



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
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**BOOK OF ABSTR
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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

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**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.



Gold-catalyzed synthesis of As_2S_3 nanolayers and their characterization by electron microscopy, surface-enhanced Raman spectroscopy and DFT calculations

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We report on the growth of cage-like molecular nanocrystals on the surface of As_2S_3 films synthesized by gold-catalyzed thermally initiated chemical vapor deposition. The Si substrates covered with a layer of 5, 20, 40 and 60 nm spherical gold nanoparticles were placed downstream and maintained at temperature of ~ 100 °C in a tube furnace flowed with As_2S_3 vapor for film preparation. The vapor was obtained by sublimation of As_2S_3 glass powder at temperature elevated up to ~ 300 °C and was forced to downstream by H_2/As carrier gas.

The formation of crystallites, their size and shape on the surface of As_2S_3 films are well defined by electron microscopy. The Raman spectra of obtained structures demonstrate crystal-like spectral behavior and show essential differences in comparison with the Raman spectra of As_2S_3 in their both glassy and crystalline states. The results of density functional theory (DFT) calculations of Raman active modes of different cage-like As-S nanoclusters [1] were combined with the results of Raman and surface-enhanced Raman spectroscopy (SERS) study in order to interpret the experimental spectra of crystallites and to identify their structure. The main bands in the SERS spectra of synthesized As_2S_3 films are located at 168, 192, 218, 228, 307, 312, 328, 341, 362, 368 and 386 cm^{-1} . Structural characterizations indicate that the crystallites are built from As_4S_5 molecular units. An ordered sequence of As_4S_5 cage-like molecules connected by weak dispersion Van der Waals forces form tetra-arsenic pentasulfide crystallites (uzonite).

1. Holomb R.M. First-principles calculations and characterization of As_4S_m and As_4S_m ($m=1-6$) type molecular clusters // *Uzhhorod University Scientific Herald. Series Physics.* - 2014.-33.-P. 30-35.