



# **ABSTRACT BOOK**

**International research  
and practice conference:**

**NANOTECHNOLOGY  
AND NANOMATERIALS  
(NANO-2017)**

**23 - 26 August 2017  
Chernivtsi  
Ukraine**



**INTERNATIONAL RESEARCH  
AND  
PRACTICE CONFERENCE  
“NANOTECHNOLOGY  
AND NANOMATERIALS”  
(NANO-2017)**

**23-26 August 2017  
Chernivtsi, UKRAINE**

**BOOK OF ABSTRACTS**



**The International research and practice conference “Nanotechnology and nanomaterials” (NANO-2017).** Abstract Book of participants of the International Summer School and International research and practice conference, 23-26 August 2017, Chernivtsi. Edited by Dr. Olena Fesenko. – Kiev: SME Burlaka, 2017. – P. 854.

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 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.

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

ISBN: 978-966-97587-3-6

© International Science and Innovation cooperation, Technology transfer  
Department of Institute of Physics of NAS of Ukraine, 2017



## Positron-positronium trapping effects near grain boundaries and in nanopores in the modified MgO-Al<sub>2</sub>O<sub>3</sub> ceramics

*Klym H.<sup>1</sup>, Ingram A.<sup>2</sup>, Shpotyuk O.<sup>3</sup>, Hadzaman I.<sup>4</sup>, Karbovnyk I.<sup>5</sup>, Kostiv Yu.<sup>1</sup>, Ivanusa A.<sup>6</sup>*

- <sup>1</sup> Lviv Polytechnic National University, Bandery str., 12, Lviv-79013, Ukraine  
E-mail: halyna.klym@lpnu.ua; klymha@yahoo.com
- <sup>2</sup> Opole University of Technology, Ozimska str., 75, Opole- 45370, Poland
- <sup>3</sup> Vlokh Institute of Physical Optics, Dragomanova str., 23, Lviv-79005, Ukraine
- <sup>4</sup> Drohobych State Pedagogical University,  
L. Franko str., 24, Drohobych-82100, Ukraine
- <sup>5</sup> Ivan Franko National University of Lviv,  
Dragomanova str., 50, Lviv-79005, Ukraine
- <sup>6</sup> Lviv State University of Life Safety, Kleparivska str., 35, Lviv-79000, Ukraine

The positron annihilation lifetime (PAL) spectroscopy method based on the fact that the unstable positron-electron system (positronium Ps) is repelled from ionic cores of atoms and tends to location in open pores. In the case of oxide water-immersed ceramics, two channels of PAL should be considered – the positron trapping and o-Ps decaying [1]. In general, these processes are independent ones. However, if trapping sites will appear in a vicinity of grain boundaries neighboring with nanopores, they can become mutually interconnected resulting in a significant complication of the measured PAL spectra. In addition, adsorbed water influences on process near grain boundaries and in nanopores in the MgO-Al<sub>2</sub>O<sub>3</sub> ceramics.

To clarify this feature, we shall study the PAL characteristics of modified MgO-Al<sub>2</sub>O<sub>3</sub> ceramics affected to water sorption treatment enhancing o-Ps decaying over positron trapping modes using positron-positronium trapping algorithm. To apply positron-positronium trapping algorithm it was shown that the chemical-adsorbed water vapor modifies structural defects located at the grain boundaries in a vicinity of nanopores, this process being accompanied by void fragmentation during water adsorption and agglomeration during water desorption after drying.

---

1 Klym H., Ingram A., Hadzaman I., Shpotyuk O. Evolution of porous structure and free-volume entities in magnesium aluminate spinel ceramics // *Ceramics International*, vol. 40, 2014, pp. 8561–8567.