



Project no. **043669**

Project acronym: ***ReCIMiCo***

Project title

Reinforcement of the Center for Integrated Microsystems and Components

Instrument: SSA

Thematic Priority: [FP6 – 2005 – INCO – WBC]
[Reinforcement of the WBC research capacities]

\

Final Project Report

**Final Project Activity Report
D1-7**

Period covered: from 01.04.2007 to 30.09.2010

Date of preparation: 12.11.2010

Start date of project: 01.04.2007

Duration: 42 months

Project coordinator name: Prof. Dr. Ljiljana Zivanov
Project coordinator organisation name: FTS

List of Contents

LIST OF CONTENTS	2
RECIMICO OVERVIEW	1
REPORT ON WP1: PROJECT MANAGEMENT	2
REPORT ON WP2: EQUIPMENT PURCHASE	2
REPORT ON WP3: MOBILITY FOR TRAINING	2
REPORT ON WP4: INVESTMENT INTO HUMAN CAPITAL	2
REPORT ON WP5: NETWORKING AND DISSEMINATION	3
SECTION 1 - PROJECT OBJECTIVES AND MAJOR ACHIEVEMENTS DURING THE REPORTING PERIOD	5
SECTION 2 - WORK PACKAGE PROGRESS OF THE PERIOD	6
2.1 WP2 EQUIPMENT PURCHASE	6
2.2 WP3 MOBILITY FOR TRAINING	8
2.4.1 Objectives of the WP3	9
2.4.2 WP3 – Mobility for training	10
2.4.3 List of WP3 Deliverables	12
2.4.4 List of Milestone	13
2.4.5 Visits SCG to EU	13
2.4.6 Visits EU to SCG	30
2.3 WP 4 INVESTMENT TO HUMAN CAPITAL	36
2.3.1 Objectives of the WP4	36
2.4 WP 5 NETWORK AND DISSEMINATION	38
2.4.1 Objectives of the WP5	38
2.4.2 List of WP5 Deliverables	38
2.4.3 List of Milestone	39
2.4.4 First Workshop organization	39
2.4.5 Second Workshop organization	41
2.4.6 International conferences	43
2.4.7 Domestic conferences	53
2.4.8 Final version of the Project websites	54
2.4.9 Accomplishment of Ph.D. researches	54
SECTION 3 – CONSORTIUM MANAGEMENT	54
3.1 WP1 Project management	55
3.1.1 Objectives of WP 1	55
3.1.2 List of WP 1 Deliverables	55
3.1.3 List of Milestone	55
3.1.4 Management activity	55
APPENDIX 1- THE GANTT CHART	57



Publishable Summary of the Final Project Report ReCIMiCo

Reinforcement of the Center for Integrated Microsystems and Components

ReCIMiCo Basic Info

Call:	FP6 INCO WBC/SSA
Contract Number:	043669
Contractor:	Faculty of Technical Sciences, Novi Sad, Serbia
Project Coordinator:	Prof. Ljiljana Zivanov
Reporting Period:	01.04.2007 - 30.09.2010
Center website:	http://www.cimc.rs
Project website:	www.ftn.uns.ac.rs/recimico

ReCIMiCo Overview

The main objective of the ReCIMiCo is to reinforce research capacities of the Center for Integrated Microsystems and Components – CIMC founded at the Faculty of Technical Sciences, University of Novi Sad, Serbia, to strengthen its leading role in the regional research community and to allow its full participation in future European research projects.

To reach these goals ReCIMiCo focuses on two major topics: upgrade of the existing equipment at CIMC, and investment into CIMC human capital through activities performed in five work packages (WPs):

WP1: Project management, WP2: Equipment purchase, WP3: Mobility for training, WP4: Investment into human capital, and WP5: Networking and dissemination.

During the implementation of project, specific ReCIMiCo objectives and its main accomplishments (in relation to respective WPs) were:

- Organization of the Kick-off meeting, Second and Third Steering Committee meeting (WP1),
- Training through 35 mobilities of CIMC staff and 10, mobilities from EU partners to Serbia (WP3)
- Improved skills of two new young researchers and they published 16 papers; 1 international journal and 15 international and domestic conference (WP4),
- Successful exploitation and training of CIMC staff on the usage of all pieces of purchased equipment and development of 8 new methods for measurements (WP4),
- Successful organization of the first and second workshop (WP5)
- Publication of two proceedings of workshops: “Design and Characterization of Integrated Microsystems and Components”, ISBN 978-86-7892-286-2 and “New Trends in Integrated Microsystems and Components”, ISBN 978-86-7892-287-9,
- Improving and maintaining of the dedicated Project web-site (WP5), and
- Networking and dissemination through participation of CIMC staff at 30 international and 2 regional conferences and 4 paper were awarded (WP5).
- Agreement on Research and Business-technical Cooperation between CIMC and ISAS,
- Successfully accomplishments of three Ph. dissertations and five master's thesis.

Stated accomplishments will be explained in detail in the following section.

Report on WP1: Project Management

The main purpose of WP1 is to guaranty undisturbed implementation of the Project and to correlate specific tasks performed during its life, thus leading to fulfilment of Project goals and maximization of its potential impact. Apart from general management-related activities, the major task of WP1 was the organization of the Steering Committee meetings. It is concluded that these meetings of the ReCIMiCo partners turned out to be a very constructive and fruitful meeting. All participants expressed their wishes to cooperate and to act together more closely. The main conclusions can be summarized as follows:

1. It is essential to actively and extensively communicate the ReCIMiCo results to research community that forms the scientific basis for further CIMC development.
2. Contacts with non ReCIMiCo members will also be actively pursued.
3. Summarizing the attendance to the Kick-off meeting, Steering Committee concluded that 29 participants attended to kick-off meeting (3 participant were from WBC and 4 from EU partnering institutions. 22 CIMC ReCIMiCo project staff).
4. Summarizing the attendance to the first Workshop Steering Committee concluded that it achieved 61 registrations. Finally 55 persons attended the workshop. 27 CIMC ReCIMiCo project staff attended the workshop, 4 EU partners, 8 WBC, 2 USA guests and 14 guests from Serbia
5. Summarizing the attendance to the second Workshop Steering Committee concluded that it achieved 61 registrations, finally, 58 people attended the workshop: 25 CIMC ReCIMiCo project staff, 4 EU partners, 9 WBC, 2 EU guests and 9 guests from Serbia
6. Steering Committee strongly believes that the workshop will enhance communication between research centers with similar scientific interests, foster collaboration on all levels.

Report on WP2: Equipment Purchase

Purchase of new equipment, complementary to that already existing at CIMC, presents a major ReCIMiCo tool for reinforcement of CIMC. Such significant up-grade of the existing tools directly leads to increased quality of research and wider research scope of CIMC. During the first Project year, all pieces of equipment planed in the scope of ReCIMiCo have been purchased and installed, and members of CIMC staff were fully trained for its usage.

The following equipment has been obtained:

- N5230A PNA-L Agilent Vector Network Analyzer and N4693A Ecal module, 10MHz to 50GHz,
- RF/Microwave Wafer Probe Station, SUSS PM5, HF precision cable PC-2.4mm 50GHz and |Z| probe,
- TLS-55C Tunable laser source C-Band and WDM Optical Spectrum Analyzer kit, JDSU
- WDM Optical Spectrum Analyzer, EXFO
- Agilent 16901A 2-slot Logic Analysis System Mainframe.

Report on WP3: Mobility for Training

Another important ReCIMiCo tool for reinforcement of CIMC is training of its staff through mobilities, performed at carefully selected EU partnering institutions. These mobilities have started during the first Project year and have continued during the second and third Project period and provided members of the CIMC staff with the chance to learn about state-of-the-art technology and recent research advances in their fields of interest. Thirty five mobilities were carried out from SCG (Serbia) in EU during this reporting period 9 in IMA, Wiener Neustadt, 19 in ISAS, Vienna Austria, 3 in Edinburgh, UK and 4 in ICC, Como, Italy. Also 10 mobilities were accomplished from EU partnering institutions in SCG (Serbia).

Report on WP4: Investment into Human Capital

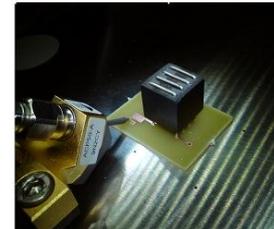
To further reinforce human resources of CIMC two new young researchers were hired during the first year. Both researcher enrolled PhD studies. During the implementation of the project new young researchers have continued their studies and have improved their skills and scientific knowledge. In the reporting period they published 2

paper in international journals, 11 papers in international conferences and 3 in domestic conferences. During the implementation of the Project all pieces of equipment purchased in the scope of the ReCIMiCo project in the first years have been successfully exploited and members of CIMC staff were fully trained for their usage. The following measuring method has been developed:

- Determination of electrical and magnetic characteristics of materials in the high frequency range 10MHz to 50GHz using N5230A PNA-L Agilent Vector Network Analyzer VNA and N4693A Ecal module,
- Characterisation of micro inductors fabricated in the LTCC technology using RF/Microwave Wafer Probe Station, SUSS PM5, HF precision cable PC-2.4mm 50GHz and |Z| probe and VNA
- Measurement of optical signals with TLS-55C Tunable laser source C-Band and WDM Optical Spectrum Analyzer kit, JDSU and WDM Optical Spectrum Analyzer, EXFO,
- Verification and testing of FPGA based 8051 IP core using Agilent 16901A 2-slot Logic Analysis System Mainframe
- Determination of electrical characteristics of electric components in the high frequency range 10MHz to 50GHz using N5230A PNA-L Agilent Vector Network Analyzer VNA and N4693A Ecal module,
- A determination of electrical characteristics of different dual-band filters topology fabricated in PCB technology and LTCC technology up to 40GHz.
- Characterisation of micro transformers fabricated in the LTCC technology using RF/Microwave Wafer Probe Station, SUSS PM5, HF precision cable PC-2.4mm 50GHz and |Z| probe and VNA
- The principle of measurement of optical amplifiers of amorphous chalcogenide semiconductors doped with erbium has also been developed. For these measurements followed a experimental setting was used. Laser light source is Agilent 81949A, which emits light in the wavelength range of 1518 to 1630 nm, while the output can be changed in the range of 5 to 30 mW.



(a)



(b)

(a) Measurement set-up for characterization of ferrite transformer placed on the wafer probe station PM5, (b) measurement set-up and SMD bead 48-057-38,

Report on WP5: Networking and Dissemination

During the implementation of the project dissemination has been simultaneously performed on different levels: international, regional, domestic and local, using the following means:

- Successful organisation the two Workshops,
- Participation in 30 leading international, regional and 2 domestic conferences,
- Publication of scientific papers in leading international and domestic journals,
- Maintenance o CIMC and ReCIMiCo web site,
- Agreement on Research and Business-technical Cooperation between CIMC and ISAS,
- Successfully accomplishments of three Ph. dissertations and five master's thesis.

The first workshop entitled “Design and Characterisation of Integrated Microsystems and Components” was planned during the first half life of the Project and was held on the 29th and 30th September, 2008 in Novi Sad.

The workshop comprised two major issues: presentation of research capacities at CIMC, including the presentation of purchased and up-graded equipment and its capabilities, and presentation of newly acquired knowledge and scientific topics of interest. While both topics addressed by the workshop are complementary and of interest to research and industry communities, the first was slightly more intended for regional and domestic partners and provides them with an overview of measurement and characterization techniques available at CIMC, that can be used in the future collaboration. The second topic presented current research directions and achievements at CIMC, and provided all participants with an insight into current research and knowledge-base existing at CIMC.

