

**50<sup>th</sup> INTERNATIONAL CONFERENCE  
ON MICROELECTRONICS,  
DEVICES AND MATERIALS**

**Under the honorary patronage of his excellency  
Mr. Borut Pahor,  
the President of the Republic of Slovenia**



**CONFERENCE 2014**

**CONFERENCE PROGRAM**

October 8<sup>th</sup> - October 10<sup>th</sup>, 2014  
Ljubljana, SLOVENIA

**CONFERENCE MIDEM 2014**  
**SHORT PROGRAM**  
**Cankarjev dom, Ljubljana**

**October 8. - October 10, 2014**

DAY/ HOUR	Wednesday, 8. 10. 2014	Thursday, 9. 10. 2014	Friday, 10. 10. 2014
8:30	OPENING CEREMONY - M. Topič	INVITED PAPER KLAUS REICHMANN	INVITED PAPER RADIOJE POPOVIČ
8:45	INVITED PAPER WILLY SANSEN	SESSION ON MATERIALS, TECHNOLOGY and DEVICES Chairperson: B. Malič	SESSION ON SENSORS and MEMS Chairperson: S. Amon
9:00			
9:15			
9:30			
9:45	SESSION ON INTEGRATED CIRCUITS and SYSTEM on CHIP Chairperson: J. Trontelj	Coffee break	BREAK
10:00			
10:15			
10:30			
10:45	Coffee break	INVITED PAPER DANIJEL DANKOVIČ	SESSION ON MATERIALS, TECHNOLOGY and DEVICES Chairperson: B. Malič
11:00			
11:15			
11:30			
11:45	SESSION ON SENSORS and MEMS Chairperson: S. Amon	SESSION ON INTEGRATED CIRCUITS and SYSTEM on CHIP Chairperson: D. Strle	Coffee break
12:00			
12:15			
12:30			
12:45	LUNCH	LUNCH	SESSION ON INTEGRATED CIRCUITS and SYSTEM on CHIP Chairperson: D. Raič
13:00			
13:15			
13:30			
13:45			
14:00			
14:00	INVITED PAPER LECH JOZWIAK	INVITED PAPER JAMES R. SITES	BREAK
14:15	SESSION ON ELECTRONICS Chairperson: A. Žemva	SESSION ON OPTOELECTRONICS Chairperson: M. Topič	SESSION ON OPTOELECTRONICS Chairperson: M. Topič
14:30			
14:45			
15:00			
15:15	Coffee break	Coffee break	CLOSING
15:30			
15:45			
16:00			
16:15	SESSION ON ELECTRONICS Chairperson: A. Žemva	INVITED PAPER LESZEK GOLONKA	
16:30			
16:45			
17:00			
17:15		SESSION ON THIN and THICK FILMS Chairperson: M. Hrovat	
17:30			
17:45			
18:00			
18:15	Celebration at the 50 <sup>th</sup> International Conference MIDEM SLOVENIAN ELECTRONICS HERITAGE		
18:30			
18:45			
19:00			
19:15			
19:30			
19:45			
20:00			
20:15			
20:30			
20:45	WELCOME PARTY		
21:00			
21:15			
21:30			
21:45			
22:00			

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## ORGANIZER

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MIDEM - Society for Microelectronics, Electronic Components and Materials,  
Stegne 7, 1000 Ljubljana, SLOVENIA

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## CONFERENCE SPONSORS

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Jožef Stefan Institute, Ljubljana  
Faculty for Electrical Engineering, University of Ljubljana  
Mikroiks d.o.o., Ljubljana  
IMAPS, Slovenia Chapter  
ZAVOD TC SEMTO, Ljubljana

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## CONFERENCE PROGRAMME COMMITTEE

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### **Conference Chair:**

Marko Topič, chairman, University of Ljubljana, Faculty of Electrical Engineering, Slovenia

### **Program Committee:**

Vanja Ambrožič, University of Ljubljana, Faculty of Electrical Engineering, Slovenia

Slavko Amon, University of Ljubljana, Faculty of Electrical Engineering, Slovenia

