



Nano – 2016

## 4th International Conference “Nanotechnologies”

Nano – 2016

October 24 – 27, 2016, Tbilisi, Georgia

<http://nano2016.gtu.ge/>

*Welcome to Nano – 2016!*

Conference is organized by the Georgian Technical University



**St. George Monument, Liberty Square, Tbilisi, Georgia**

The 4th International Conference “Nanotechnologies” (NANO – 2016) will be devoted the methods of synthesizing of nanomaterials, studying their structure, chemical, physical and technological properties, as well as applications in techniques. Conference will provide an evaluation of the present state-of-art in this field of knowledge, new achievements and prospects of developments in nanotechnologies. At the planned oral and poster sessions, it will be presented results of experimental investigations of nanosystems, as well as theoretical approaches to their modeling. Conference will be a forum of nanoscientists for broad interdisciplinary discussions and, therefore, not only intensify the actual collaboration, but also facilitate the future developments of international cooperation in nanotechnology research.

### **Oral and poster sessions**

- Nanotechnology
- Nanophysics
- Nanochemistry
- Nanobiology and Nanomedicine
- Nano Materials Science
- Nanoengineering
- Nano Safety
- Nano Education

## International Scientific Committee

*Chairman :*

**Archil Prangishvili** (Georgia)

*Vice-Chairmen :*

**Zurab Gasitashvili** (Georgia)

**Alex Gerasimov** (Georgia)

*Members :*

**Rosa Abdulkarimova** (Kazakhstan)

**Zhores Alferov** (Russia)

**Hossein Aminian** (Canada)

**Rick Becker** (USA)

**Levan Chkhartishvili** (Georgia)

**Toyohisa Fujita** (Japan)

**Fathi Habashi** (Canada)

**Bilgin Kaftanoglu** (Turkey)

**Pawan Khanna** (India)

**Boris Kharisov** (Mexico)

**Laszlo Kotai** (Hungary)

**Haldun Kurama** (Turkey)

**George Kvesitadze** (Georgia)

**Olena Lavrynenko** (Ukraine)

**Sergey Maksimenko** (Belarus)

**Fernand Marquis** (USA)

**Victor Mordkovich** (Russia)

**Valentine Parmon** (Russia)

**Vladimir Sanin** (Russia)

**Lina Sartinska** (Ukraine)

**Sebastian Schlucker** (Germany)

**Klaus Thiessen** (Germany)

**Onuralp Yucel** (Turkey)

**Pawel Zukowski** (Poland)

**Zbigniew Zytkeiwicz** (Poland)

## National Organizing Committee

*Chairman :*

**Alex Gerasimov**

*Secretary :*

**Levan Chkhartishvili**

*Members :*

**Aliosha Bakuridze**

**Amiran Bibilashvili**

**Guram Chikladze**

**Mikheil Chikhradze**

**Nikoloz Chikhradze**

**Raphael Chikovani**

**George Chiradze**

**Archil Chirakadze**

**Guram Dgebuadze**

**Akaki Gigineishvili**

**Kakha Gorgadze**

**David Jishiashvili**

**Paata Kervalishvili**

**Levan Matsaberidze**

**Shota Sidamonidze**

**David Tavkhelidze**

**Michael Vepkhvadze**

**Otar Zumburidze**

## Conference Important Dates

*Abstracts Submission Deadline :*

30 June, 2016

*Notification of Including in Program :*

15 July, 2016

*Registration Deadline :*

31 July, 2016

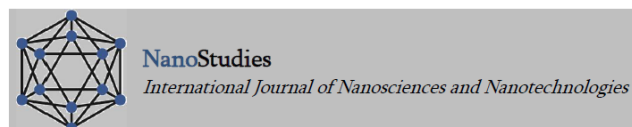
**Attention:** Registration Fee for any participants, who is the (co)author of a presentation included in the Conference Program, will be paid by the Georgian Technical University.

## Publication of Conference Proceedings

Abstracts of all the presentations included in Conference Program will be published as a separate volume and Abstracts Book will be handed to Conference attendees. Full-texts of the presentations made at Conference will be published in following journals:

*Nano Studies*

[www.NanoStudies.org](http://www.NanoStudies.org)



*European Chemical Bulletin*

[www.eurchembull.com](http://www.eurchembull.com)



*American Journal of Nano Research and Applications*

Special Issue "Nanotechnologies"

<http://www.sciencepublishinggroup.com/specialissue/226029>



## Abstracts

One-page Abstract (file – .doc or .docx, font – Sylfaen, size – 12, and spacing – No Spacing) should be prepared according to the template, i.e., include title, author(s) initials and family name(s), affiliation(s) and e-mail address(es), city and country, and body-text. Illustrations, tables and list of references can be inserted in the same file.

