

**48th INTERNATIONAL CONFERENCE
ON MICROELECTRONICS,
DEVICES AND MATERIALS**

**and the WORKSHOP on
CERAMIC MICROSYSTEMS**



CONFERENCE 2012

CONFERENCE PROGRAM

**September 19th – September 21st, 2012
Otočec, SLOVENIA**

PRELIMINARY SHORT PROGRAM

OTOČEC, September 19. - September 21. 2012

DAY/ HOUR	19. 9. 12 Wednesday	20. 9. 12 Thursday	21. 9. 12 Friday
8:00			
8:15			
8:30			INVITED PAPER
8:45		WORKSHOP OPENING - D. Belavič	Chairperson: M. Hrovat
9:00	OPENING CEREMONY- M. Topič	WORKSHOP - INVITED PAPERS	P. Muralt
9:15	SESSION ON	Chairperson: D. Belavič	COFFEE BREAK
9:30	OPTOELECTRONICS	Golonka	SESSION ON THICK AND THIN FILMS
9:45	Chairperson: M. Topič	Maeder	Chairperson: M. Hrovat
10:00		Jones	
10:15			
10:30	COFFEE BREAK	COFFEE BREAK	
10:45			COFFEE BREAK
11:00	SESSION ON MATERIALS, TECHNOLOGIES AND DEVICES	WORKSHOP INVITED PAPERS	SESSION ON INTEGRATED CIRCUITS
11:15	Chairperson: M. Hrovat	Chairperson: D. Belavič	Chairperson: J. Trontelj
11:30		Bermejo	
11:45		Partsch	
12:00		Bechtold	
12:15			
12:30	LUNCH	LUNCH	
12:45			
13:00			
13:15			
13:30			
13:45			
14:00			
14:15			CLOSING CEREMONY
14:30	SESSION ON SENSORS AND ACTUATORS	WIP	
14:45	Chairperson: S. Amon	Radosavljevič	
15:00		WORKSHOP	
15:15		regular papers	
15:30		Chairperson: D. Belavič	
15:45			
16:00	COFFEE BREAK	COFFEE BREAK	
16:15			
16:30	SESSION ON ELECTRONICS	SESSION NAMASTE	
16:45	Chairperson: A. Žemva	Chairperson: M. Kosec	
17:00			
17:15			
17:30			
17:45			
18:00	POSTERS	POSTERS	
18:15			
18:30			
18:45			
19:00			
19:15			
19:30	WELCOME PARTY	CONFERENCE DINNER	
19:45			
20:00			
20:15			
20:30			
20:45			
21:00			

ORGANIZER

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

CO – ORGANIZER

Centre of Excellence NAMASTE, Jamova 39, 1000 Ljubljana

CONFERENCE SPONSORS

Slovenian Research Agency, Ljubljana

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ZAVOD TC SEMTO, Ljubljana

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Workshop Chair:

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Darko Belavič, IN.Medica, Slovenia and CoE NAMASTE, Slovenia

Iztok Šorli, MIKROIKS d.o.o., Slovenia

GENERAL INFORMATION

Welcome to the 48th International Conference on Microelectronics, Devices and Materials, (MIDEM 2012) and the joint Workshop on Ceramic Microsystems. This conference continues the tradition of annual, international meetings organized by MIDEM – Society for Microelectronics, Devices and Materials, Ljubljana, Slovenia. These conferences have always attracted a large number of Slovene and foreign experts, as well as distinguished guest speakers. At the conferences scientists have the opportunity to present their activities and research progress to the international audience and to discuss trends and problems related to their fields of work with other colleagues. This year, 66 reviewed regular papers and eight invited papers will be presented over the three days, 19 – 21 September 2012.

The standard conference contributions presented on the first and third days are grouped into six sessions: Materials, technology and devices; Electronics; Optoelectronics; Thin and Thick Films; Integrated Circuits and Sensors and Actuators. On the second day the work will be organised as the Workshop on Ceramic Microsystems, which is one of the fastest-growing areas of ceramic technology. The entire value chain, which includes material science, design, fabrication, technology process and different applications, will be discussed. One of the topics is intended for the new generation of 3D, integrated, passive components and microsystems in LTCC technology. The workshop will be extended with an additional NAMASTE session. The papers in this session will present the six main activities in the Centre of Excellence: Advanced Materials and Technologies for the Future (CoE NAMASTE).