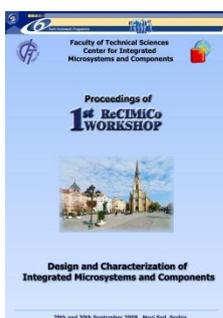
The main aim of the workshop was to present the integrated results of the work done in the past 18 months from the beginning of ReCIMiCo project. The focus was on the presentation of purchased and upgraded equipment. In addition to a few introductory conventional presentations, a lot of time was dedicated to demonstration of the newly acquired knowledge and scientific topics of interest. During the first workshop 20

presentations from 6 thematic fields were demonstrated: Microsystem technology - 4 presentations, Transfer micro to nano technology - 4 presentations, Optoelectronic components – 4 presentations, Design and simulation of microelectronic components and circuits – 3 presentations, Embedded systems and informatics – 3 presentations and Experimental characterization of materials and components – 2 presentations.

After termination of First ReCIMiCo Workshop a brief report, photos and presentations are presented on project website (<http://www.ftn.uns.ac.rs/recimic>).

The second ReCIMiCo Workshop was held in Novi Sad from 5th to 6th March 2010. The second workshop was entitled “New Trends in Integrated Microsystems and Components” and 58 people attended the workshop from 6 countries. During the Workshop, 20 papers by authors from 4 countries (Austria, Bosnia and Herzegovina, Poland and Serbia) were presented in 3 oral sessions. The talks covered five major research topics: Microsystem technologies, Nanoelectronics components, New trends in microsensor technologies, Characterization and modeling of optoelectronics components and New trends in logic integrated circuits. We strongly believe that the workshop enhanced communication between research centers with similar scientific interests, fostered collaboration on all levels and identification some of the future research directions, with special attention to possible preparation of new proposals.

Papers presented on the First and Second ReCIMiCo Workshop are published in the Workshop proceedings.



Proceedings of the First ReCIMiCo Workshop



Proceedings of the Second ReCIMiCo Workshop

Except for fostering exchange of ideas, participation of CIMC staff at conferences constructively contributes to the reputation of CIMC. During the implementation of project, CIMC staff participated in 30 international conferences and 2 domestic conferences where they presented their original scientific results. Also, research results obtained with the help of the ReCIMiCo project equipment were published by CIMC staff in the IEEE Sensors Journal, IEEE Transaction on Magnetics, Progress in Electromagnetic Research, Microelectronic International, etc.

CIMC web site (<http://www.cimc.rs>) and ReCIMiCo web site (<http://www.ftn.uns.ac.rs/recimico>) are regularly updated with new research results, list of scientific papers published by CIMC staff, novel measurement and characterization techniques offered by CIMC, as well as presentations of the networking partners, meeting minutes etc. Apart from above mentioned tasks dissemination was also performed through discussions with individual policy makers and participation of CIMC key personnel in the work of governmental advisory committees, which presents less public, but often one of the most effective means of dissemination.

ReCIMiCo Outcomes:

The ReCIMiCo Project allowed CIMC to come out with a critical mass of well-specialized researchers, promote current and future development of integrated micro- and nano- based systems and components, develop new methodological tools for the characterization techniques and, in general, be the leader in innovations in this field in the West Balkan region and wider. These outcomes are entirely corresponding to *EU - Balkans countries Action Plan* adopted on June 2003 at Thessaloniki Ministerial Conference.

Activities in the reinforced CIMC have potentials to contribute to the solution of some specific problems faced by Serbia (SCG), such as the unemployment and the brain-drain phenomena. Strengthening research center CIMC resulted in easier access to modern state-of-the-art equipment, better work conditions, better carrier opportunities and gained few new international and domestic projects.

Section 1 - Project objectives and major achievements during the reporting period

The project represents coherent set of development, coordination and dissemination actions directly aimed to improve and reinforce the CIMC research capacities in the field of integrated microsystems and components. The objectives of this project are:

- To upgrade and renew equipment necessary for successful introduction of new microsystem techniques in the research.
- To hire two new young researchers,
- To develop international collaboration by networking in order to enhance the expertise of CIMC researchers and provide training of CIMC young researchers within some of the best laboratories in EU partner's institutions thus, supporting scientific excellence,
- To develop, launch and support information system through web portal offering access to thematic and general information resources created at CIMC, but also at centres with similar scientific interest in the field of Microsystems and components, and providing researchers, students, general public, as well as policy makers an opportunity to gather most recent information and expertise and to disseminate those information,
- To organize specialized Workshops

In the reporting period, main achievements of the ReCIMICo project are:

- Organization of the Kick-off meeting, Second and Third Steering Committee meeting
- Successful exploitation of new purchased equipment
- Successfully development of 8 new measuring methods
- Successful initiation of networking with partner institution through trainings of young researchers and short study (35 mobilities)
- 10 mobilities of EU partners were accomplished involving very interesting topics
- Successful organization of the first and second Workshop, First Workshop "Design and Characterization of Integrated Microsystems and Components" and Second Workshop "New Trends in Integrated Microsystems and Components", with limited number of invited speakers and contributors, but in the same time opened for participation of general scientific community within WBC region, and even EU,
- Publication of two proceedings of workshops: "Design and Characterization of Integrated Microsystems and Components", ISBN 978-86-7892-286-2 and "New Trends in Integrated Microsystems and Components", ISBN 978-86-7892-287-9,
- Networking and dissemination through participation of CIMC staff at 23 international and 2 regional conferences and 4 paper were awarded,
- Improving and maintaining the web portal,
- Agreement on Research and Business-technical Cooperation between CIMC and ISAS,
- Successfully accomplishments of three Ph. dissertations and five master's thesis.

Installation of the newly purchased equipment is very important milestone of the ReCIMICo project and great progress for CIMC as well. Together with the 1st and 2nd Workshop which was held in September 2008 and March 2010 and for which preparation activities lasted half year, these are the essential steps for implementation of the new technologies into the CIMC research curricula. Also, thanking to the willingness for cooperation of partner institution, mobility and training plan for project is accomplished. Web portal is a very important part of the dissemination plan and its improving could also be judged as satisfactory. Activities within the project were in accordance with the plan provided in Annex I of the contract, or corresponding deliverable.

Section 2 - Work package progress of the period

2.1 WP2 Equipment purchase

During the starting months of the Project the tender and public acquisition procedures were performed. Bearing in mind that all envisaged pieces for this Project had values above 10.000€ a special procedure of public acquisition has been required. All pieces of equipment were purchased and installed at the Center for Integrated Microsystems and Components (CIMC).

The modern equipment installed at CIMC is briefly described and depicted in the figures below.

D) N5230A PNA-L Agilent Network Analyzer and N4693A Ecal module, 10MHz to 50 GHz 2-port PNA-L, is a quality, cost-effective solution designed for general purpose network applications such as S-parameter, filter, basic amplifier, and basic mixer measurements. PNA-L, along with RF Wafer Probe Station PM5, makes possible to measure characteristics of passive devices on chip such as integrated inductors, transformers, microwave filters, antennas, etc.



RF/Microwave Wafer Probe Station (PM5) and Agilent Network Analyzer 10MHz-50GHz

Also, it was purchased Agilent N4693A Ecal module. Electronic calibration module makes calibration of vector network analyzers fast, easy and accurate. The RF ECal system is easily controlled by one of two methods depending on the network analyzer. The Agilent PNA and ENA series of network analyzers controls the module directly via the USB interface.

Ecal is an ideal solution for calibrating network analyzers. Performing a full two-port calibration takes less than half the time and number of connections using ECal versus mechanical cal kits. Furthermore, the accuracy of the calibration is comparable between electronic and mechanical methods. Traditional mechanical calibrations require intensive operator interaction which is prone to errors. With ECal, the operator simply connects the ECal module to the network analyzer and the software controls the rest.



The basic parts of the ECal module

The public purchasing procedure of the network analyzer and the electronic calibration module is presented in Appendix 1.

II) RF/Microwave Wafer Probe Station, HF precision cable PC-2.4mm 50GHz and |Z| probe

The SUSS PM5 Analytical Probe System is intended for cost-effective and precision analysis of wafers and substrates up to 150 mm.

III) a. TLS-55C Tunable laser source C-Band and WDM Optical Spectrum Analyzer kit, including one FTB-400-D4-NIO-H-Z Universal Test System and one FTB-5230-XX.

Key features of TLS-55C Smart Optical Tunable Laser Source

- Battery-operated tunable laser source for field applications.
- Supports ROADM network channel routing applications.
- Battery-operation ensures highest flexibility even for field applications.
- C-band or L-band version.
- Extra 1510 nm wavelength for OSC testing (only with TLS-55C).
- Supports 50 GHz, 100 GHz, or 200 GHz channel spacing (according to ITU-T). Tunable laser source



Tunable laser source

b. WDM Optical Spectrum Analyzer

(Universal Test System—FTB-400 with Optical Spectrum Analyzer—FTB-5240)

Applications:

- Characterization of 50 GHz DWDM networks
- ROADM and 40 Gbit/s testing
- in-band OSNR ROADM testing

Key Features and Benefits

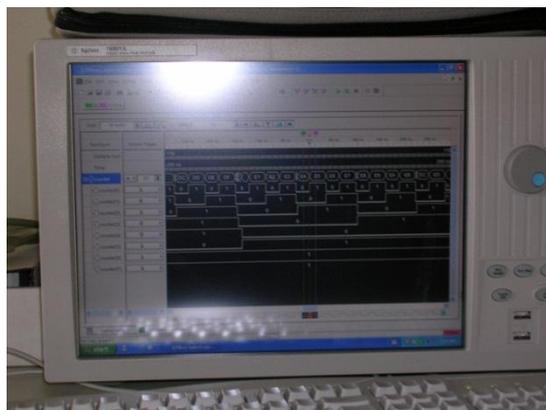
- Wavelength range: 1250 to 1650 nm
- Wavelength accuracy: ± 15 pm with external calibration and a resolution bandwidth (FWHM) of 65pm
- ORR of 40 dB at 25 GHz and 50 dB at 50 GHz from the peak
- 40 Gbit/s-ready
- ROADM-ready: In-band OSNR measurement



WDM Optical Spectrum Analyzer

IV) Agilent 16901A 2-slot Logic Analysis System Mainframe

This system is comprised of the following parts: 15-inch Display with Touch Screen, Agilent 16911A 68 Ch 4GHz Timing/250MHz State Logic Analysis Module, Agilent 16720A 300M Vector/S Pattern Generator Module and B4655A Xilinx FPGA Dynamic Probe Application Software. The mentioned system is intended for testing digital components in the wide frequency range. The main part of this equipment is shown in figure below.



16901A Agilent Logic Analysis System

After the successful installation of the above mentioned pieces of equipment, equipment suppliers trained interested CIMC staff for the basic usage of these modern instruments.

2.2 WP3 Mobility for training

Study visits of young, but also senior scientists, researchers in EU research institutions are the most important methods for their personal development, and consequently development of the CIMC in general. Hosting scientists from abroad for training and/or research activities will increase cooperation and facilitate networking of CIMC with other research institution within EU. WP3 is divided in three main tasks: organization of 1-month-trainings in EU institutions, organization of 1 or 2 week-study visits to EU institutions, and hosting scientists from abroad for training and/or research activities.

2.4.1 Objectives of the WP3

- Increased knowledge-base of CIMC staff in scientific fields of strategic interest,
- Increased knowledge of CIMC key personnel regarding management of research and technology centers,
- To gain overview of different research directions at the partnering institution,
- To help networking and foster future collaboration,
- To develop basis for joint experiments and future joint scientific projects,
- Gaining experience with specific fabrication technologies, sophisticated pieces of equipment, etc.

