ABSTRACT BOOK

International research and practice conference:

NANOTECHNOLOGY AND NANOMATERIALS (NANO-2017)

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This book contains the abstracts of contributions presented at the International research and practice conference "Nanotechnology and Nanomaterials" (NANO-2017).

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 Nanotwining 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.

Website of the Nano-2017 conference: http://www.iop.kiev.ua/~nano2017/

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Processing of thin films of organic-inorganic perovskites $CH_3NH_3PbI_3$ with control of microstructure

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In recent years, organic–inorganic metal halide perovskites $APbX_3$ ($A = CH_3NH_3$, X = Cl, Br, I) have been one of the most intensively investigated optoelectronic materials by researchers in many different disciplines [1]. Solar cell based on organic-inorganic perovskite evinces 20% solar conversion efficiency, what are approaching commercial monocrystalline silicon solar cells and has relatively low production costs [2].

In this work, the effect of starting reagents (CH_3NH_3I:PbI_2) with different ratios in raw solutions on the microstructure, phase composition, absorption, and luminescence spectra of the films of organic-inorganic perovskites $CH_3NH_3PbI_3$ has been investigated.

Organic-inorganic metal halide perovskite films by one-step deposition have been obtained. Starting reagents (PbI_2 and CH_3NH_3I) in different ratios were dissolved in DMF, and stirred until optically clear solutions are formed. The resulting solutions were spin-coated on the glass substrates. It has been found that the microstructure of films strongly depends on the ratio of starting reagents. With the stoichiometric ratio of the starting reagents, the films are formed by needle-like particles and with an increase in the content of CH_3NH_3I, a transition to the particles of a rounded and, subsequently, faceted shape is observed. At the same time, the fluorescence intensity of films increases and the absorption in the optical range becomes more selective.

1 *Brenner T. M., Egger D. A., Kronik L., Hodes G., Cahen D.* Hybrid organic-inorganic perovskites: low-cost semiconductors with intriguing charge-transport properties // Nature Reviews Materials. – 2016. – 1. Article: 15007.
2 *Cahen D., Lubomirsky I.* Self-Repairing Energy Materials: Sine Qua Non for a Sustainable Future // Acc. Chem. Res. – 2017. – 50. P 573-576.