We would like to express our thanks to the invited speakers and the contributors of regular papers for their valuable scientific contributions to the conference sessions and to the workshop. The members of the International Scientific Board of the conference, who made the review of the contributions, are gratefully 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.

We hope that you will remember this event, not only for the importance of the papers and discussions, but also for the new friendships and the pleasant memories of the country.

We wish you a pleasant stay in Otočec and in Slovenia.

M. Kosec, D. Belavič and P. Šorli

Otočec, September 2012



SLOVENIAN RESEARCH AGENCY



REPUBLIC OF SLOVENIA
**MINISTRY OF EDUCATION,
SCIENCE, CULTURE AND SPORT**



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Slovenia Chapter

CONFERENCE VENUE

The Conference is held from September 19th to September 21st, 2012 at hotel Šport in Otočec, 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: **250 EUR + TAX**
- MIDEM Society members, MIDEM Sponsors: **200 EUR + TAX**

The tax is calculated based on the 29. Article of the law on value added tax ZDDV-1-UPB3.

The tax is calculated based on the place of performed services. The Conference will be held in Slovenia, so the calculated tax bases on the place / location where the service (conference) will be held. The tax is not related to EU membership or associated with the presentation of an article on the conference.

The fee includes Conference Proceedings and free access to all Conference events (Welcome party at Castle Otočec and Conference dinner in Tango restaurant).

Accompanying persons who do not take part in the conference may join other conference events at an extra charge (Welcome party: 15 EUR, Dinner: 20 EUR, additional conference materials: 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

Welcome party at Castle Otočec is scheduled for Wednesday, September 19th at 19:30. There is a five minute walk to the Castle.

The Conference Dinner will be held on Thursday, September 20th in restaurant Tango at 19:30, which is near hotel Šport.

ACCOMMODATION

Please send your room reservations by filling the reservation forms, that are on the web page of the Society MIDEM, indicating "for MIDEM 2012 Conference", directly to:

booking.otocec@terme-krka.si

or call this number + **386 (0)7 38 48 600**.

Programme and Organizing Committee, MIDEM 2012 Conference

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Conference Web page: <http://www.midem-drustvo.si/conf2012>

CONFERENCE PROGRAM

WEDNESDAY, SEPTEMBER 19

08:30 REGISTRATION

09:00 WELCOME AND OPENING CEREMONY

09:15 SESSION ON OPTOELECTRONICS

CHAIRPERSON: M. Topič

09:15 A. Čampa

NIKA - Model for Extracting Refractive Indices

09:30 M. Filipič, Z. Holman, S. De Wolf, F. Smole, C. Ballif, M. Topič

Analysis of Parasitic Light Absorption Losses in ITO and Silver

Layers at the Back of Silicon Heterojunction Solar Cells

09:45 M. Sever, B. Lipovšek, J. Krč and M. Topič

Periodic Surface Texture Optimization for Improved

Light Trapping in Thin-film Silicon Solar Cells

10:00 M. Kočevar, Z. Kačič, A. Chowdhury, B. Kotnik

Analysis of Fingerprint Enhancement Based on the Change

of Contrast in Fingerprint Image

10:15 M. Pirc, M. Topič

Electric Field Enhanced Optical Absorption in

Hydrogenated Amorphous Silicon

10:30 COFFEE BREAK

11:00 SESSION ON MATERIALS, TECHNOLOGIES

AND DEVICES

CHAIRPERSON: M. Hrovat

11:00 J. Pavlič, M. Kosec, J. Holc, T. Rojac

$K_{0.5}Na_{0.5}NbO_3$ Thick Films: Preparation and Properties

11:15 A.-P. Abellard, F. Levassort, D. Kuscer, J.-M. Grégoire,

J. Holc, M. Lethiecq and M. Kosec

Electrophoretically Deposited PZT Thick Films for

High-frequency Ultrasound Applications

11:30 M. Kopecky, V. Sedlakova, V. Holcman, H. Pettersson

Analysis of Transport Mechanisms for the Ta_2O_5

Layers for Low Temperature Range 80 K to 300 K

11:45 K. Vojisavljević, B. Malič, M. Senna, S. Drnovšek and M. Kosec
Preparation and Dielectric Properties of CuAlO₂ Ceramics

**12:00 C. E. Ciomaga, C. S. Olariu, L. Padurariu, S. Tascu,
R. Frunza, C. Galassi and L. Mitoseriu**
Applicability of Finite-Element Modeling Method
and Effective Medium Approximation to Ferroelectric-ferrite
Ceramic Composites in Microwave Range