Mobility SCG to EU

No.	Dates of travel	Destination	Name of staff travelling
1	02-31.07.2007	Vienna, Austria	Andrea Maric
2	02-31.07.2007	Vienna, Austria	Goran Radosavljevic
3	04.13.12.2007	Edinburgh, U.K.	Radonić Vasa
4	27.01-03.02.2008	Como, Italy	Mirjana Videnović-Mišić
5	24.02.-07.03.2008	Vienna, Austria	Radosavljević Goran
6	06.-11.05.2008	Wiener Neustadt, Austria	Milos Živanov
7	23-29.06.2008	Vienna, Austria	Miljko Sataric
8	12-16.10.2008	Vienna, Austria	Andrea Maric
9	12-16.10.2008	Vienna, Austria	Goran Radosavljevic
10	05.-09.05.2009	Winer Neustadt, Austria	Milos Zivanov
11	07.-12.09.2009	Wiener Neustadt, Austria	Ljiljana Zivanov
12	27.07.-10.08.2009	Edinburgh, UK	Radonić Vasa
13	27.07.-12.08.2009	Edinburgh, UK	Jankovic Nikolina
14	22.-28.11.2009	Vienna, Austria	Andrea Maric
15	22.-28.11.2009	Vienna, Austria	Goran Radosavljevic
16	31.01.-20.02.2010	Vienna, Austria	Andrea Maric
17	31.01.-28.02.2010	Vienna, Austria	Goran Radosavljevic
18	06-10.04.2010	Vienna, Austria	Snezana Djuric
19	06-10.04.2010	Vienna, Austria	Milan Radovanovic
20	06-10.04.2010	Vienna, Austria	Djordje Obradovic
21	06-10.04.2010	Vienna, Austria	Nelu Blaz
22	25.-28.04.2010	Wiener Neustadt, Austria	Milos Zivanov
23	09-30.7.2010	Vienna, Austria	Andrea Maric
24	23.-27.7.2010	Vienna, Austria	Goran Radosavljevic
25	29.8.-03.09.2010	Wiener Neustadt, Austria	Ljiljana Zivanov
26	17.-21.09.2010	Wiener Neustadt, Austria	Milos Slamkamenac
27	17.-26.09.2010	Wiener Neustadt, Austria	Nikola Stojanovic
28	17.-26.09.2010	Wiener Neustadt, Austria	Djordje Obradovic
29	15.-19.09.2010	Wiener Neustadt, Austria	Milos Zivanov
30	16.-26.09.2010	Vienna, Austria	Goran Radosavljevic
31	19.-26.09.2010	Vienna, Austria	Andrea Maric
32	19.-26.09.2010	Vienna, Austria	Nelu Blaz
33	23.-26.09.2010	Milano, Italy	Mirjana Damnjanovic
34	21.-30.09.2010	Milano, Italy	Mirjana Videnovic Mistic
35	21.-30.09.2010	Milano, Italy	Alena Djugova

Mobility EU to SCG

No.	Dates of travel	Destination	Name of staff travelling
1	10.-12.07.2008	Novi Sad, Serbia	Walter Smetana
2	25.-28.10.2008	Novi Sad, Serbia	Zoran Đinović
3	26.-28.10.2009	Novi Sad, Serbia	Zoran Đinović
4	05.-07.03.2010	Novi Sad, Serbia	Michael Unger
5	05.-07.03.2010	Novi Sad, Serbia	Jovan Matović

6	05.-07.03.2010	Novi Sad, Serbia	Zoran Đinović
7	27.-30.08.2010	Novi Sad, Serbia	Walter Smetana
8	15.-20.05.2010	Novi Sad, Serbia	Walter Smetana
9	24.-25.09.2010	Novi Sad, Serbia	Jovan Matović
10	24.-25.09.2010	Novi Sad, Serbia	Roman Sordjan

2.4.2 WP3 – Mobility for training

Period I

During the first period of the project trainings for 3 researchers, as planned according to WP3 Mobility for Training Work Plan, were organized in:

- Andrea Maric, Vienna, Austria, 02-31.07.2007
- Goran Radosavljevic, Vienna, Austria, 02-31.07.2007
- Radonić Vasa, Edinburgh, U.K., 04.13.12.2007
- Radosavljević Goran Vienna, Austria 24.02.-07.03.2008

Also, 2 short term study visits of CIMC senior scientist to ReCIMiCo partner institutions were accomplished as planned:

- Mirjana Videnović-Mišić, Como, Italy, 27.01-03.02.2008
- Milos Živanov Wiener, Neustadt, Austria, 06.-11.05.2008

Period II

During the second period of the project trainings for 2 young researchers, as planned according to WP1 Mobility and Training Work Plan, were organized in:

- Andrea Maric, Vienna, Austria, 12-16.10.2008
- Goran Radosavljevic, Vienna, Austria, 12-16.10.2008

Two short visit of EU researcher to the CIMC were also accomplished:

- Walter Smetana, from Vienna, Austria to Novi Sad, Serbia, 10.-12.07.2008 made presentation, entitled *LTCC Technology-actual research*, about current research of his group at ISAS, with an accent made on the topics of the LTCC processing and fabrication of LTCC microsystems.
- Zoran Đinović, from Wiener Neustadt, Austria to Novi Sad, Serbia, 25.-28.10.2008, gave very interesting presentation entitled “In-line liquid concentration measurement in nanoliter volume using fiber optic low coherence interferometry”

Period III

During the third period of the project, 27 trainings were accomplished. These trainings were related to following institutions:

- 8 mobilities at the IMA (05.-09.05.2009, Milos Zivanov, 07.-12.09.2009, Ljiljana Zivanov, 25.-28.04.2010, Milos Zivanov, 29.8.-03.09.2010, Ljiljana Zivanov, 17.-21.09.2010, Milos Slamkamenac, 17.-26.09.2010, Nikola Stojanovic, 17.-26.09.2010, Djordje Obradovic, 15.-19.09.2010, Milos Zivanov) under supervision of Dr. Zoran Djinovic
- 14 mobilities at the ISAS (16.-26.09.2010, Goran Radosavljevic, 19.-26.09.2010, Andrea Maric, 19.-26.09.2010, Nelu Blaz, 09-30.7.2010, Andrea Maric, 23.-27.7.2010, Goran Radosavljevic ,22.-28.11.2009, Andrea Maric, 22.-28.11.2009, Goran Radosavljevic, 31.01.-20.02.2010, Andrea Maric, 31.01.-28.02.2010, Goran Radosavljevic, 06-

10.04.2010, Snezana Djuric,06-10.04.2010,Milan Radovanovic,06-10.04.2010, Djordje Obradovic, 06-10.04.2010,Nelu Blaz) under supervision of Dr Walter Smetana

- 2 mobilities at the Heriot Watt University in Edinburgh (27.07.-10.08.2009, Radonić Vasa, 27.07.-12.08.2009, Jankovic Nikolina) under supervision of Dr George Gousetis
- 3 mobilities at the ICC (23.-26.09.2010, Mirjana Damnjanovic, 21.-30.09.2010, Mirjana Videnovic Mistic, 21.-30.09.2010, Alena Djugova) under supervision of Dr Roman Sordjan

Eight short visits of researchers from partner institutions to the CIMC were also accomplished in the 3rd period of the project. Some of them:

- 2 visits from ISAS, Dr Walter Smetana (15.-20.05.2010, 27.-30.08.2010), First presentation was entitled “Ceramic microstructure activities at the ICeT- (Integrated Ceramic Technology) Laboratory” and second was “Design, modeling, fabrication and characterisation of LTCC sensors for pressure detection”
- 1 visits from ISAS, M.Sc. Michael Unger, (05.-07.03.2010), held presentation under the title “LTCC Material Properties at Elevated Temperature”
- 2 visits from IMA, Dr Zoran Djinovic (26.-28.10.2009, 05.-07.03.2010),First one was “Some practical examples of fiber-optic sensors” and the second one was entitled “Characterization of polymer composite materials by optical coherence tomography”.
- 2 visits from ISAS, Dr Jovan Matović (05.-07.03.2010, 24.-25.09.2010), Tiles of his presentation was “Characterization of nano conductive structure”. and “Nanomembrane R&D work at ISAS, TU Wien, Austria”
- 1 visits from ICC Dr. Roman Sordjan, (24.-25.09.2010), give the lecture on exciting physical properties and possible application of graphene, entitled “Graphene Nanodevices”.

Planned Budget for WP3: Mobility for training (from Annex I)			Actual No. of Mobilities
Partial cost	Breakdown	Sum	
Short term mobilities, SCG → EU6	20 * (350 € + 7 * 150 €)	28.000 €	27
Short term mobilities, EU → SCG7	8 * (350 € + 3 * 100 €)	5.200 €	10
Medium term mobilities8	3 * (350 € + 15 * 150 €)	7.800 €	3
Long term mobilities9	3 * (350 € + 2/3 * 30 * 150 €)	10.050 €	5
TOTAL Cost Planned / Actual		51.050 €	43.893,16€

Total number of realized SCG→EU mobilities is 35 and planned number was 34.

Total number of realized long term mobilities was 5 (3 was 30-day long visits and 2-was 21-days long visits) and planed was 3.

Planned number of medium term mobilities and realized number are the same 3.

Realized number of short term mobilities, SCG→EU, was 27 more than planned (20).

In addition to difference of planed (51050,00€) and spent (43893.16€) amount of WP3 is 7156.84€. We used cheaper accommodation how we should be realized higher number of mobilities and how we should be realized planned number of participation in international and regional conferences (28).

2.4.3 List of WP3 Deliverables

Table 2.2.1: Deliverables List

List of all deliverables, giving date of submission and any proposed revision to plans.

Del.no.	Deliverable name	Work package no.	Date due	Actual/Forecast delivery date	Estimated indicative person-months	Used indicative person-months	Lead contractor
D3-1	Phase reports to coordinator, delivered after mobility by every participating member of CIMC staff	WP3	02-31.07.2007	02-31.07.2007	4		1
			02-31.07.2007	02-31.07.2007			
			04.13.12.2007	04.13.12.2007			
			27.01-03.02.2008	27.01-03.02.2008			
			24.02.-07.03.2008	24.02.-07.03.2008			
			06.-11.05.2008	06.-11.05.2008			
			12-16.10.2008	12-16.10.2008			
			12-16.10.2008	12-16.10.2008			
			27.07.-10.08.2009	27.07.-10.08.2009			
			27.07.-12.08.2009	27.07.-12.08.2009			
			23-29.06.2008	23-29.06.2008			
			07.-12.09.2009	07.-12.09.2009			
			22.-28.11.2009	22.-28.11.2009			
			22.-28.11.2009	22.-28.11.2009			
			31.01.-20.02.2010	31.01.-20.02.2010			
			31.01.-28.02.2010	31.01.-28.02.2010			
			06-10.04.2010	06-10.04.2010			
			06-10.04.2010	06-10.04.2010			
			06-10.04.2010	06-10.04.2010			
			06-10.04.2010	06-10.04.2010			
			25.-28.04.2010	25.-28.04.2010			
			09-30.7.2010	09-30.7.2010			
			23.-27.7.2010	23.-27.7.2010			
			29.8.-03.09.2010	29.8.-03.09.2010			
			17.-21.09.2010	17.-21.09.2010			
			17.-26.09.2010	17.-26.09.2010			
			17.-26.09.2010	17.-26.09.2010			
15.-19.09.2010	15.-19.09.2010						
16.-26.09.2010	16.-26.09.2010						
19.-26.09.2010	19.-26.09.2010						
19.-26.09.2010	19.-26.09.2010						
23.-26.09.2010	23.-26.09.2010						
21.-30.09.2010	21.-30.09.2010						
21.-30.09.2010	21.-30.09.2010						
05.-09.05.2009	05.-09.05.2009						
D3-2	Published written materials and presentations from lectures and training delivered by EU partnering institution staff	WP3	10.-12.07.2008	10.-12.07.2008	2		1
			26.-28.10.2009	26.-28.10.2009			
			05.-07.03.2010	05.-07.03.2010			
			05.-07.03.2010	05.-07.03.2010			
			05.-07.03.2010	05.-07.03.2010			
			27.-30.08.2010	27.-30.08.2010			
			15.-20.05.2010	15.-20.05.2010			
			24.-25.09.2010	24.-25.09.2010			
24.-25.09.2010	24.-25.09.2010						

2.4.4 List of Milestone

Table 2.2.2: Milestones List

List of all milestones, giving date of achievement and any proposed revision to plans.

