



ABSTRACT BOOK

International research
and practice conference:

**NANOTECHNOLOGY
AND NANOMATERIALS
(NANO-2019)**

27-30 August 2019
Lviv, Ukraine

**INTERNATIONAL RESEARCH
AND PRACTICE CONFERENCE
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BOOK OF ABSTRACTS

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This book contains the abstracts of contributions presented at the International research and practice conference “Nanotechnology and Nanomaterials” (NANO-2019).

The NANO-2019 Conference was organized by the Institute of Physics of NAS of Ukraine with the participation of the Lviv Polytechnic National University, University of Tartu (Estonia), University of Turin (Italy) and Pierre and Marie Curie University – Paris 6 (France). The Conference is supported by EEN.

The NANO-2019 was the seventh 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, the Conference 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 2017-2018 it gathered above 650 participants from Ukraine, Poland, Italy, Estonia, France, Austria, Germany, Greece, Turkey, USA, Romania, Moldova, Czech Republic, Republic of China, Lithuania, Egypt, Iran, India, Algeria, Indonesia and other countries. In 2019 Organizer Committee has received more than 700 application forms from about 25 countries of the world.

The NANO-2019 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-2019 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-2019 conference: <http://nano-conference.iop.kiev.ua/>

Electrical and structural characterization of PEDOT:PSS composites reinforced with single/multi-walled carbon nanotubes

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In this work we experimentally analyze structural features and electrical behavior of PEDOT:PSS polymer layers with inclusions of high-purity single-walled (SWCNTs) or multi-walled carbon nanotubes (MWCNTs).

It is shown that all investigated samples show lowest impedance (highest conductivity) at room temperature and electrical conductivity decrease upon cooling. General trend is that $\text{Re}(Z)$ slightly increases with frequency from 1 kHz to up to some threshold frequency and then drops rapidly. This threshold frequency for pure PEDOT:PSS and PEDOT:PSS/SWCNTs samples is about 100 kHz and is somewhat lower for composite layers with MWCNTs. For layers reinforced with SWCNTs, increase of impedance is more gradual and even more so for MWCNTs-reinforced composites. In the latter case, reliable measurements can be performed even at temperatures as low as 40K. Such specific temperature behaviour of electrical properties may be a consequence of the change in contamination of residual impurity molecules. In samples with incorporated CNTs the conditions for residual molecules trapping are potentially different due to structural changes introduced by specific nanofiller, so that time needed for their complete removal is different and the process is eventually finished at different temperature. This assumption is further supported by the fact that samples with MWCNTs show slower growth of real impedance with decreasing temperature and generally have higher conductivity at lowest measured temperatures.

Scanning electron microscopy investigation confirmed strong tendency of nanotube bundles formation, especially in the case of multi-walled nanotubes. Local fragments of conductive network formed by nanotubes were confirmed.