Petar Biljanović, University of Zagreb, Faculty of Electrical Engineering and Computer Science, Croatia

Cor Claeys, IMEC and KU Leuven, Belgium

Leszek J. Golonka, Technical University Wroclaw, Poland

Marko Hrovat, Jožef Stefan Institute, Slovenia

Zsolt Illyefalvi-Vitez, Technical University Budapest, Hungary

Monika Jenko, Institute of Metals and Technology, Slovenia

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Alena Pietrikova, Technical University of Kosice, Kosice, Slovakia  
Giorgio Pignatelli, University of Perugia, Italy  
James Sites, Colorado State University, USA  
Nava Setter, Ecole Polytechnique Federal de Lausanne, Switzerland  
Giovanni Soncini, University of Trento, Trento, Italy  
Paul Svasta, University of Bucharest, Romania  
Janez Škrlec, Chamber of Craft and Small Business of Slovenia, Slovenia  
Janez Trontelj, University of Ljubljana, Faculty of Electrical Engineering, Slovenia  
Matjaž Vidmar, University of Ljubljana, Faculty of Electrical Engineering, Slovenia  
Miro Zeman, TU Delft, The Netherlands  
Andrej Žemva, University of Ljubljana, Faculty of Electrical Engineering, Slovenia

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#### CONFERENCE ORGANIZING COMMITTEE

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Polona Šorli, MIDEM, Slovenia  
Olga Zakrajšek, MIDEM, Slovenia  
Iztok Šorli, MIKROIKS d.o.o., Slovenia

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#### GENERAL INFORMATION

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Welcome to the 50<sup>th</sup> International Conference on Microelectronics, Devices and Materials, (MIDEM 2014). This conference continues the tradition of an annual international meeting organized by the *MIDEM society - Society for Microelectronics, Electronic Components and Materials*. Our golden anniversary conference is organized under the honorary patronage of his excellency Mr. Borut Pahor, the President of the Republic of Slovenia that we gratefully acknowledge. This is a great honour and a huge motivation for our society and all its members.

It started exactly 49 years ago, on 8<sup>th</sup> October 1965 with the first Yugoslav conference on microelectronics that was organized in Ljubljana.

The MIDEM conferences have always attracted a large number of Slovene and foreign researchers from academia and experts from industry and hosted distinguished invited speakers. Participants have the opportunity to present their R&D activities and latest results and to discuss trends and problems dur-

ing sessions and breaks. This year, 56 peer reviewed regular papers and seven invited papers will be presented over the three days, 8 - 10 October 2014.

The MIDEM 2014 conference contributions are grouped into six sessions: Materials, technology and devices; Electronics; Optoelectronics; Thin and Thick Films; Integrated Circuits and System on Chip and Sensors and MEMS. Invited speakers will talk about new approaches in LTCC sensors and systems, heterogeneous multi-processor system-on-chip for modern cyber-physical systems, integrated Hall magnetic angle sensors, antiferroelectrics as new materials for ceramic power devices, analog design techniques in nanometer CMOS technologies, high efficiency solar cells and methods to measure degradation of power VDMOSFETs.

We would like to express our thanks to the invited speakers and all authors for their valuable scientific contributions to the conference. The members of the Conference Programme Committee, who made the review of the contributions, are sincerely acknowledged. We also thank all the Session Chairs and the members of the Conference Organizing Committee, who did their best to make the conference a success.

To celebrate the golden 50<sup>th</sup> conference in a row we organize an evening celebration event with distinguished guests and representatives from academia and industry to highlight some of the most outstanding R&D achievements in the last five decades.

We hope that you will remember this conference not only for the importance of the scientific achievements and discussions not the golden anniversary, but also for new friendships and vivid memories of Ljubljana and Slovenia.

We cordially wish you an enjoyable conference and pleasant stay in Ljubljana.

Professor Marko Topič  
Chairman of the MIDEM Conference 2014

### **CONFERENCE VENUE**

The Conference is held from October 8<sup>th</sup> to October 10<sup>th</sup>, 2014 at Cankarjev dom in Ljubljana, Slovenia.