Milestone no.	Milestone name	Work package no.	Date due	Actual/Forecast delivery date	Lead contractor
M12-M24	Phase reports to coordinator, delivered after mobility by every participating member of CIMC staff	WP3	02-31.07.2007	02-31.07.2007	1
			02-31.07.2007	02-31.07.2007	
			04.13.12.2007	04.13.12.2007	
			27.01-03.02.2008	27.01-03.02.2008	
			24.02.-07.03.2008	24.02.-07.03.2008	
			06.-11.05.2008	06.-11.05.2008	
			12-16.10.2008	12-16.10.2008	
			12-16.10.2008	12-16.10.2008	
			27.07.-10.08.2009	27.07.-10.08.2009	
			27.07.-12.08.2009	27.07.-12.08.2009	
			23-29.06.2008	23-29.06.2008	
			07.-12.09.2009	07.-12.09.2009	
			22.-28.11.2009	22.-28.11.2009	
			22.-28.11.2009	22.-28.11.2009	
			31.01.-20.02.2010	31.01.-20.02.2010	
			31.01.-28.02.2010	31.01.-28.02.2010	
			06-10.04.2010	06-10.04.2010	
			06-10.04.2010	06-10.04.2010	
			06-10.04.2010	06-10.04.2010	
			06-10.04.2010	06-10.04.2010	
			25.-28.04.2010	25.-28.04.2010	
			09-30.7.2010	09-30.7.2010	
			23.-27.7.2010	23.-27.7.2010	
			29.8.-03.09.2010	29.8.-03.09.2010	
			17.-21.09.2010	17.-21.09.2010	
			17.-26.09.2010	17.-26.09.2010	
	17.-26.09.2010	17.-26.09.2010			
	15.-19.09.2010	15.-19.09.2010			
	16.-26.09.2010	16.-26.09.2010			
	19.-26.09.2010	19.-26.09.2010			
	19.-26.09.2010	19.-26.09.2010			
	23.-26.09.2010	23.-26.09.2010			
	21.-30.09.2010	21.-30.09.2010			
	21.-30.09.2010	21.-30.09.2010			
	05.-09.05.2009	05.-09.05.2009			
M12-M24	Published written materials and presentations from lectures and training delivered by EU partnering institution staff	WP3	10.-12.07.2008	10.-12.07.2008	1
			26.-28.10.2009	26.-28.10.2009	
			05.-07.03.2010	05.-07.03.2010	
			05.-07.03.2010	05.-07.03.2010	
			05.-07.03.2010	05.-07.03.2010	
			27.-30.08.2010	27.-30.08.2010	
			15.-20.05.2010	15.-20.05.2010	
			24.-25.09.2010	24.-25.09.2010	
	24.-25.09.2010	24.-25.09.2010			

2.4.5 Visits SCG to EU

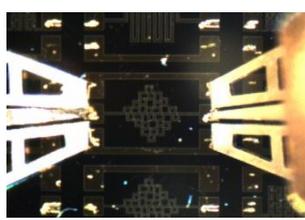
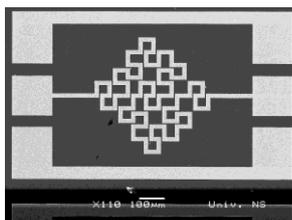
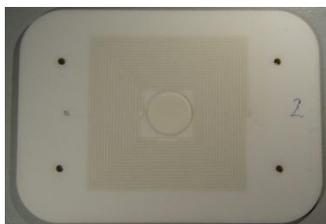
There were thirty five visits from SCG (Serbia) to EU partnering institutions and short reports from all visits are presented below:

Mobility report for Goran Radosavljević and Andrea Marić

This mobility was realised within the scope of the FP6 INCO project “Reinforcement of the Center for Integrated Microsystems and Components (CIMC)”, project no. 043669. Researchers Goran Radosavljević and Andrea Marić visited, Department of Applied Electronic Materials (AEM) at Institute of Sensor and Actuator Systems (ISAS) and Institute of Electrodynamics, Microwave and Circuit Engineering (EMCE) at Vienna University of Technology to perform research activities foreseen with this project. Visit was realised in the period from the 2nd to the 31st of July, 2007. Prof.Dr Walter Smetana the head of Integrated Ceramic Technology (ICT) laboratory at ISAS acted as an academic supervisor of Radosavljević, while prof.Dr. Markus Mayer leader of the Microwave Engineering group hosted Marić at EMCE.

Planned work activities involved several aspects:

- getting acquainted with laboratory facilities and equipment at ISAS and EMCE,
- design of new components and sensors and their fabrication (ICT),
- experimental characterisation of fabricated sensors (ICT),
- experimental measurement of parameters of different integrated components (EMCE),
- characterization of components (EMCE),
- analyses of obtained results and their comparison with expected values.



Some fabricated samples and measurement procedure

All other activities foreseen for this mobility were realised. Many new samples were made and results important for the future research steps were achieved.

Report on the visit to the Heriot Watt University, Edinburgh, Scotland - Vasa Radonić

During the INCO project: “Reinforcement of the Center for Integrated Microsystems and Components”, proposal no. 043669 it was planned for me to attend three courses, two short visits (7 days) and one longer (30 days). My first visit was realized between 4th and 13th of December, 2007. I visited Heriot Watt University in Edinburgh, Scotland. My mentor was a lecturer George Gousetis, PhD professor. Heriot-Watt University offers a high quality learning experience. It is one of the leading UK universities and has a good international reputation for innovative education, enterprise and practical research.



Heriot Watt University, Edinburgh, Scotland



George Gousetis – a lecturer on Heriot Watt University

My basic research was connected with high frequency components and circuits which operate at GHz range, especially meta-surfaces and their applications. During this training course, several activities were realized:

- Introducing with artificial meta-surfaces (Photonic Band Gap - PBG, Frequency Selective Surfaces - FSS, High impedance surfaces - HIS and Artificial Magnetic Conductor - AMC)
- Estimation of propagation constant (B_f) as a function of frequency for 2-ports and multi-ports structures obtained for simulation
- Estimation of propagation constant (B_f) as a function of frequency for meta-surfaces
- Simulation and measurement of reflection and transmitted coefficient for different types of surfaces in a specialized microwave laboratory
- Planning future common activities in the field of metamaterial surfaces and their applications.

As a simulation tool High Frequency Structure Simulator - HFSS from the Ansoft company was used. Ideal work conditions and a significant support from the mentor gave very positive results. All activities were realized very efficiently. I have learned all important things about meta-surfaces and difference between some of them. I have got the basic knowledge about their work operation and characterization. A new method for the estimation of B_f diagram, obtained directly from s-parameters, was established for 2-ports and multi-ports structures. The simulation results obtained from HFSS and measurement were compared. A very good agreement has been confirmed. Additionally, I have learned how to produce B_f diagram directly from simulations for 2D and 3D structures using HFSS. The simulation results were compared with previous mentor's results obtained by a calculation method. We measured previously fabricated surfaces, their reflections and transmitted coefficients. The common working plans for future activities were also adopted. Some of these activities will be realized during my next visits.



Geore Gousetis, his assistant and me

Although the visit did not last so long, hard work every day and commitment of team members gave significant results. This visit improved my knowledge in the field of meta-surfaces noticeably and now we are preparing one common scientific paper for a leading international journal in the field about a new type of meta-surfaces.

A report on the visit to the Interuniversity Center Como, the Milan Polytechnic, Italy – Mirjana Videnović-Mišić

This visit was organized from January 27th to February 3rd 2008. I was given an overview of the research carried out in the “Laboratorio L-Ness, Como, Politecnico di Milano”.



Laboratorio L-Ness, Como, Politecnico di Milano

In this section, I will shortly explain, the main contributions on improving my knowledge and experience during this visit.

a) Mr. Giovanni Isella explained how equipment for Silicon germanium (SiGe) deposition by low-energy plasma-enhanced chemical vapor deposition (LEPECVD) works. As SiGe show very good properties in up-to-date applications (today's Intel processors work with SiGe transistors) the idea is to find controllable way of SiGe growth. LEPECVD is used to deposit high-quality crystalline silicon-germanium films on silicon substrates. Plasma is used to enhance the deposition rate, as compared to the conventional chemical vapor deposition (CVD). Low energy plasma is used to avoid damage to the crystal structure from high-energy ions. The process has a high flexibility and controllability during deposition as growth rates can be controlled by varying some parameters independently. The drawback of this method compared to Molecular Beam Epitaxy (MBE) is that process is faster than MBE but introduces more defects.

b) Mr. Sergio Bietti explained the purpose of AlGaAs quantum dots and their integration on Si/SiGe. As quality GaAs substrate is very expensive and hard to get the main idea is to use SiGe substrate (from their own line) for AlGaAs devices.

c) Mr. Alexey Fedorov explained process and equipment for Molecular Beam Epitaxy (AlGaAs). At the moment of my visit they were trying to set the MBE equipment as measurement results were not satisfying. Though MBE process is very slow many different things such as pressure and timing of Al, Ga, As introduction is essential. The idea in this process is also to use SiGe substrate instead of GaAs.

d) Mr. Gerd Norga explained application of functional oxides in nanoelectronics. Application of the MOS technology is no longer limited to digital world. The main obstacle of MOS transistors use in analog circuits is defects at the Si/SiO₂ interface. Another general problem is SiO₂ oxide which with scaling cannot endure high electric field. Therefore, this part of research in L-Ness is conducted with the aim to see how various dielectrics (compatible with Si) would behave in place of SiO₂.

e) Roman Sordan gave me an overview of the clean-room facilities that contains equipment for semiconductor devices microfabrication, including facilities for optical lithography, wet and dry etching, thin film metal deposition, bonding and other microfabrication processes. Roman Sordan is the leader of the group for Electron Beam Lithography (EBL). He explained advantages of the process and gave me an introductory EBL course that Mr. Roman gives to students at the Politecnica di Milano. During this

presentation he explained advantages of this approach to devices productions. This technique use highly focused electron beam for resist radiation where diffraction is not a limiting factor as in case of optical lithography. As a result EBL can achieve smaller devices. However, the resolution of EBL is mostly limited by imperfections in the electron optics and electron backscattering from the substrate. These effects limit the smallest feature size to ~ 10 nm. EBL is not suitable for a large scale production because electron beam exposure is a serial process. On the other hand, EBL is a fabrication tool of choice in nanoelectronics and low-dimensional physics. It allows researchers to fabricate and investigate very small devices which might be used in the future.

Report on the visit to the Institute of Sensor and Actuator Systems (ISAS), Vienna University of Technology, Austria – Goran Radosavljević

In the scope of the INCO project “Reinforcement of the Center for Integrated Microsystems and Components”, proposal no. 043669 one 15 days visit and one 30 days visit as well as participation in three courses are planned to be carried out from my behalf. The first visit has been realized from 24th February until 7th of March 2008. It was conducted at Institute for Sensor and Actuator System (ISAS), Technical University of Vienna, Austria, with Dipl.Ing.Dr.techn Walter Smetana as the academic supervisor. Dr. Smetana is one of the leading European researchers in area of the LTCC (Low Temperature Co-fired Ceramics) technology and acts as the head of the modern LTCC laboratory at ISAS.

The Technical University of Vienna is one of the leading European universities and has a good international reputation for innovative education, enterprise and practical research.



Technical University of Vienna,
Vienna, Austria



Dr. Smetana in the laboratory

The basic research conducted at ISAS has been intended for the introduction with the LTCC technology and the whole fabrication process. With obtained skills fabrication of the new design of wireless pressure sensors for MHz range was possible. During this training course several activities were executed:

- getting acquainted with laboratory facilities and fabrication equipment at ISAS,
- preparation of some wireless pressure sensor designs for the fabrication process,
- fabrication of design structures,
- characterization of pressure sensors based on measured parameters,
- analysis of obtained results and their comparison with expected results (simulated values).

All activities were realized very efficiently.

The few following pictures have been taken at the ISAS laboratory. They show a couple of phases of the fabrication process and one realized structure.