12:30 LUNCH

14:30 SESSION ON SENSORS AND ACTUATORS
CHAIRPERSON: S. Amon

14:30 K. Polh, A. Pleteršek, M. Maček, J. Trontelj
Structural and Functional Properties of Fabricated Gas
Sensors Based on Tin Metal-Oxide Microstructures

14:45 B. Sviličić, E. Mastropaolo, R. Cheung
Silicon Carbide MEMS Cantilever Resonator with
Piezoelectric Actuation and Sensing

**15:00 D. Resnik, U. Aljančič, D. Vrtačnik, M. Možek, B. Pečar,
T. Dolžan and S. Amon**
Anodic Bonding of Glass-glass Substrates
for Microfluidic Devices

**15:15 B. Pečar, D. Križaj, D. Vrtačnik, D. Resnik, M. Možek,
U. Aljančič, T. Dolžan, S. Amon**
Numerical Simulation of STMT
Piezoelectric Micropump Operation

15:30 F. Iliescu, C. Iliescu
Approaching Transdermal Drug Delivery as a
Microfabrication Process

15:45 C. Mărculescu, C. Bălan, G. Tresset, M. Ni, C. Iliescu
Synthesis of Polymeric Nanoparticles Using
Hydrodynamic Focusing in a Microfluidic Device

16:00 COFFEE BREAK

16:30 SESSION ON ELECTRONICS

CHAIRPERSON: A. Žemva

16:30 I. Bratuž, A. Trost, A. Vodopivec

Analysis in I/Q Plane for RFID Collision Optimisation

**16:45 M. Damnjanović, L. Živanov, A. Menićanin, M. Kisić,
Č. Žlebič, S. Đurić and G. Stojanović**

Learning EMC/EMI Design Problems Using Simulation
Tool and Measurement Techniques

17:00 G. Matič, D. Jurman, M. Jankovec, M. Topič

Development and Validation of Attitude Estimation
System for All-rotating Unmanned Aerial Vehicles

17:15 M. Radovanović, M. Potrebić, D. V. Tošić

Inherent Transmission Zeros in Printed Combline Filters

17:30 J. Tomažič, A. Žemva

Battery Management in All-electric Powered Ultralight Aircraft

17:45 A. Biasizzo, F. Novak

Towards Hardware Implementation of Lossless
LIDAR Data Compression

18:00 POSTER SESSION

OPTOELECTRONICS

M. Bokalič, J. R. Sites, M. Topič

Spice Simulations of Solar Cells' Electroluminescence Mapping

T. Gyergyek, J. Kovačič

Dependence of the Floating Potential of an Electron
Emitting Collector that Terminates a Bounded Plasma
System on Electron Emission Studied by a Particle-in-Cell
Computer Simulation

T. Vidmar, U. Opara Krašovec, M. Hočevar, M. Topič

Electrochromic Devices Based on $\text{Co}^{2+} / \text{Co}^{3+}$ Redox Couple

S. Madunić, M. Friškovec, F. Zajc, U. Opara Krašovec, M. Topič

Evaluation of Electroluminescent Display Performance

MATERIALS, TECHNOLOGIES AND DEVICES

M. Koželj and B. Cviki

Comments on the Current-voltage Interpretation of Organic Diodes by the Model of Traps Exponentially Distributed in Energy

S. Bernik, L. Cheng, M. Podlogar, G. Li

Development of ZnO-Based Varistor Ceramics Sintered at Temperatures below 1000°C

SENSORS AND ACTUATORS

U. Aljančič, R. Bošnjak, A. Levstek, D. Resnik, M. Možek,

D. Vrtačnik, N. Vujanović, M. Benedičič and S. Amon

Silicon Photodiode for Photoplethysmography

T. Dolžan, D. Vrtačnik, D. Resnik, U. Aljančič, M. Možek,

B. Pečar, A. Janež, V. Urbančič, S. Amon

Investigation of Silicon Microneedle Transdermal Drug Delivery System

I. Tominec, E. Breznik, A. Titorič, S. Penič

Application of Anisotropic Magnetoresistive Sensors for Detection of Changes in Organ Activity