### **CONFERENCE PROCEEDINGS**

Invited and accepted papers are published in the Conference Proceedings distributed at the Conference registration.

## **LANGUAGE**

The official Conference language is English.

## **REGISTRATION**

The registration fees are as follows:

- FULL registration fee: 300 EUR
- MIDEM Society members, MIDEM Sponsors: 244 EUR

The fee includes Conference Proceedings and free access to all Conference events (Celebration at the 50<sup>th</sup> International Conference – Slovenian Electronics Heritage and Welcome party in Cankarjev dom).

Accompanying persons who do not take part in the conference may join Welcome party at an extra charge of 30 EUR. Price for additional conference materials is 100 EUR.

Undergraduate students have free access to all Conference sessions on submitting their student card / index. For other Conference events there will be an additional charge.

## **SOCIAL EVENTS**

Celebration at the 50<sup>th</sup> International Conference – Slovenian Electronics Heritage in the Kosovel hall of Cankarjev dom is scheduled for Wednesday, October 8<sup>th</sup> at 18:00.

The Welcome party will be held on Wednesday, October 8<sup>th</sup> at 19:30 in front of the Kosovel hall of Cankarjev dom.

## **ACCOMMODATION**

Accommodation is available in:

- Hotel Slon, Slovenska cesta 34, 1000 Ljubljana, Slovenia  
(<http://www.hotelslon.com/>) or
- Grand Hotel Union (<http://www.union-hotels.eu/sl/union-hoteli/>).

## **Programme and Organizing Committee, MIDEM 2014 Conference**

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Society MIDEM

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**Conference Web page: <http://www.midem-drustvo.si/conf2014>**

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## CONFERENCE PROGRAM

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WEDNESDAY, OCTOBER 8

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- 08:00 REGISTRATION**
- 08:30 WELCOME AND OPENING CEREMONY**
- 08:45 INVITED PAPER**  
**CHAIRPERSON: J. Trontelj**
- 08:45 W. Sansen**  
Analog Design Techniques in Nanometer CMOS Technologies
- 09:30 SESSION ON INTEGRATED CIRCUITS and SYSTEM on CHIP**  
**CHAIRPERSON: J. Trontelj**
- 09:30 J. Marjanovič, A. Trost**  
System on Chip for Load Identification on a Switching Power Supply
- 09:45 V. C. Zhang, E. Ofner, D. Raič, J. Sturm, A. Fant, D. Strle**  
Decimation Filter and Tri-stimulus Colour Transformation for Ambient Colour Light Sensor
- 10:00 G. Batistell, J. Sturm, A. Fant, D. Strle**  
Color Sensor for Ambient Light Measurements in 130nm CMOS Technology
- 10:15 U. Nahtigal, A. Fant, D. Strle**  
A Low Power, High Resolution, Sigma-Delta A/D Converter for an Ambient Color Light Sensor
- 10:30 M. Trifković, D. Raič, D. Strle**  
Digital Signal Processing for a Multi-Channel Chemical Sensor Interface
- 10:45 COFFEE BREAK**
- 11:15 SESSION ON SENSORS and MEMS**  
**CHAIRPERSON: S. Amon**



- 11:15 M .A. Morris**  
The Self-assembly of Block Copolymer Systems for Large Area Patterning of Substrates
- 11:30 D. Vrtačnik, D. Resnik, U. Aljančič, M. Možek, B. Pečar, T. Dolžan, I. Šorli, Z. Bele and S. Amon**  
Design and Fabrication of Hollow Silicon Microneedles for Transdermal Drug Delivery
- 11:45 D. Resnik, U. Aljančič, M. Možek, T. Dolžan, B. Pečar, A. Janež, V. Urbančič, I. Šorli, Z. Bele, S. Amon, D. Vrtačnik**  
Skin Impedance Measurements With Si Microneedle Array Electrode
- 12:00 B. Pečar, D. Vrtačnik, D. Krizaj, D. Resnik, T. Dolžan, M. Možek and S. Amon**  
Crucial Design Parameters in Mono-Actuator-Peristaltic (MAP) Micropumps
- 12:15 C. Iliescu, C. Mărculescu, D. Resnik and D. Vrtačnik**  
Characterization of TEOS Thin Film Depositions on PECVD Reactors
- 12:30 LUNCH**
- 14:00 INVITED PAPER**  
**CHAIRPERSON: A. Žemva**
- 14:00 L. Jóźwiak**  
Heterogeneous MPSoC Technology for Modern Cyber-physical Systems
- 14:45 SESSION ON ELECTRONICS**  
**CHAIRPERSON: A. Žemva**
- 14:45 M. Pirc, A. Levstek**  
Sources of Noise in Practical Implementations of Modulators/Amplifiers for Parametric Acoustic Arrays
- 15:00 G. Matič, M. Jankovec, M. Topič**  
A Simulation Study of the Magnetometer and Accelerometer Signals during Forward Flight of Amonocopter