Goran Radosavljevic works with the screen-printing machine



Preparation for the lamination process

I find my stay and work in Vienna to be of great importance. I have gained new experience in the area of fabrication process in the LTCC technology, with the unselfish help of Dr. Smetana. This knowledge will be valuable for my future work, since I will be able to exploit it at my present working position at the Center for Integrated Microsystems and Components (CIMC), University of Novi Sad, Serbia. In addition, accomplished professional contacts will surely be useful in my future carrier. Cooperation between ISAS and CIMC will continue to grow in the future through the realization of new projects. Also, preparation of couple joint scientific papers for leading international conferences/journals from the field of micro-sensors has been agreed and partly realized.

The cooperative working plans for future activities have also been adopted. Some of these activities are planned to be realized during the next visits.

Report on the visit to IMA, Winer Nuestad, Austria, 06.-11.05.2008, Dr Milos Zivanov

Within the FP6 INCO WBC/SSA project (ReCIMiCo - project no. 043669) it was planned one short visit (7 days) at the Integrated Microsystems Austria (IMA) in Winer Nuestad. IMA is situated in the modern industrial area of Winer Nuestad.

My first visit was realized from 6th to 11th of May 2008. I visited IMA laboratories which deal with optoelectronics. My mentor was dr Zoran Djinovic whose research interest is in the field of microelectronics and optoelectronics for the long period. Also, I was cooperated with mr Lazo Manojlovic, young researcher in optoelectronics. Our work was connected with optical sensor systems and integrated optical systems, more specifically in the following areas:

- In-line measurement of nanoscale etching rate of fiber-optic waveguides by white-light interferometry
- Acoustical vibration measurement of the pig's middle ear ossicles by fiber-optic vibrometer
- Fiber optic temperature sensor based on spectral transmittivity of CdTe
- A low-coherence interferometric technique for small displacement measurement based on two fiber optic couplers

We have also discussed about application of the Optical Spectral Analyzer for CWDM characterization of optical systems. We made some preliminary preparation jobs regarding the first Workshop devoted to the application of new installed equipment at CIMC which will be held in Novi Sad during September 2008

Mobility report for Andrea Marić and Goran Radosavljević

One short term mobility to Institute of Sensor and Actuator Systems (ISAS), Department of Applied Electronic Materials (AEM), Vienna University of Technology was realised within the scope of the FP6 INCO project "Reinforcement of the Center for Integrated Microsystems and Components", project no. 043669. Researchers mr Andrea Marić and mr Goran Radosavljević visited ISAS facilities in October 2008 and held several meetings with prof.Dr Walter Smetana the head of the Integrated Ceramic Technology

(ICT) laboratory and his team. Topics of discussion were pointed towards analyzing achieved results of joint research and defining next steps of the future research.

During this visit Marić and Radosavljević also took participation in conference in Slovakia where they presented one scientific paper entitled “Modelling and characterisation of fractal based RF inductors on silicon substrate.

The International Conference on Advanced Semiconductor Devices and Microsystems ASDAM 2008 was held from 12th to 16th October 2008 in Smolenice Castle, House of Scientists of Slovak Academy of Sciences and was organised by the Institute of Electrical Engineering, Slovak Academy of Sciences and co-organized by the Faculty of Electrical Engineering and Information Technology, Slovak University of Technology. The conference was devoted to the latest results of research and development in the field of new semiconductor devices and microsystems, with the main accents on materials, technologies, modelling and characterisation of micro semiconductor and nano devices.



House of Scientists of Slovak Academy of Sciences in Smolenice, Slovakia

Report on the visit of Vasa Radonic - One of the very important strategic objectives of the Center for Integrated Microsystems and Components (CIMC) is to improve performances of their researchers. Based on this concept, some regular visits were planned for young researches to improve their performances. During the INCO project: “Reinforcement of the Center for Integrated Microsystems and Components”, proposal no. 043669 it was planned for me to attend two courses, one short visit (7 days) and one longer (15 days). My first visit was realized in 2008 between 4th and 13th of December, while second one was realized in 2009 between 27th of July and 10th of August. I visited Heriot Watt University in Edinburgh, Scotland. My mentor there was lecturer George Gousetis, PhD professor. Heriot-Watt University offers a high quality learning experience. It is one of the leading UK universities and has a good international reputation for innovative education, enterprise and practical research.

The subject of my basic research was high frequency components and circuits which operating at GHz region, especially metamaterials and their applications. At this second learning course, several activities had been planned:

- Introducing with antennas and leaky waves antennas. Take a course in these topics and implement some assignments designs.
- Discussing about conventional microstrip patch designs, apart from miniaturization of resonators and filters realized in the standard PCB technology and troubles with determining the polarization.
- Implementing technique proposed by Maci to validate our previous results on HIS (High Impedance Surfaces). This will give me some crucial tools as an explanation how to work with this type of surfaces. Applying the pole-zero technique proposed by Maci in the extraction of propagation diagram and the theoretical background for MoM-based software for the analysis of this type of structures.
- Fabrication of 3D structure resonator in the LTCC (*Low Temperature Co-fired Ceramic*) technology.

Ideal work conditions and significant support from mentor gave positive results. All activities are realized very efficiently. I have learned many things about leaky-wave antennas and difference between them and

conventional antennas. I have got the basic knowledge about their work operation and characterization. Theoretical method for implementation and obtaining relevant parameters is recognized. As a simulation tool, High Frequency Structure Simulator HFSS was used to verify mathematical equations. I took a short course and received theoretical background of MoM-based software for the analysis of HIS structures. Novel method for implementing Maci techniques is obtained directly from s-parameters for analysis the periodical structures. The simulation results obtained from HFSS and measurement are compared. Very good agreement is confirmed.

In the cooperation with professors and PhD students from Heriot Watt University, novel configuration of 3D Hilbert resonator was fabricated in LTCC technology. Many thanks to George Goussetis for making it all possible and organizing the fabrication process and especially my gratitude to his PhD student Yves Laccote for helping during fabrication. We were measuring fabricated prototypes, their reflections and transmitted coefficients. All characteristic qualities of different surfaces are confirmed. We acquired common working plans for future activities in the realization and characterization of LTCC components and circuits. We are writing the joint paper for the international magazines. The hard work paid-off since the results are excellent.

Although the visit did not last long enough, hard working every day and commitment of team members gave important results. This visit improved my knowledge in the field of metamaterials and leaky-wave antennas and now we are preparing one paper for international magazine about fabricated 3D circuit in the LTCC technology.

Report on the visit of Nikolina Jankovic - One of the strategic objectives of the Centre for Integrated Microsystems and Components (CIMC) is to improve knowledge and competence of its researchers. With the aim of improving my knowledge, I visited Heriot Watt University in Edinburgh, Scotland, between 27th July and 10th August 2009, within the INCO project “Reinforcement of the Centre for Integrated Microsystems and Components”, proposal no. 043669.

Heriot-Watt University is one of the leading universities in the UK and has an international reputation for innovative education, enterprise and practical research. It offers a high quality learning experience as well as an excellent working environment.

During the visit, my supervisor was George Goussetis, an assistant professor at Heriot-Watt University.

My research during the visit was related to antennas operating at GHz frequencies, in particular leaky-wave antennas, and LTCC technology and manufacturing process. My work focused on the following:

- Introduction to general theory of leaky-waves
- Application of the theory to antennas
- Introduction to LTCC technology and manufacturing process
- LTCC fabrication of the circuit that had been previously optimised at CIMC

All aspects of my work were successfully realised owing to the professor’s devotion and help and excellent working environment. I gained basic knowledge, theory and analytical methods of leaky-waves antennas.

Also, through the fabrication of the circuit I attained knowledge of LTCC technology and the devices and equipment that are used in the manufacturing process. Since the LTCC fabrication consists of seven demanding processes, the fabrication of the circuit lasted for several days. After the fabrication, measurement results of the fabricated structure were compared to the simulation ones and an excellent agreement between those results was observed.

As a result of the successful fabrication, we are preparing a joint paper for an international journal.

To sum up, taking into consideration that the visit to Heriot-Watt University lasted for two weeks and that all objectives of the visit were achieved, the visit can be considered as efficient and successful.

**Report on the visit to IMA, Winer Nuestad, Austria, Period: 5th -9th of May 2009,
Dr Milos Zivanov, full professor**

Within the FP6 INCO WBC/SSA project (ReCIMiCo - project no. 043669) it was planned e short visits (7 days) at the Integrated Microsystems Austria (IMA) in Winer Nuestad. IMA is situated in the modern industrial area of Winer Nuestad.

My second visit was realized from 6th to 11th of May 2008. I visited IMA laboratories which deal with optoelectronics. My mentor was dr Zoran Djinic whose research interest is in the field of microelectronics and optoelectronics for the long period. Also, I was cooperated with mr Lazo Manojlovic, young researcher in optoelectronics. Our work was connected with optical sensor systems and integrated optical systems. Our main work was on preparation Project Proposal “Fiber-optic sensors for on-line monitoring of gas and oil pipelines”

This project is aimed for investigation and development of one fiber-optic sensor system that is capable to be used along the new or already in use gas and oil pipelines for on-line structural health monitoring (SHM) by measurement of different physical and chemical parameters. The main goal is to provide a real time environmental protection of soil, rivers and atmospheres against accidental or long-time leakage of pipelines content.

We can nowadays here very bad news of tragic events that appear all around the world in different industrial fields such as in constructive engineering, traffic, plant industry, transportation, etc. Let’s mention very dramatic news that come from time to time from Nigeria in regions where the oil pipelines net is very developed. The main reason for these catastrophic events, is a kind of material failure or outside brutal action, leading to the decline and collapse of the structure. It is usually occurs due to fatigue of the material, when an internal structural deformation, such as cracks, are developed.

There is a strong effort in the scientific and engineering community to predict the behaviour of the material structure by structural health monitoring (SHM). Numerous techniques are in use today: acoustic emission system, acousto-ultrasonic system, phased array, fiber-optics. Fiber-optic sensing technique is an advantageous way of SHM, because of some well-known features of optical fibers: EMI resistance, small overall dimensions, ability to be embedded without disturbing of the domicile matrix etc. They are particularly advantageous to be used in explosive or flammable environment such are gas and/or oil pipelines due to safety reasons being absolutely dielectric in nature. Optical SHM can be based on several type of fiber-optic sensors, such as: intensity modulated, Fabry-Perot interferometers, optical time domain reflectometry (OTDR), fiber Bragg gratings (FBG).

FBGs are widely accepted for monitoring of different structure material based on metal, carbon or glass fiber reinforced polymers (CFRP, GFRP). The main problem in FBG sensors is how to separate the useful signal, caused by strain in the structure, from a parasitic signal, like temperature effects, which is often for an order of magnitude higher. Also, a rather huge number of FBGs sensors should be applied in order to cover the whole structure and the interrogation unit is of very high price. On the other side they are very promising to be used along the line of the pipe being are in-line with the input fiber.

In this Project we propose two techniques capable to detect the material failure and leakage of the gas and oil from the pipeline based on measurement and analysis of the acoustic signals that travels along the pipe. Both techniques are based on effect that acoustic signals, usually developed by the fluid leakage, generate transversal and longitudinal vibrations and microstrains along the pipe. The amplitudes of the vibrations will be measured by: a) alternation of the back-reflected light spectrum that travels through the FBG sensors and b) low-coherence interferometry in “all-in-fiber” sensing configuration. For the first technique the strain sensing element is fiber Bragg grating itself, while for the second technique is a fiber-optic loop made of several turns of single mode optical fiber and firmly fixed on the surface of the subjected gas or oil pipeline. The interferometric detection configuration is basically of Michelson type, made of a 3x3 singlemode fiber optic directional coupler, used for quasi-quadrature signals generation. The interferometric 2π ambiguity is overcome using a low coherence light source.

