15th International Conference on the Physics of Non-Ideal Plasmas Almaty, August 30- September 4, 2015

# Book of Abstracts

## 15th International Conference on the Physics of Non-Ideal Plasmas Almaty, August 30 - September 4, 2015

Al-Farabi Kazakh National University

Institute of Experimental and Theoretical Physics

National Laboratory of Nanotechnology

TNS-INTEC

Insitute of Applied Sciences and Information Technologies

IASIT

Laboratory of Engineering Profile

15th International Conference on the Physics of Non-Ideal Plasmas Almaty, August 30- September 4, 2015

# Book of Abstracts

## 15th International Conference on the Physics of Non-Ideal Plasmas Almaty, August 30 - September 4, 2015

Al-Farabi Kazakh National University

Institute of Experimental and Theoretical Physics

National Laboratory of Nanotechnology

TNS-INTEC

Insitute of Applied Sciences and Information Technologies

IASIT

Laboratory of Engineering Profile

## Initiative Committee

V. Mintsev (Chernogolovka)
R. Redmer (Rostock)
T. Ramazanov (Almaty)
M. Desjarlais (Sandia)
The LOC Chairman of PNP16

## Program Committee of the PNP15

**Chairman**: R. Redmer (Rostock)
A. Alastuey (Lyon)
M. Bonitz (Kiel)
D. Ceperley (Urbana)
M. Desjarlais (Sandia)
C. Deutsch (Paris)
D. Gericke (Warwick)
S. Glenzer (Livermore)
V. Fortov (Moscow)
D. Hoffmann (Darmstadt)
C. Keitel (Heidelberg)
M. Knudson (Sandia)
W.-D. Kraeft (Rostock)
V. Mintsev (Chernogolovka)
T. Ramazanov (Almaty)
H. Reinholz (Rostock)
G. Roepke (Rostock)
R. Sauerbrey (Dresden)
M. Schlanges (Greifswald)
P. Schram (Eindhoven)
I. Tkachenko (Valencia)
T. Tschentscher (Hamburg)

## Local Organizing Committee

**Chairman**: T.Ramazanov
Yu. Arkhipov
A. Askaruly
D. Batryshev
T. Daniyarov
A. Davletov
M. Dosbolayev
K. Dzhumagulova
M. Gabdullin
S. Kodanova
O. Lavrichshev
M. Muratov
Kh. Nurekenov

## Advisory Organizing Council

G.M. Mutanov – President of Al-Farabi KazNU
M.Zh. Zhurinov – President of National Academy of Sciences of the Republic of Kazakhstan
T.A. Kozhamkulov – academician, Scientific Advisor of IETP
T.S. Ramazanov – Chairman of the LOC

## Organizers & Sponsors

Al-Farabi Kazakh National University
Institute of Experimental and Theoretical Physics
National Laboratory of Nanotechnology
TNS-INTEC
Institute of Applied Sciences and Information Technologies
Laboratory of Engineering Profile

**P2.13**

# Plasma treatment of ZnO:B nanostructured layers synthesized by hydrothermal route

Kh.A. Abdullin, Zh. K. Kalkozova
*National Nanotechnology Laboratory, Kazakh National University after al_Farabi, al_Farabi ave. 71, Almaty, 050000 Kazakhstan*

L.V. Gritsenko, S.E.Kumekov, Zh.O. Mukash, N.K. Saitova
*Kazakh National Technical University after K.I. Satpaev, Satpaev str., 22, Almaty, 050013 Kazakhstan*
*magic-cool@mail.ru*

A.Yu. Sazonov
*University of Waterloo, 200 University Avenue West, Waterloo, Ontario, Canada*

At present, zinc oxide due to its unique physical characteristics becomes an important material for use in short-wavelength light-emitting diodes, detectors, piezoelectric devices, power electronics and many other applications. In particular, ZnO thin films doped with boron is used as a transparent and conductive facial contact of solar cells based on different materials.

One of the most common, low-cost and effective synthesis methods of the different ZnO nanostructures are hydrothermal and sol-gel methods. For the preparing of ZnO structures with required electrical and optical properties is used doping by impurity atoms. In this paper, hydrothermal synthesis of ZnO:B nanorods was performed according to the low temperature technique [1, 2].

The influence of plasma treatment on the electric, optical properties and photoluminescence (PL) spectra of ZnO:B thin films grown on glass substrates was studied. It was found that hydrogen plasma treatment lead to the recovery of the electrical characteristics of ZnO:B samples after degradation caused by thermal annealing in air. Free carrier mobility was especially sensitive to the hydrogen plasma treatment. It is noted that in the hydrogen plasma treatment dramatically increases the intrinsic PL intensity in ZnO:B samples. The initial PL spectra consist of a weak band's own interband luminescence and the impurity band at 550-600 nm. H-plasma treatment causes a significant increase in the intensity of the own photoluminescence more than two orders.

**References**

[1] Chin-Hsien Hung, Wha-Tzong Whang *Materials Chemistry and Physics*, 2003, 82, pp 705–710.
[2] Zhong Lin Wang *Materials Science and Engineering R*, 2009, 64, pp 33–71.