- 15:15 G. Kojek, A. Biasizzo, F. Novak**  
Implementation of PCI Express Interface on FPGA Device Using Partial Reconfiguration
- 15:30 R. Tavčar, J. Dedič, D. Bokal, A. Žemva**  
DSS-Driven Neural Network R&D
- 15:45 COFFEE BREAK**
- 16:00 A. A. Demidov, O. A. Kalashnikov, A. Y. Nikiforov, A. S. Tararaksin, V. A. Telets**  
Radiation Behavior and Test Specifics of A-D and D-A Converters
- 16:15 L. N. Kessarinskiy, D. V. Boychenko, A. Y. Borisov**  
Analysis of DC-DC Converters' TID Experimental Results for Reliability and Hardness Increase in Space Applications
- 16:30 A. O. Akhmetov, D. V. Boychenko, D. V. Bobrovskiy, A. I. Chumakov, O. A. Kalashnikov, L. N. Kessarinskiy, A. Y. Nikiforov**  
The FASTRAD Forward Monte Carlo Module Verification Using Extrapolated Range of Electrons
- 16:45 P. V. Nekrasov, O. V. Merkushin, I. I. Shvetsov-Shilovskiy**  
Analog-Digital Blocks Contribution to the Microcontrollers' TID Response
- 18:00 CELEBRATION AT THE 50<sup>th</sup> INTERNATIONAL CONFERENCE MIDEM IN THE KOSOVEL HALL OF CANKARJEV DOM: SLOVENIAN ELECTRONICS HERITAGE**
- 19:30 WELCOME PARTY IN CANKARJEV DOM**

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THURSDAY, OCTOBER 9

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- 08:00 REGISTRATION**
- 08:30 INVITED PAPER**  
**CHAIRPERSON: B. Malič**
- 08:30 K. Reichmann, T. Kainz**  
Antiferroelectrics: Materials for New Ceramic Power Devices
- 09:15 SESSION ON MATERIALS, TECHNOLOGY and DEVICES**  
**CHAIRPERSON: B. Malič**
- 09:15 M. Vrabelj, H. Uršič, B. Rožič, Z. Kutnjak, S. Drnovšek, B. Malič**  
Influence of the Microstructure of  $0.9\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-}0.1\text{PbTiO}_3$  Ceramics on the Electrocaloric Effect
- 09:30 M. Košir, N. Daneu, A. Rečnik, M. Čeh, E. Guilmeau, S. Bernik**  
Thermoelectric Ceramics Based on the  $\text{ZnO-In}_2\text{O}_3$  System
- 09:45 M. Presečnik, S. Bernik**  
Effect of Processing Methods on the Microstructural Development and Thermoelectric Properties of  $\text{Ca}_3\text{Co}_4\text{O}_9$
- 10:00 R. Rudež, P. Markowski, A. Dziedzic, S. Bernik**  
Development of Oxide-based Thermoelectric Microgenerators Based on *p*-type  $\text{Ca}_3\text{Co}_4\text{O}_9$  and *n*-type  $(\text{ZnO})_5\text{-In}_2\text{O}_3$  Thermopiles
- 10:15 S. Bernik, N. Noval Gramc, M. Podlogar, A. Rečnik, N. Daneu**  
Low-Voltage Varistor Ceramics with the Addition of Pre-Reacted  $\text{Bi}_2\text{O}_3\text{-TiO}_2$  Phases
- 10:30 COFFEE BREAK**
- 11:00 INVITED PAPER**  
**CHAIRPERSON: D. Strle**
- 11:00 Z. Prijic, D. Danković, A. Prijic, I. Manić, N. Stojadinović**  
A Method for Measuring NBTI Degradation in p-channel Power VDMOSFETs

