

## Preface

This volume is a collection of papers presented at the 13th international conference on Global Research and Education “INTER-ACADEMIA 2014” held from September 10 to September 12, 2014 in Latvia at the Riga Technical University, Riga. The first Inter-Academia was held by Comenius University in Slovakia in 2002, followed by Warsaw University of Technology (Poland 2003), Budapest University of Technology and Economics (Hungary 2004), Wuppertal University (Germany 2005), Alexandru Ioan Cuza University (Romania 2006), Shizuoka University (Japan 2007), Budapest University of Technology and Economics (Hungary 2008), Warsaw University of Technology (Poland 2009), Riga Technical University (Latvia 2010), Alexandru Ioan Cuza University (Romania 2011), Obuda University (Hungary, 2012) and Sofia University (Bulgaria, 2013). The main purpose of Inter-Academia is to exchange information concerning research and education, but even more important is to promote a better understanding between academic and non-academic staff, researchers and students from participating Universities through substantial social events. One example of the fruitful results obtained through Inter-Academia activities is the Double Degree Special Program (DDP) which was launched in 2006 between Shizuoka University and Warsaw University of Technology. This is a new education system for Ph.D. students carried out under supervision of professors from two Universities. From 2007 DDP is extended to Alexandru Ioan Cuza University and from 2012 to Riga Technical University.

The present proceedings contain 69 contributions from 13 countries. The papers, presented by internationally recognized experts in the field, review the state-of-the-art and future trends in their respective research fields.

The proceedings volume are organized in the following sections:

- Solid-State Physics and Related Technologies
- Chemical Materials and Chemical Technologies
- Materials and Technologies in Biomedicine and Environmental Engineering
- Fibers and Fabric
- Control and Automation
- Signal and Data Processing, Computational Procedures
- Applied Information Technologies
- Product Design and Engineering Management

Every University contributes with proposals to make the Inter-Academia conferences and collaboration between the Universities more inspiring from the point of view of new science and education. Inter-Academia conferences offer an outstanding opportunity for students and post- Doctors to gain unique knowledge in their field of research by meeting famous scientists from Japan and Europe, listening to their lectures and participating in discussions.

Finally, I would like to express my gratitude to the Shizuoka University and the funds and companies kindly giving their financial support to the conference.

Prof. Arturs Medvids,

Chairman of the 13th Inter-Academia 2014,  
Institute of Technical Physics,  
Faculty of Material Science and Applied Chemistry,  
Riga Technical University

13<sup>TH</sup> INTERNATIONAL CONFERENCE ON GLOBAL RESEARCH AND  
EDUCATION  
“INTER-ACADEMIA 2014”

**Conference Chairman:**

Arturs Medvids, Latvia

**Co-Chair:**

Talis Juhna, Latvia

**Honorary Committee:**

Leonids Ribickis, Latvia

Yukihiro Ito, Japan

Jan Szmidski, Poland

Vasile Isan, Romania

Gábor Péceli, Hungary

Lambert T. Koch, Germany

Karol Mičieta, Slovakia

Mikuláš Bek, Czech Republic

Aleksandr V. Rogachev, Belarus

Janos Fodor, Hungary

Leonid V. Hubersky, Ukraine

Ivan Ilchev, Bulgaria

**Executive Committee:**

Annamária R. Várkonyi-Kóczy Hungary

Arturs Medvids, Latvia

Dariusz Korzec, Germany

Dumitru Luca, Romania

Evgenia Benova, Bulgaria

Gheorghe Popa, Romania

Hidenori Mimura, Japan

Hiroshi Mizuta, England

Jürgen Engeman, Germany

Kenji Murakami, Japan

Leonid Poperenko, Ukraine

Leszek Kudla, Poland

Lucel Sirghi, Romania

Masaaki Nagatsu, Japan

Masashi Kando, Japan

Michiharu Tabe, Japan

Nicoleta Dumitrascu, Romania

Nobuyuki Araki, Japan

Noriko Matsuda, Japan

Péter Korondi, Hungary

Ryszard Jablonski, Poland

Sergei Khakhomov, Belarus

Stefan Matejcik, Slovakia

Valdis Kokars, Latvia

**Programme Committee:**

Andris Ozols, Latvia

Alfonsas Grigonis, Lithuania

Aleksandrs Mychko, Latvia

Andris Sternbergs, Latvia

Dagnija Loca, Latvia

Enn Mellikov, Estonia

Gundars Mezinskis, Latvia

Igor Dmitruk, Ukraine

Jevgenijs Kaupužs, Latvia

Jurijs Dehtjars, Latvia

Karlis Gross, Latvia

Maris Knite, Latvia

Nerija Žurauskienė, Lithuania

Steponas Asmontas, Lithuania

Talivaldis Puritis, Latvia

**Local Organizing Committee:**

Arturs Medvids

Pavels Onufrijevs

Edvins Dauksta

Ilona Pavlovskā

Līga Grase

Iveta Medvida