie University – Paris 6 (France) and Representative office of Polish Academy of Sciences in Kiev.

NANO-2017 was the fifth conference in the series of NANO-conferences initiated by the Institute of Physics of NAS of Ukraine in 2012 in the framework of FP7 Nanotwinning project. From year to year, they attract more attention and participants. In 2012, the first meeting was held in the format of International Summer School for young scientists "Nanotechnology: from fundamental research to innovations". The 2013 and 2014 conferences were organized in conjunction with the International Summer Schools for young scientists under the same title. In 2013, this event was attended by more than 300 scientists, in 2014-2015, 450 scientists took part and in 2016 it gathered above 650 participants from Ukraine, Poland, Italy, Estonia, France, Austria, Germany, Greece, Turkey, USA, Romania, Moldova, Czech Republic, Taiwan, Lithuania, Egypt, Iran, India, Algeria, Indonesia and other countries. In 2017 Organizer Committee has received more than 700 application forms from about 25 countries of the world.

The NANO-2017 conference brought together leading scientists and young researchers from many countries of the world. This year its topics were as follows: Nanoobjects' microscopy; Nanocomposites and nanomaterials; Nanostructured surfaces; Nanooptics and photonics; Nanoplasmonics and surface enhanced spectroscopy; Nanochemistry and biotechnology; Nanoscale physics; Physico-chemical nanomaterials science.

This year the NANO-2017 Conference was organized in the framework of the NAS of Ukraine Program «Fundamental issues of creation of new nanomaterials and nanotechnologies» for 2015–2019.

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Nonlinear helical winding in highly viscous chiral thin films

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Novel highly viscous chiral liquid crystalline (HVCLC) compositions have been attracting a lot of interest due to sensitivity of their photonic band gap to shear deformation. The system has revealed a gigantic shift of the selective reflection band under stretching and manifested mechanically tuned lasing in a wide range [1,2]. Novel rotation/displacement remote sensors with high accuracy and discrimination being well inferior to milliradians could be realized with these compositions [3].

The HVCLC systems were obtained by mixing cyclic oligomers able to form glassy state at a room temperature with low molar mass compounds based on cholesterol derivatives. Optical transformations occurring under a minute shift of substrates bounding HVCLC compound and their dependence on the concentration clearly point to the inclination and expansion of the helical structure that does not correspond to the behavior of usual low molecular mass cholesterics. In addition, the composition manifests an unusual nonlinear concentration dependence of its helical periodicity.

The model of coil formation due to physical bonding of nano- and micro-clusters of cyclic oligomer molecules is proposed for explaining the observed effects. Such elastic “floating springs” should influence the both optical and mechanical properties of HVCLC that could be useful for different electro-optical applications or opto-mechanical and deformation sensing.

1 *Shibaev P. V., Rivera P., Teter D. et al. Color changing and lasing stretchable cholesteric films // Opt. Express. – 2008. – 16. – P. 2965–2970.*

2 *Shibaev P. V., Uhrlass R., Woodward S. et al. Cholesteric materials with photonic band gap sensitive to shear deformation and mechanical sensors // Liq.Cryst. – 2010. – 37. – P. 1601–1604.*

3 *Shibaev P. V., Iljin A., Troisi J., Reddy K. Distant optical detection of small rotations and displacements by means of chiral liquid crystals // AIP Advances. – 2014. – 4. – P. 017115-11.*