In the frame of the Project we will investigate:

- different “all-in-fiber” sensing configurations: FBG and low-coherence interferometry
- type of FBG that the best suit to increase the signal to noise ratio (SNR)
- type of low coherence light source that the best suit to increase SNR
- the critical number of fiber-optic sensors of both types
- algorithms for signal processing of raw signals
- visual graph presentation of results altogether with alarm levels
- fixation of fiber-optic sensing line on the new- or already used gas- and oil pipelines



Dr Z. Djinovic and prof. M. Zivanov

Report on the visit of prof. Dr Miljko Sataric - As a participant on the ReCIMiCo, FP6 project, no.043 669, conducted within Center for Integrated Microsystems and Components (CIMC), from Faculty of Technical Sciences in Novi Sad, Serbia, I was invited by Institute of Sensor and Actuator Systems (ISAS) at Vienna University of Technology to be a guest, and to present my seminar there. The host of my visit was Dr Nadja Adamovic, research fellow. I had got there on Wednesday, the June 24th, 2009. On Thursday, June the 25th I gave my presentation entitled: “INTRINSIC ELECTRIC FIELDS AS A CONTROL MECHANISM OF BI-DIRECTIONAL INTRACELLULAR TRANSPORT ALONG MICROTUBULES”. This presentation attracted many fellows and students and initiated vivid discussion regarding many points. Bearing in mind that some researchers from ISAS are dealing with artificial nano-pores, as the sensor tools applicable in biology and medical research, my experience in cellular ionic channels was very appreciated. I gave them some ideas arising from the fact that nano-pores in microtubules seems to play the crucial role in providing transistor-like features of microtubules in ionic signal processing within living cells. I had a fruitful discussion with prof. Michiel Vellekoop, one of the leading scientists in ISAS. My stay in Vienna was finished on Sunday, June the 27th, 2009.

Report on the visit of prof. Dr Ljiljana Zivanov -I visited Integrated Microsystem Austria in Wiener Neustadt from 7th to 12th September 2009. Since my host, Dr Zoran Djinović, is also ReCIMiCo Steering Committee member, the visit presented a good opportunity for discussion on overall ReCIMiCo project management. The objectives of the visit were:

- to get more familiar with facilities, current research programmes and activities and plans for future
- research of host partner institution
- to evaluate the results of the research visit in past period and prepare a plan for next visit
- to discuss next Workshop scientific programme and foreseen lecture
- to discuss potential future joint actions

One of the benefit of the visit was the possibility to get the latest information of the trends in current and hints on future research topics and challenge CIMC position and potential to be a suitable partner for future projects. Also, I elaborated potential speakers choice for the next Workshop in details with Dr Djinović and his colleagues.

Report on the visit of Goran Radosavljevic and Andrea Maric - In the scope of the INCO project “Reinforcement of the Center for Integrated Microsystems and Components”, project no. 043669 one short visit to the Institute for Sensor and Actuator Systems (ISAS), Vienna University of Technology was made. The visit took place from the 22nd to the 28th of November, 2009 and prof. Dr Walter Smetana hosted the visit.

The visit was conducted for several reasons:

- to exchange results obtained in the current joint part of the research,
- a detail discussion regarding the next visit that would take place in February 2010,
- introduction with the new equipment at ISAS (High Temperature Co-fired Ceramics - HTCC furnace).

The current research and co-operation with prof.Dr Smetana is a fruitful one and many results have been gathered. They were summarized and presented at several meetings. Some of results are already presented at international and national conferences (“Performance Improvement of a Resonant Pressure Sensor by Means of a Model Based Design Optimisation,” *IEEE Sensor 2008*, October 2008, Lecce, Italy; “A Capacitive Temperature Sensor Concept Realized in LTCC-Technology,” *SSI 2009*, March 2009, Brussels, Belgium; “Parameters governing the sensor characteristic of capacitive temperature sensors built up in LTCC-technology,” *ISSE 2009*, May 2009, Brno, Czech Republic; “A Sensitivity improvement of a non contact LTCC resonant pressure sensor,” *IMAPS 2009*, September 2009, Gliwice - Pszczyna, Poland; “Characterisation of dielectric LTCC tapes using the capacitance method,” *CAS 2009*, October 2009, Sinaia, Romania; “Resonant pressure sensor designed for the LTCC-technology,” *ETRAN 2008*, June 2008, Palić, Serbia). Also, one publication in the leading journal is realised (“A Wireless Embedded Resonant Pressure Sensor Fabricated in the Standard LTCC Technology,” *IEEE Sensor Journal*, vol. 9 Issue 12, pp. 1956-1962, December 2009).

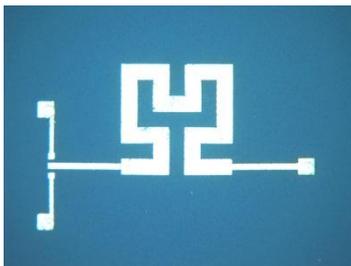
The other part of the visit was directed towards making plans for the next visit. This will be a one month visit during which new agreed designs and components will be fabricated. During previous visits many designs were fabricated in the LTCC technology. Now, there is a possibility to broaden the research and involve the HTCC technology using the newly purchased furnace.

All planed aspects of the visit were successfully realised and constructive arrangements were made on the mutual pleasure.

Mobility report for Andrea Marić and Goran Radosavljević Within the scope of the FP6 INCO project “Reinforcement of the Center for Integrated Microsystems and Components”, project no. 043669, a visit to Institute of Sensor and Actuator Systems (ISAS), Department of Applied Electronic Materials (AEM), Vienna University of Technology was realised. Researchers mr Andrea Marić and mr Goran Radosavljević visited ISAS as a planned mobility activity. Prof.Dr Walter Smetana head of the laboratory hosted the visit and helped its realisation. The visit took place from the 31st of January to the 20th of February, 2010 for Marić and from the 31st of January to the 26th of February, 2010 for Radosavljević.

This visit supported research in the area of:

- fabrication of integrated LTCC inductors,
- characterisation of newly obtained ferrite LTCC tapes,
- fabrication of ferrite and dielectric samples for material characterisation,
- fabrication of test transformer structures on dielectric and ferrite substrate.



Some of the fabricated samples

Also, analyze of results obtained in previous months was conducted and guidelines for the future research steps were set.

Planed activities were successfully realised leaving room for the continuance of the future research.

Report on the mobility activities preformed during the visit to Vienna University of Technology, April, 2010, Vienna, Austria

Researchers Snezana Djuric, Milan Radovanovic, Nelu Blaz, and Djordje Obradovic visited Vienna University of Technology as part of the planned mobility activity within the FP6 INCO project

“Reinforcement of the Center for Integrated Microsystems and Components”, project no. 043669. Visit took place from 6th to 10th April for Milan Radovanovic, Nelu Blaz, and Djordje Obradovic and from 6th to 11th April for Snezana Djuric.

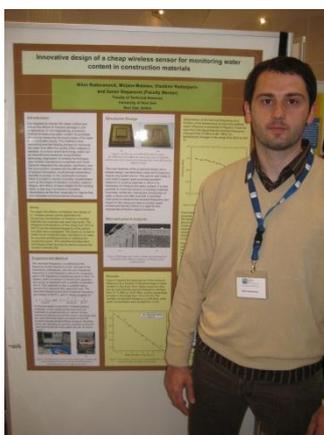


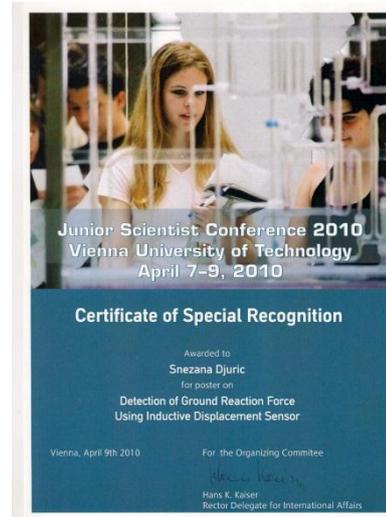
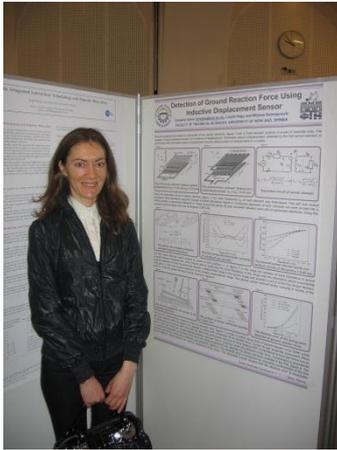
Researchers visited Institute of Sensor and Actuator Systems, Faculty of Electrical Engineering and Information Technology at the Vienna University of Technology. At Department of Applied electronic Materials, researchers had opportunity to visit Integrated Ceramic Technology Laboratory. Prof. Dr Walter Smetana, the head of the Laboratory, hosted the visit. Researchers were acquainted with available equipment and its manufacturing performances: LTCC technology, electroplating and wet-etching techniques, laser micro-machining, etc.



Ned-YAG laser for micro-machining

During the visit, researchers participated the Junior Scientist Conference 2010 (http://www.tuwien.ac.at/jsc/jsc10/home_jsc_10/), held at Vienna University of Technology on April 7-9, 2010, as well. Snezana Djuric presented paper “Detection of Ground Reaction Force using Inductive Displacement Sensor” (the paper has been awarded), Milan Radovanovic presented paper ”Innovative design of a cheap wireless sensor for monitoring water content in construction materials”, Nelu Blaz was the author of paper “Determination of electric and magnetic characteristics of basic electronic materials”, and Djordje Obradovic presented paper “Advanced Solution for Gamma Photon Detection.”





Report on the visit to IMA, Winer Nuestad, Austria, 25th -28th of April 2010, Dr Milos Zivanov, full professor

Visit was realized from 25th to 28th of April 2010 I visited IMA laboratories which deal with optoelectronics. My mentor was dr Zoran Djinovic whose research interest is in the field of microelectronics and optoelectronics for the long period. Also, I was cooperated with director Martin Gaggl. Our work was connected with optical sensor systems and integrated optical systems.

Integrated Microsystems Austria GmbH are networking partners of the Center for Integrated Microsystems and Components (CIMC), Faculty of Technical Sciences, University of Novi Sad, Serbia. The partnership has been established within the EU funded Sixth Framework Programme Priority Project [INCO-2005-C] entitled 'Reinforcement of the Center for Integrated Microsystems and Components' (ReCIMiCo), Contract no. 043669. The Project is intended to improve the research capacity of the CIMC by connecting it with EU research centers and establishing a long-term collaboration.

We made first new project preparation. This project will be aimed for investigation and development of one fiber-optic sensor system that is capable to be used along the new or already in use gas and oil pipelines for on-line structural health monitoring (SHM) by measurement of different physical and chemical parameters. The main goal is to provide a real time environmental protection of soil, rivers and atmospheres against accidental or long-time leakage of pipelines content.

We can nowadays here very bad news of tragic events that appear all around the world in different industrial fields such as in constructive engineering, traffic, plant industry, transportation, etc. Let's mention very dramatic news that come from time to time from Nigeria in regions where the oil pipelines net is very developed. The main reason for these catastrophic events is a kind of material failure or outside brutal action, leading to the decline and collapse of the structure. It is usually occurs due to fatigue of the material, when an internal structural deformation, such as cracks, are developed.

There is a strong effort in the scientific and engineering community to predict the behaviour of the material structure by structural health monitoring (SHM). Numerous techniques are in use today: acoustic emission system, acousto-ultrasonic system, phased array, fiber-optics. Fiber-optic sensing technique is an advantageous way of SHM, because of some well-known features of optical fibers: EMI resistance, small overall dimensions, ability to be embedded without disturbing of the domicile matrix etc. They are particularly advantageous to be used in explosive or flammable environment such are gas and/or oil pipelines due to safety reasons being absolutely dielectric in nature. Optical SHM can be based on several type of fiber-optic sensors, such as: intensity modulated, Fabry-Perot interferometers, optical time domain reflectometry (OTDR), fiber Bragg gratings (FBG).