## Conference Working Language is English

Abstracts, slides for oral presentations, posters and texts of papers should be prepared in **English**.

## Social Program

There are planned

- Welcome party for participants
- Visiting Georgian National Museum
- Trip in city Gori and its vicinity
- Gala-banquet for participants

**Attention:** Social program for any participant, who is the (co)author of a presentation included in the Conference Program, will be made free of charge by the Georgian Technical University.

## Contact

Before the coming of participants-registration and abstracts-submission systems, please send your personal details and abstracts to Secretary of National Organizing Committee

Prof. Levan Chkhartishvili: [chkharti2003@yahoo.com](mailto:chkharti2003@yahoo.com)



Tbilisi by night

### ON POSSIBLE NATURE OF METALLIC CONDUCTANCE OF BORON–NITROGEN COMPOUNDS

R. Becker <sup>1</sup>, L. Chkhartishvili <sup>2</sup>

<sup>1</sup>Cluster Sciences Research Institute  
Boron Metamaterials  
Ipswich, MA, USA  
*rbecker@clustersciences.com*

<sup>2</sup>Georgian Technical University  
Department of Engineering Physics  
Tbilisi, Georgia  
*chkharti2003@yahoo.com*

It is well proved (e.g., see our calculations [1 – 4]) that, all the boron nitrides BN – diatomic molecule, crystalline modifications, nanotubular and fullerene-like structures – possess wide band or HOMO – LUMO gaps, what limits their applications. Recently, hypothetical tetragonal phase has been found [5] to be metallic, but metastable as compared to the known BN crystals. Usually, the metallicity of boron nitrides with the stoichiometric ratios of B : N  $\approx$  1 : 1 are related to structural defects and / or impurities (e.g., see [6]). There are number of evidences that boron nitride structures prefer the stoichiometry with B-excess. In particular, the phase equilibrium studies in the B / BN system by both in situ experiments and thermodynamic calculations have revealed the existence of solid boron subnitrides BN<sub>x</sub>,  $x \ll 1$  [7]. All these phases can be imagined as mixtures of boron crystalline modifications doped with N. Because icosahedron B<sub>12</sub> is known to be their main structural motif, the presumable local geometries of environments of N atoms in boron-rich B / N systems can be constructed on the basis of crystal structure data on B<sub>12</sub>-networks [8]. We reported [9] a mass-spectrometric study of boron clusters containing B<sub>12</sub>, which produced by laser vaporization from boron-rich targets and demonstrated [10] that, created boron clusters can be self-assembled into nanostructures. These studies together with results available in literature on behavior of N in boron crystals [11] lead to the conclusion that, N atoms have to occupy the nano-sized crystallographic voids characteristic for boron-rich structures.

It was demonstrated both experimentally [12] and by us theoretically [13] that, in semiconducting boron crystals heavily doped with donor-impurities the covalent–metallic conversion can occur. Similarly, BN<sub>x</sub> compounds are expected to be metallic. Boron is less electronegative than nitrogen. However, in boron nitrides with boron excess, B atoms enable to form icosahedra and other clusters enhancing the electronegativity of the B-component. Thus, N atoms should act as electron-donors.

1. L. Chkhartishvili, D. Lezhava, O. Tsagareishvili. J. Solid State Chem., 2000, 154, 148.
2. L. S. Chkhartishvili. Phys. Solid State, 2004, 46, 2126.
3. L. Chkhartishvili. J. Solid State Chem., 2004, 177, 395.
4. L. Chkhartishvili. Mater. Sci. Ind. J., 2006, 2, 18.
5. Sh. Zhang, Q. Wang, Y. Kawazoe, P. Jena. J. Am. Chem. Soc., 2013, 135, 18216.
6. Y. Guo, W. Guo. Nanoscale, 2014, 6, 3731.
7. V. L. Solozhenko, O. O. Kurakevych. J. Solid State Chem., 2009, 182, 1359.
8. I. Higashi, T. Ishii. Forma, 2001, 16, 187.
9. S.-J. Xu, J. M. Nilles, D. Radisic, W.-J. Zheng, S. Stokes, K. H. Bowen, R. C. Becker, I. Boustani. Chem. Phys. Lett., 2003, 379, 282.