



ABSTRACT BOOK

**International research
and practice conference:**

**NANOTECHNOLOGY
AND NANOMATERIALS
(NANO-2018)**

27-30 August 2018
Kyiv, Ukraine

dedicated to the 100th Anniversary
of the National Academy of Sciences of Ukraine

**INTERNATIONAL RESEARCH
AND PRACTICE CONFERENCE
“NANOTECHNOLOGY
AND NANOMATERIALS”
(NANO-2018)**

**27-30 August 2018
Kyiv, Ukraine**

**dedicated to the 100th Anniversary
of the National Academy of Sciences of Ukraine**

**BOOK OF ABSTR
ACTS**

The International research and practice conference “Nanotechnology and nanomaterials” (NANO-2018). Abstract Book of participants of the International research and practice conference, 27 - 30 August 2018, Kiev. Edited by Dr. Olena Fesenko. - Kiev: SME Burlaka, 2018. - P. 818.

This book contains the abstracts of contributions presented at the International research and practice conference “Nanotechnology and Nanomaterials” (NANO-2018).

The NANO-2018 Conference was organized by the Institute of Physics of NAS of Ukraine with the participation of the Taras Shevchenko National University of Kyiv (Ukraine), University of Tartu (Estonia), University of Turin (Italy) and Pierre and Marie Curie University - Paris 6 (France).

NANO-2018 was the sixth 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 2014-2016, 450 scientists took part and in 2017 it gathered above 700 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-2018 conference brought together leading scientists and young researchers from many countries of the world. This year its topics were as follows: Nanobiotechnology for health-care; Nanochemistry and biotechnology; Nanocomposites and nanomaterials; Nanoobjects microscopy; Nanooptics and photonics; Nanoplasmonics and surface enhanced spectroscopy; Nanoscale physics; Nanostructured surfaces; Physico-chemical nanomaterials science.

This year the NANO-2018 Conference was organized in the framework of the NAS of Ukraine Program «Fundamental issues of creation of new nanomaterials and nanotechnologies» for 2015-2019.

Conference of this year is dedicated to celebration of 100 years of National Academy of Science of Ukraine foundation. It's a great honor for us to organized conference where our scientists can get, exchange and share experience with abroad colleagues, and it is pleasure to be part of this. We always will work in this direction.

Website of the Nano-2018 conference: <http://nano-conference.iop.kiev.ua/>

ISBN: 978-966-97694-0-4

© International Science and Innovation cooperation. Technology transfer Department of Institute of Physics of NAS of Ukraine, 2018

**Welcome to International Conference
«NANOTECHNOLOGY
AND NANOMATERIALS»!**

It gives me a great pleasure to welcome you all at the International conference "Nanotechnology and nanomaterials" (NANO-2018) that will be held in Kiev from August 27 to 30, 2018. Its aim is to promote scientific contacts and discussions between researchers representing various fields.

Previous NANO Conferences, held in Ukraine in 2012-2017, were organized in the joint format with the International Summer Schools "Nanotechnologies and nanomaterials: from fundamental research to innovations". They allowed the participants, including young scientists, to familiarize with current research and application problems in this area and thus to promote further implementation of nanotechnologies into innovations which meet public needs. The events also gave the opportunity to young and early-career researchers to attend lectures of internationally recognized experts and roundtable discussions on the emerging fields in nanosciences and nanotechnologies.

Our International Conferences and Summer Schools received a positive feedback from international experts and sparked interest in the media. This year above 850 registration forms have been received from scientists representing more than 25 countries. I would like to thank all participants of these events for their active participation. We also acknowledge the support of the NANO-2018 Conference obtained in the framework of the NAS of Ukraine Program «Fundamental issues of creation of new nanomaterials and nanotechnologies» for 2015-2019.



***In situ* controlled reversible transformations of As₅₆Se₄₄ nanolayers for application as active media in all optical signal processing systems**

Kondrat O.B.¹, Holomb R.M.¹, Kondrat O.O.², Csik A.³, Takats V.³, Veres M.⁴, Vondráček M.⁵, Tsud N.⁶, Matolin V.⁶, Prince K.C.⁷ and Mitsa V.M.¹

¹ *Uzhhorod National University, Pidhirna Str., 46, 88000 Uzhhorod, Ukraine.*

E-mail: o.b.kondrat@gmail.com

² *Lviv Polytechnic National University, 12, Stepan Bandera street, 79013, Lviv, Ukraine*

³ *Institute for Nuclear Research, Hungarian Academy of Sciences, H-4001 Debrecen, Hungary.*

⁴ *Wigner Research Centre for Physics, Hungarian Academy of Sciences, 1121 Budapest, Hungary.*

⁵ *Institute of Physics, Academy of Science of the Czech Republic, Na Slovance 2, CZ-182 21 Praha 8, Czech Republic.*

⁶ *Charles University, Faculty of Mathematics and Physics, Department of Surface and Plasma Science, V Holešovičkách 2, 18000 Prague 8, Czech Republic.*

⁷ *Elettra-Sincrotrone Trieste S.C.p.A., Area Science Park, Strada Statale 14, km 163.5, 34149 Basovizza (Trieste), Italy*

The As₅₆Se₄₄ nanolayers were deposited onto silicon substrates *in situ* by ordinary thermal evaporation of bulk glass powder at a temperature (T) of 220 °C [1]. Thermal annealing of as-prepared films was performed at T_{an} ~ 100 °C during 0.5 h. A green diode laser operating at wavelength of 532 nm (corresponding photon energy of ~2.33 eV) was used for *in situ* modification of the surface structure of annealed nanolayers. It was found that *in situ* above-bandgap laser illumination stimulates diffusion processes in As₅₆Se₄₄ nanolayers and leads to formation of new structural units (s.u.) with homopolar Se-Se and As-As bonds. The effect of ordering in the structure of illuminated As-Se films during second step of thermal annealing was detected. The appearance of homopolar bonds in the structure of As-Se film surface after second laser illumination were established. Results show that the structural changes of As-Se nanolayers is fully reversible during the cycles of thermal annealing and laser illumination.

1. O.B. Kondrat, R.M. Holomb, A. Csik, et al. Reversible structural changes of *in situ* prepared As₄₀Se₆₀ nanolayers studied by XPS spectroscopy// *Appl Nanosci* (2018). <https://doi.org/10.1007/s13204-018-0771-3>.