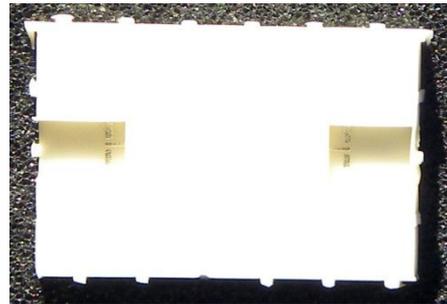
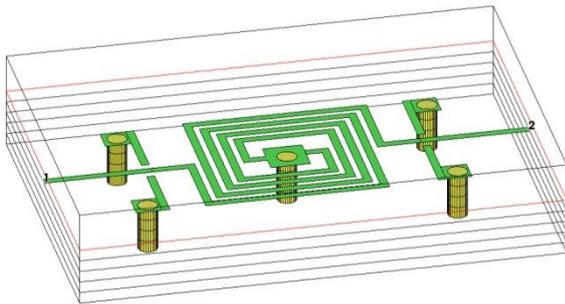
We concluded that we will continue on preparation of this procect. The next meeting will be in next Outem when we will made final preparation suggested project.

Mobility report for Andrea Marić and Goran Radosavljević

Within the scope of the FP6 INCO project “Reinforcement of the Center for Integrated Microsystems and Components (CIMC)”, project no. 043669, a visit to Institute for Sensor and Actuator Systems (ISAS), Department of Applied Electronic Materials (AEM), Vienna University of Technology was realised. Researchers mr Andrea Marić and mr Goran Radosavljević visited ISAS as a planned mobility activity in the period from the 9th to the 30th of July, 2010 for Marić and from the 23rd to the 27th of July, 2010 for Radosavljević. Prof.Dr Walter Smetana head of the laboratory hosted the visit and helped realisation of planned activities.

This visit followed up research activities undertaken during previous stays of both researchers at ISAS laboratories. Following activities were planned:

- fabrication of new designs of integrated LTCC inductors and transformers,
- analysis of characterization results for structures fabricated during the previous visit (characterisation was performed in CIMC laboratories),
- setting up following research interests and discussing possible topics for future joint projects.



One of the designed structures - model and fabricated sample

All planned activities were successfully realized. Many new samples were fabricated and are now to be characterised at CIMC. Discussions and meetings turned out to be very constructive and more solid new planes were made.

Report on the visit of prof. Dr. Ljiljana Zivanov (IMA, Wiener Neustadt, 25.08.-03.09.2010)

Dr Ljilana Zivanov, full professor and coordinator of ReCIMiCo project visited Integrated Microsystems Austria in Wiener Neustadt, Austria, where she was hosted by Dr. Zoran Djinovic. The objectives of the visit were:

- a) To get direct insight into IMA management and organizational structure, facilities, current research programmes and activities of host partner institution, in particular, to methodologies developed by the group for optoelectronics;
- b) To prepare a plan for training of Milos Slankamenac, Nikola Stojanovic and Djordje Obradovic and
- c) To discuss potential future joint action.

Personnel contact with the host helped in clarifying some of the major organisational and scientific issues for the forthcoming training, but more importantly, present a valuable experience as it would certainly strengthen the already existing cooperation between our two institution and researchers which proved to be already a case as publication of a small joint research study are currently being prepared.

The proposed training programme for M. Slankamenac, N. Stojanovic and Dj. Obradovic proved to be efficient, well balanced and invaluable experience for the trainee, while methods adopted and transposed to Centre of Integrated Microsystem and Components would certainly strengthen our overall performance.

Report on the visit of Miloš Slankamenac, Nikola Stojanović and Đorđe Obradović, IMA - Integrated Microsystems Austria GmbH.

IMA - Integrated Microsystems Austria GmbH is networking partner of the Center for Integrated Microsystems and Components (CIMC), Faculty of Technical Sciences, University of Novi Sad, Serbia. The

partnership has been established within the EU funded Sixth Framework Programme Priority Project [INCO-2005-C] entitled 'Reinforcement of the Center for Integrated Microsystems and Components' (ReCIMiCo), Contract no. 043669. The Project is intended to improve the research capacity of the CIMC by connecting it with EU research centers and establishing a long-term collaboration.

Miloš Slankamenac, Nikola Stojanović and Đorđe Obradović visited Hotwell company during 5th PNN Conference on September 17th-19th, 2010. Program of the conference was:

- Case-Studies: Actual experiences in operating Hotwell Tools and the most interesting examples from field practice:
 - PNN (Pulsed Neutron Neutron)
 - SIPLOS (Simultaneous Production Logging System)
 - AFT (Activation Flow Logging Tool)
 - SPECTRAL GR
 - ACE 5000
 - DIPLOG
 - MULTIFINGER CALIPER
 - ODT (Omni Directional Tool)
- PNN and other saturation logging tools and systems
- New processing and interpretation techniques with presentation of new software
- Formation Evaluation in general: different formation evaluation logging, processing and interpretation techniques



Miloš Slankamenac, Nikola Stojanović and Đorđe Obradović visited IMA - Integrated Microsystems Austria GmbH in period from 20th to 27th Sept. 2010. They were given an overview of the research carried out in IMA by their group leaders. They were also introduced to IMA equipment and laboratories.

Opportunities for cooperation are considered and a brief proposal regarding a future project is written. This project is aimed for investigation and development of one fiber-optic sensor system that is capable to be used along the new or already in use gas and oil pipelines for on-line structural health monitoring (SHM) by measurement of different physical and chemical parameters.

Report on the visit to IMA, Winer Nuestad, Austria, 15th -19th of September 2010, Dr Milos Zivanov, full professor

The visit was realized from 15th to 19th of September 2010. I visited IMA laboratories which deal with optoelectronics. My mentor was dr Zoran Djinovic whose research interest is in the field of microelectronics and optoelectronics for the long period. Also, we have working meeting with director Martin Gaggl.

IMA - Integrated Microsystems Austria GmbH are networking partners of the Center for Integrated Microsystems and Components (CIMC), Faculty of Technical Sciences, University of Novi Sad, Serbia. The partnership has been established within the EU funded Sixth Framework Programme Priority Project [INCO-2005-C] entitled 'Reinforcement of the Center for Integrated Microsystems and Components'

(ReCIMiCo), Contract no. 043669. The Project is intended to improve the research capacity of the CIMC by connecting it with EU research centers and establishing a long-term collaboration.

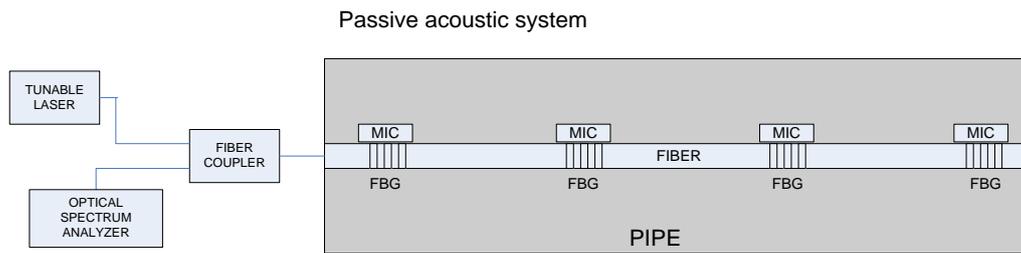
Our main work was on preparation of future Project Proposal “Fiber-optic sensors for on-line monitoring of gas and oil pipelines”

We do much efforts to prepare the project techniques:

In this Project we propose two techniques capable to detect the material failure and leakage of the gas and oil from the pipeline based on measurement and analysis of the acoustic signals that travels along the pipe. Both techniques are based on effect that acoustic signals, usually developed by the fluid leakage, generate transversal and longitudinal vibrations and microstrains along the pipe. The amplitudes of the vibrations will be measured by

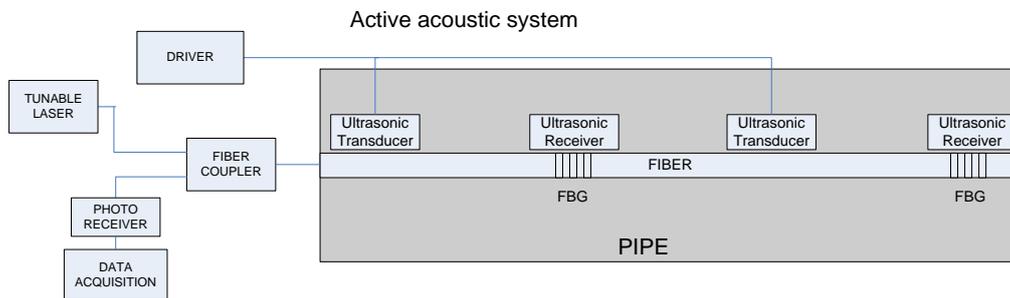
a) alternation of the back-reflected light spectrum that travels through the FBG sensors and

This system is based on passive detection of sound changes in the pipes for the transfer of oil or gas. The changes are transmitted to the microphone membrane which affect the FBG, resulting in changes in the sent signal. Using an optical spectrum analyzer, we're monitoring and signal processing.



b) active acoustic system with FBG sensors. For the first technique the strain sensing element is fiber Bragg grating.

In this active system, ultrasonic transducer sends signal within the tube, response is detected by ultrasonic receiver which transmits information through the FBG and affects the reference signal through a fiber.



In the frame of the Project we will investigate:

- different “all-in-fiber” sensing configurations
- type of FBG that the best suit to increase the signal to noise ratio (SNR)
- the critical number of fiber-optic sensors
- algorithms for signal processing
- visual graph presentation of results altogether with alarm levels
- fixation of fiber-optic sensing line on the new- or already used gas- and oil pipelines

Report on the visit of Goran Radosavljević, Nelu Blaž and Andrea Marić Within the scope of the FP6 INCO project “Reinforcement of the Center for Integrated Microsystems and Components”, project no. 043669, mobility of research staff is planned. Researchers dr Goran Radosavljević, MSc Nelu Blaž and mr Andrea Marić have visited Institute for Sensor and Actuator Systems (ISAS), Department of Applied Electronic Materials (AEM), Vienna University of Technology as part of the planned mobility activity. The head of the laboratory prof.Dr Walter Smetana hosted the visit. The visit took place from the 16th to the 26th of September, 2010 for dr Radosavljević and from the 19th to the 26th of September, 2010 for MSc Blaž and mr Marić. Dr Radosavljević had a previously arranged meeting with prof.Dr Johann Nicolics and prof.Dr Michiel Vellekoop from ISAS, therefore he had an earlier departure.



Entrance at the ISAS facilities, Vienna

The visit was conducted for several reasons:

- to exchange and analyze results obtained in the current joint part of the research,
- a detail discussion regarding future cooperation,
- to define topics of interest for preparation of future joint projects,
- to discuss in more details possibilities for future student exchange,
- visit to the Integrated Ceramic Technology (ICT) Laboratory and overview of all presently available equipment and manufacturing possibilities.



ICT Laboratory facilities at AEM Department

All planned aspects of the visit were successfully realised and constructive arrangements were made on the pleasure of all interested parties. As the so far cooperation was very successful there is no doubt that established cooperation will continue and expand in the future.

Report on the activities performed during the visit of Mirjana Damnjanovic to Interuniversity Center Como, Italy

The city of Como is located in the northern part of Italy, on the border between Italy and Switzerland. The Interuniversity Center Como (ICC), founded in 1989, is the part of the Politecnico di Milano.

The Interuniversity Center Como is a networking partner of the Center for Integrated Microsystems and Components (CIMC), Faculty of Technical Sciences, University of Novi Sad, Serbia. The partnership has been established within the EU funded Sixth Framework Programme Priority Project [FP6-2005-INCO-WBC/SSA-3] entitled “Reinforcement of the Center for Integrated Microsystems and Components” (ReCIMiCo), Contract no. 043669.

Prof. Mirjana Damnjanovic, a researcher working on ReCiMiCo project, visited the Laboratory for Epitaxial Nanostructures on Silicon and Spintronics (L-NESS), Interuniversity Center Como, Polytechnic of Milano on the September 24th 2010.

Prof. Damnjanovic was given an overview of the research carried out in the L-NESS Center by their group leaders. She was shown all steps in the nanofabrication of graphene nanodevices (mechanical exfoliation of

graphene from highly-ordered graphite, characterization of graphene flakes by optical, atomic-force, and scanning-electron microscopy, device fabrication by electron beam lithography, and electrical characterization at room and cryogenic temperatures).