- 11:45 SESSION ON INTEGRATED CIRCUITS and SYSTEM on CHIP**  
**CHAIRPERSON: D. Strle**
- 11:45 J. Podržaj, A. Sešek, J. Trontelj**  
An Integrated Power MOSFET Driver with Improved Functionality
- 12:00 M. Hajdič, J. Trontelj**  
Integrated Driver Circuits for High Side Power Transistors Based on Resonance Inductive Devices
- 12:15 R. Vrtovec, J. Trontelj**  
SiC MOSFET Static Characteristic Modelling Approach
- 12:30 LUNCH**
- 14:00 INVITED PAPER**  
**CHAIRPERSON: M. Topič**
- 14:00 J. R. Sites**  
High-Efficiency CdTe Solar Cells
- 14:45 SESSION ON OPTOELECTRONICS**  
**CHAIRPERSON: M. Topič**
- 14:45 M. Jošt, J. Krč and M. Topič**  
UV Nanoimprint Litography for Replication of Textured Surfaces in Thin-film Photovoltaics
- 15:00 M. Sever, J. Krč and M. Topič**  
Optical Optimisation of Periodic Surface Textures in Thin-Film Silicon Solar Cells with Consideration of Defective Regions
- 15:15 M. Kovačič, J. Krč, B. Lipovšek and M. Topič**  
Optical Filtering for Fluorescence Detection - Diffraction Grating Approach
- 15:30 S. Çetinkaya, S. Kahraman, M. Podlogar, S. Bernik, H. A. Çetinkara, H. S. Güder**  
THE Effect of Ethylene Glycol and Glycerol on the Formation and Solar Cell Performance of  $\text{Cu}_2\text{ZnSnS}_4$  (CZTS) Thin Films
- 15:45 COFFEE BREAK**

- 16:00 INVITED PAPER**  
**CHAIRPERSON: M. Hrovat**
- 16:00 L. Golonka**  
LTCC Sensors and Microsystems
- 16:45 SESSION ON THIN AND THICK FILMS**  
**CHAIRPERSON: M. Hrovat**
- 16:45 A. Matavž, R. C. Frunzã and B. Malič**  
Patterning of Transparent Electronic Components by Inkjet Printing
- 17:00 T. Pečnik, S. Glinšek, B. Kmet, B. Malič**  
Microstructure and Dielectric Properties of  $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$  ( $x=0.5-0.3$ ) Thin Films
- 17:15 M. Hrovat, D. Belavič, H. Uršič, S. Drnovšek, J. Cilensek**  
The Evaluation of Thick-film Materials for Temperature and Pressure Sensors on LTCC Structures
- 17:30 D. Belavič, M. Hrovat, T. Bakarič, D. Kuščer**  
The Investigation of Thick-film Materials on Porous Alumina Substrates
- 17:45 M. S. Bernardo, B. Malič, D. Kuščer**  
Piezoelectric Nb-Doped Lead Zirconate Titanate Thick Films by Electrophoretic Deposition: Influence of Suspension Composition on Microstructure and Properties

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FRIDAY, OCTOBER 10

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**08:00 REGISTRATION**

**08:30 INVITED PAPER**  
**CHAIRPERSON: S. Amon**

**8:30 R. S. Popović**  
Integrated Hall Magnetic Angle Sensors

**09:15 SESSION ON SENSORS and MEMS**  
**CHAIRPERSON: S. Amon**

**09:15 U. Aljančič, R. Bošnjak, M. Benedičič, D. Resnik, S. Amon, T. Dolžan, B. Pečar, M. Možek, D. Vrtačnik**  
Clinical Test of Photoplethysmograph for Intraoperative Monitoring of Optic Nerve Microcirculation