ELECTRONICS

D. Krklješ., M. Nikolić, S. Savić, L. Nagy, K. Babković

Humanoid Robot Wrist Prototype

M. Pavlin

Wireless Medical Device Coexistence

L. Zupančič, R. Mahmoudi, M. Akil, A. Žemva

Optimization of Beating Ventricular Segmenter Programming Tool

19:30 WELCOME PARTY AT CASTLE OTOČEC

THURSDAY, SEPTEMBER 20

08:00 REGISTRATION

08:45 WORKSHOP ON CERAMIC MICROSYSTEMS - OPENING

09:00 WORKSHOP – INVITED PAPERS CHAIRPERSON: D. Belavič

09:00 L. J. Golonka and K. Malecha
LTCC Fluidic Microsystems

**09:30 T. Maeder, C. Slater, B. Jiang, F. Vecchio,
C. Jacq and P. Ryser**
3D Structuration of LTCC and Related Technologies for
Thermal Management and Microfluidic Structures

10:00 A. Karbasi, W. K. Jones
Cofired Platinum /Alumina Microsystems for
Implantable Medical Applications

10:30 COFFEE BREAK

11:00 WORKSHOP – INVITED PAPERS CHAIRPERSON: D. Belavič

11:00 R. Bermejo
Mechanical Properties of Low Temperature
Co-fired Ceramics: Testing Methodologies for
Strength Characterization

11:30 U. Partsch, C. Lenz, S. Ziesche, C. Lohrberg, H. Neubert, T. Maeder
LTCC-based Sensors for Mechanical Quantities

12:00 F. Bechtold
Innovation Steps Towards A Novel and Cost Efficient LTCC
Packaging Technology for High End Applications

12:30 LUNCH

14:30 WORKSHOP – INVITED PAPERS

CHAIRPERSON: D. Belavič

14:30 G. Radosavljević

Resonant Sensors Realized in LTCC-technology for
Wireless Monitoring of Physical Parameters

15:00 WORKSHOP – REGULAR PAPERS

CHAIRPERSON: D. Belavič

15:00 K. Zaraska, B. Synkiewicz, J. Gaudyn

An Implantable Animal Neurostimulator in LTCC Technology

**15:15 A. Marić, B. Nelu, S. Toškov, G. Misković,
L. Živanov, G. Radosavljević**

Implementation of LTCC Interdigital Capacitor for
Detection of Liquid Quantity and Type

15:30 S. Toskov, G. Miskovic, A. Maric, B. Nelu, G. Radosavljevic

The Effect of Water Presence on Properties of LTCC Dielectric Tapes

**15:45 B. Nelu, B. Pantelić, A. Marić, D. Vasiljević,
G. Stojanović, L. Živanov**

Influence of Various Parameters on Capacitance of
Interdigital Capacitor Realized in Flexible Technology

16:00 COFFEE BREAK

16:30 SESSION NAMASTE

CHAIRPERSON: M. Kosec

**16:30 K. Makarovič, R. Bermejo, I. Kraleva, J. Holc,
M. Hrovat, A. Benčan, M. Santo Zarnik, D. Belavič, M. Kosec**

Mechanical Properties of Low-Temperature Co-Fired
Ceramics Fired at Different Temperatures

16:45 A. Pirih, M. Cergolj, S. Bernik, J. Sodec, A. Tavčar, M. Hariš

A High-current Surge Generator 8/20 μ s for Testing ZnO
Varistors and SPDs up to 100 kA

17:00 R. Tavčar, J. Dedič, A. Žemva

Design of Neural Networks for Dedicated
Hardware Implementation

17:15 M. Ravnik, M. Humar, S. Pajk and I. Musevic
Nematic Droplets as Tuneable Optical Microresonators

17:30 T. Kosmac, A. Dakskobler, A. Kocjan, P. Jevnikar, C. Oblak
Ageing of Dental Zirconia: Why Bother?

**17:45 H. Uršič, G. Trefalt, J. Holc, B. Rožič, Z. Kutnjak,
M. Santo Zarnik, M. Kosec**
Multifunctional Piezoelectric and Electrocaloric
Self-standing Thick Films

18:00 POSTER SESSION

NAMASTE

A. Bunderšek, B. Japelj, B. Mušič, N. Rajnar, P. Kranjc
Influence of SiO₂ and Al(OH)₃ Nanoparticles on Mechanical,
Optical and Thermal Properties of PMMA

I. Ban, J. Stergar, M. Drogenik, G. Ferk, A. Hamler
Novel Syntheses of CU_{1-x}Ni_x Nanoparticles for
Applications in Biomedicine

**B. Rožič, Z. Kutnjak, H. Uršič, B. Malič, J. Holc,
J. Koruza, A. Kupec, M. Kosec**
Electrocaloric Thermometry: An Experimental Method for the
Direct Electrocaloric Measurements

**M. Podlogar, D. Vengust, N. Daneu, J. J. Richardson,
A. Rečnik and S. Bernik**
Influences of Seed Layer on the Properties of ZnO
Films Prepared by Low-temperature Hydrothermal Synthesis

**I. Ramšak, B. Mirtič, M. Oberžan, H. Razpotnik,
D. Kuščer, M. Kosec**
Dense Cordierite Ceramics

**M. Antonijevič, T. Dolžan, B. Pečar, U. Aljančič,
M. Možek, D. Vrtačnik, D. Resnik, S. Amon**
Characterization System for Piezoelectric Micropumps

M. Santo Zarnik, D. Belavič, M. Hodnik, S. Kocjan
A Differential Fluid Pressure Sensor in LTCC

**D. Belavič, M. Santo Zarnik, M. Hodnik, S. Kocjan,
M. Stušek, M. Hrovat, J. Holc, K. Makarovič**
Some Examples of LTCC-based Ceramic Pressure Sensors

THICK AND THIN FILMS

M. Vondra, P. Sedlak, V. Sedlakova, J. Majzner, J. Sikula, V. Holcman
Equivalent Circuit of Polypyrrole-based QCM

B. Pinter, M. Lindič, B. Voljč, Z. Svetik, R. Lapuh, M. Kokalj
System for Electromagnetic Characterization of Ceramics

19:30 DINNER AT RESTAURANT TANGO

FRIDAY, SEPTEMBER 21

08:00 REGISTRATION

08:30 INVITED PAPER
CHAIRPERSON: M. Hrovat

8:30 P. Muralt
Energy Harvesting with Piezoelectric Thin Film Micro Devices:
Status and Promises

09:15 COFFEE BREAK

09:30 SESSION ON THICK AND THIN FILMS
CHAIRPERSON: M. HROVAT

09:30 M. Hrovat, D. Belavič, K. Makarovič, J. Holc
Thick-Film Piezoresistors as Pressure Sensors on
Different LTCC Structures

09:45 R. C. Frunzã, M. Jankovec, M. Strojnik, B. Malič and M. Kosec
Electrical Properties of Ta₂O₅-rich Dielectric
Thin Films from Solution

10:00 M. Radovanović, G. Stojanović
Performances Comparison of Wireless Passive Sensors for
Measuring Moisture in Construction Materials

**10:15 V. Sedlakova, J. Majzner, P. Sedlak, V. Holcman and J. Sikula,
M. Santo Zarnik, D. Belavič, M. Hrovat**
Influence of Functional Resistors on Offset Voltage Noise
in Thick-film Pressure Sensors

10:30 P. Sedlak, J. Sikula, M. Vondra, V. Sedlakova, J. Majzner, V. Holcman
Fluctuation-enhanced Gas Sensing Using Polypyrrole-based
QCM and its Adsorption-desorption Kinetics

10:45 COFFEE BREAK

11:15 SESSION ON INTEGRATED CIRCUITS
CHAIRPERSON: J. Trontelj

11:15 R. Vrtovec, J. Trontelj, J. Podržaj
Magnetic Filed Ferrite Concentrator for
Differential Current Measurement

11:30 M. Podhraški, A. Švigelj, M. Maček, J. Trontelj
Thermal Analysis of THz Microbolometer

11:45 R. Ribnikar, D. Strle
Analysis of Explicit and Implicit True RMS Digital Computation

12:00 A. Švigelj, A. Sešek, J. Trontelj
Portable System, Capable of Producing THz Images of
Hidden Objects at Stand-off Distance

12:15 M. Trifković, D. Raič, D. Strle
Low Noise Post-synthesis of Synchronous Digital
Circuits with Clock-serial Processing

12:30 U. Nahtigal, D. Strle
Single-ended Folded Cascade Chopped Amplifier

12:45 G. Ergaver, J. Trontelj, J. Podržaj, I. Špacapan
Prediction of Maximum Radiated Emissions in
Semi-Anechoic Chamber by Measuring Common-Mode
Current on Attached Cables

13:00 CLOSING CEREMONY