**09:30 D. Smole, T. Dolžan, B. Pečar, U. Aljančič, M. Možek, D. Vrtačnik, D. Resnik, S. Amon**  
Low-power Piezoelectric Micropump Driving Module

**09:45 I. Bilican, T. Guler, M. Yuksel, S. Agan and C. Elbuken**  
Easy and Cost Effective Fabrication Method of 3D Electrodes for Impedance Based Detection

**10:00 J. Plankar, T. Dolžan, B. Pečar, U. Aljančič, M. Možek, D. Vrtačnik, D. Resnik, S. Amon**  
Optical Flow Rate Measurement Device for Piezoelectric Micropump Characterization

**10:15 T. Beravs, S. Beguš, J. Podobnik, M. Munih**  
Accelerometer and Magnetometer Calibration Using an Adaptive Method

**10:30 BREAK**

**10:45 SESSION ON MATERIALS, TECHNOLOGY and DEVICES**  
**CHAIRPERSON: B. Malič**

**10:45 B. Bertoneclj, K. Vojisavljević, J. Rihtaršič, G. Jelenc, B. Malič**  
Effect of E-glass Fiber and Mineral Filler Content on Microstructure,

- Mechanical, Dielectric and Thermal Properties of Bulk Molding Compound
- 11:00 A. Bradeško, M. Santo Zarnik, D. Belavič, D. Kušcer, T. Rojac**  
Modeling, Fabrication and Characterization of a Piezoelectric Vibrating System
- 11:15 M. Santo Zarnik, S. Kocjan, M. Stušek, D. Belavič**  
Influence of Housing on Performances of LTCC-based Pressure Sensors
- 11:30 M. Mozetič**  
Formation of Metal-oxide Nanoparticles by Plasma Treatment of Metal Foils
- 11:45 E. Pavlica, S. R. Pathipati, R. B. Penumala and G. Bratina**  
Semiconducting Polymer: Graphene Blends Studied by a Time-of-flight Photoconductivity
- 12:00 COFFEE BREAK**
- 12:30 SESSION ON ONTEGRATED CIRCUITS and SYSTEM on CHIP**  
**CHAIRPERSON: D. Raič**
- 12:30 M. Podhraški, J. Trontelj**  
Integrated Microcoils for Alternating Magnetic Field Generation in Position Sensing Applications
- 12:45 G. Ergaver, J. Trontelj**  
Switching Noise Reduction Techniques in CMOS Integrated Circuits
- 13:00 A. Sešek, J. Trontelj**  
Temperature Compensation of Magnetic Sensor Sensitivity Maintaining Radiometric Output
- 13:15 S. Ostrožnik**  
System on Chip for a Glow Plug with Integrated In-cylinder Pressure Sensor
- 13:30 A. Stadler**  
The Optimum Choice of Stranded Wire for Lead-outs and Bridge Connections of High Frequency Transformers

- 13:45 D. V. Bobrovsky, G. S. Sorokoumov, A. A. Pechenkin, A. O. Akhmetov, P. V. Nekrasov**  
The Method of SEL and SEFI Separation in Complex ICs
- 14:00 BREAK**
- 14:15 SESSION ON OPTOELECTRONICS**  
**CHAIRPERSON: M. Topič**
- 14:15 M. Berginc, U. O. Krašovec and M. Topič**  
Evolution of the Iodine Crystals in Dye-sensitized Solar Cells
- 14:30 M. E. Cherniak, A. V. Ulanova, A. Y. Nikiforov**  
Some Aspects of Optocouplers' Radiation Hardness
- 14:45 R. Kimovec, M. Jankovec, M. Topič**  
Wireless Powering of Electronic Devices Over Optical Fiber
- 15:00 B. Kirn, M. Jankovec, B. Glažar and M. Topič**  
Irradiance Sensor Interface for PV Monitoring Systems
- 15:15 M. Bokalič, K. Brecl, M. Topič**  
Preconditioning of Thin-film Photovoltaic Modules Followed by Electroluminescence Imaging
- 15:30 CLOSING CEREMONY**