She was also introduced to all L-NESS Center equipment and laboratories. Dr Damnjanovic discussed with the Prof. Roman Sordan the possibility of employing their experience and expertise at the CIMC. The discussion was very fruitful and we agreed on future collaboration between our Centers.

Report on the visit of Mirjana Videnovic-Misic and Alena Djugova, 21.-30.09.2010

Mirjana Videnovic-Misic and Alena Djugova, researchers at CIMC, Faculty of Technical Science, Novi Sad, visited Interuniversity Center Como (ICC), Polytechnic of Milano, the Laboratory for Epitaxial Nanostructures on Silicon and Spintronics (L-NESS) from 22nd to 23rd and from 27th to 29th September 2010.

The L-NESS occupies a unique position in the Italian research landscape because of the extraordinary concentration of research infrastructure. The multidisciplinary approach of the L-NESS is reflected in intense collaborations among researchers active in the growth of materials, their characterization, and their atomistic modeling. Finally, a strong emphasis is placed on developing strategic partnerships with the global high-tech industry.

Ms Djugova and Ms Videnovic-Misic were given an overview of the research carried out in the L-NESS Center by group leaders (Roman Sordan, Alexey Fedorov...). In particular, they were introduced to graphene research carried out in the Center. They received a basic training in all steps in the nanofabrication of graphene nanodevices (mechanical exfoliation of graphene from highly-ordered graphite, characterization of graphene flakes by optical, atomic-force, and scanning-electron microscopy, device fabrication by electron beam lithography, and electrical characterization at room and cryogenic temperatures). They were also introduced to all equipment and laboratories.

Mirjana Videnovic-Misic and Alena Djugova also visited Microelectronics Laboratory (MicroLab) at the University of Pavia on 24th September 2010. They met Prof. Rinaldo Castello and Prof. Danilo Manstretta and had discussion about their research and possible cooperation. MicroLab at the University of Pavia had a broad range of research activities and strong cooperation with private industry (STmicroelectronics, Conexant Systems (now Mindspeed Technologies), Lucent Technologies (now Agere Systems), Maxim, CSEM, National Semiconductor and RFDomus). Therefore, their experience and knowledge, in the fields complementary to CIMC, could be very beneficial for further advancement of our Centre.

2.4.6 Visits EU to SCG

There were ten visits from EU to SCG (Serbia) and reports from all visits are presented below:

Report on the visit of prof. Dr. Walter Smetana - In the scope of the INCO project "Reinforcement of the Center for Integrated Microsystems and Components", proposal no. 043669, prof. Dr. Walter Smetana visited the Center for Integrated Microsystems and Components during the period from the 10th to the 12th of July 2008. Prof. Dr Walter Smetana currently employed at the Vienna University of Technology where he is the leader of the ICeT-laboratory group at the Institute of Sensor and Actuator Systems. Special field of his interest focuses on the development of packaging concepts for power and automotive hybrid microelectronics with regard to thermal and thermal-mechanical aspects, as well on the evaluation of thick film and LTCC-materials for sensor and actuator applications.

The visit was conducted in order to discuss the possible continuation of the cooperation between the two research centers ISAS (Institute for Sensor and Actuator System) and CIMC (Center for Integrated Microsystems and Components). Main topics of the discussion were dissemination of the research results between the two groups and talk about the preparation of the new joint project.

Also prof. Dr Walter Smetana made presentation, entitled *LTCC Technology-actual research*, about current research of his group at ISAS, with an accent made on the topics of the LTCC processing and fabrication of LTCC microsystems.

Report on the visit of Dr Zoran Djinovic to Center for Intergrated Microsystems and Components, 25.-28.10.2008

As Zoran Djinovic was absent during ReCIMiCo Kick-off meeting because ReCIMiCo project coordinator Ljiljana Zivanov introduced him with main tasks in the frame of ReCIMiCo project. Dr. Zoran Djinovic attended the First ReCIMiCo workshop (28.-30.09.2008) and gave very interesting presentation entitled "In-line liquid concentration measurement in nanoliter volume using fiber optic low coherence interferometry" after that coordinator of the ReCIMiCo project called Dr. Zoran Djinovic to make similar presentation for training mobility.

Great efforts are invested today in miniaturization of different analytical systems that belong to a rather broad application range in chemical and biochemical engineering, life science, etc. For instance, routine laboratory analyses are shrinking to the microliter, nanoliter, or even picoliter level, based on emerging microfluidic devices such as "Lab-on-a-chip". The result is a vast reduction in sample and reagent consumption, decreased waste generation, dramatically faster operation, and an incredible potential for automation and massive, parallel processing of laboratory procedures. These benefits come together with greater resolution in separations, exquisite control over mixing, and the capacity for expediting chemical reactions within highly controlled microenvironments performed by microchemical reactors. Rapid development of miniature high-throughput analytical systems has also resulted in accelerated research in the sensing field. Typically, a sensing unit should provide an *in line* information extracted from the ultrasmall volume of probe of several nano or even pico liter range. Common analytical techniques, such as spectroscopy and liquid- or gas-chromatography are not suitable for a microchemical architecture with small overall dimensions of about 25x25x0.3 mm³.

Dr. Zoran Djinovic prepared presentation entitled „In-line concentration and index of refraction measurement of nanoliter liquid sample using low-coherence spectral interferometry“

A method for in-line measurement of the refraction index and the concentration of binary liquid mixture in a nanoliter volume is presented. Low-coherence spectral interferometric technique, based on fiber optic Mach-Zehnder interferometer, is applied for measuring the liquid refraction index, from which its volume fractions are found. The accuracy of volume fractions measurement, of about $\pm 0.2\%$, was predominantly determined by the accuracy and resolution of reading the light spectrum. The data rate has been limited to 40 Hz by the time of the light spectrum capturing.

Report on the visit of Dr. Zoran Djinovic - On the behalf of the Center for Integrated Microsystems and Components, Dr Zoran Djinovic delivered lecture "Some practical examples of fiber-optic sensors" in Novi Sad, on October, the 26th, 2009. Dr Zoran Djinovic prepared a presentation in the frame of ReCIMiCo Project. His visit was a nice opportunity to review and evaluate our cooperation and make a plan for the future cooperation between our two institutions.

Lecture themes and objectives:

- Nanoscale measurement of distance/vibrations: Distance and vibration FOS based on numerical aperture and Vibration and displacement FOS based on numerical aperture and a flexible mirror,
- High-Coherence Interferometric FOS,
- Low-Coherence Interferometric FOS,
- Non-destructive characterization of multilayer structures by low-coherence interferometry,
- In-line Measurement of Index of Refraction and Concentration of Nanoliter Liquid Sample,
- Contactless Measurement of Temperature of the High-Polished Movable Strip,
- Fizeau Receiving Interferometer with 2-D CCD Matrix for Low Coherence Interferometric Fiber Optic Sensors,

Mobility report for Michael Unger

In the scope of the INCO project "Reinforcement of the Center for Integrated Microsystems and Components" proposal no. 043669, one short term mobility of MSc Michael Unger from Institute of Sensor

and Actuator Systems (ISAS), Vienna University of Technology was realized. The visit took place in the period from the 4th to the 6th of March 2010. Mr. Unger visited Center for Integrated Microsystems and Components (CIMC) in Novi Sad and held presentation under the title "LTCC Material Properties at Elevated Temperature" on the 4th of March. Presentation focused on development of thermal and thermal-mechanical aspects of LTCC materials and dealt with evaluation of thick film and LTCC-materials for sensor and actuator applications from Integrated Ceramic Technology (ICT) group from ISAS and spoke about their main fields of research and current activities.. Presentation was intended purely for CIMC staff.

In the scope of this mobility visit, Mr. Unger participated in the 2nd ReCIMiCo Workshop where he presented paper entitled "High temperature characteristics of various LTCC-tapes".

Mobility report for Jovan Matovic, 05.-07.03.2010.

Short study visit of Institute of Sensor and Actuator Systems (ISAS) member and researcher from partner institution to CIMC was planned for third period of ReCIMiCo project. Dr. Jovan Matovic visit us with the aim to initiate and establish potentially long term collaboration based on characterization of nano membranes. Discussion on potential future cooperation was fruitful as scientific interest of Dr. Jovan Matovic highly correspond with CIMC current and projected research activities. During the visits specific further steps in cooperation have been agreed upon Dr. Jovan Matovic accepted the invitation to give lecture about "Characterization of nano conductive structure".

Lab-on-chip devices improve chemical and biological analysis by reducing the size of handled fluids and chip dimensions, in order to obtain "smaller, cheaper and faster" components. Currently, nanofluidic channels, as basic element in such devices, are receiving a considerable attention. There are already many different reported technologies suitable for the fabrication of such devices.

Recently, the better understanding and control of proton/ion transport in nanochannels, has received a major interest also in the field of alternative energy sources, particularly Polymer Electrolyte Membrane Fuel Cells (PEMFC). The efficiency of PEMFCs depends on the proton conductivity, mechanical strength and chemical stability of polymer electrolyte membranes. Up to now, all polymer electrolyte membranes contained randomly distributed channels, which did not provide an optimal proton/ion transport. On the other hand, well aligned nanochannels would bring many advantages for the operation of PEMFC, like better transfer of protons in the membrane, no influence on PEMFC operation by the content of water etc.

Also in the scope of mobility visit he participated on second workshop where he presented paper entitled "Nanofluidic proton conductive structure: design and characterization".

Report on the visit of Dr Zoran Djinovic to Center for Intergrated Microsystems and Components, 05.-07.03.2010

Dr. Zoran Djinovic Integrated system Austria, Wiener Neustad was invited by Ljiljana Zivanov to visit CIMC with the aim to initiate and establish potentially long term collaboration, based on optical method of measurements. During his stay, Dr. Zoran Djinovic become acquainted with member of CIMC, laboratory equipment and facilities an ongoing research projects and other activities.

He presented a non-destructive technique for characterization of multilayer composite structures composed of polymer layers or matrix and reinforced fibers, entitled "Characterization of polymer composite materials by optical coherence tomography". This technique is optical coherence tomography capable to give data about physical thickness, index of refraction of composite sample and structural defects. He used low-coherence interferometry as a basic physical principle performed as fiber-optic Michelson interferometer. There were tested polymer foils and composite structures made of epoxy resin and carbon fibers. He determined the size of the impact defect of composite samples and the interface between the two materials of a sandwich structure with accuracy of about 40 nm.

Optical coherence tomography is unique non-destructive characterization technique of polymer composite matrix because it provides high spatial and depth resolution. Nowadays there are a huge number of these techniques in medicine for in-vivo tissue characterization instead of standard biopsy. It is possible since optical radiation can penetrate till to 2-3 mm of tissue.

Recently this technique has found an interesting application for microstructural characterization of polymer composite matrix and different sandwich structures. There is a list of various non-destructive techniques in use for in-depth structural investigation of multilayer structure or composite matrix. The most frequently

used is ultrasound technique having resolution of the order of hundreds of micrometers with penetration depth of tens of millimeters. Ultrasound technique is primarily used to observe structural defects; delaminations, voids, fiber cracks, etc.

Thickness measurement of multilayer thin films in a submicron range is rather challenging task. Current techniques such as ellipsometry, surface plasmon resonance, capacitance measurements and mechanical profilometry, X-ray diffraction, atomic force microscope (AFM) are very complex and require specific and expensive apparatus that cannot be used for in-line measurement.

In the scope of this mobility visits Dr. Zoran Djinovic participate in the second workshop where he presented short version of mobility training presentation entitled "Structural characterization of polymer composite materials by optical coherence tomography"

Report on the visit of Walter Smetana

In the scope of the INCO project "Reinforcement of the Center for Integrated Microsystems and Components" proposal no. 043669, one short term mobility of prof. Dr. Walter Smetana from Institute of Sensor and Actuator Systems (ISAS), Vienna University of Technology was realized. The visit took place in the period from the 16th to the 19th of May 2010. Dr. Smetana visited Center for Integrated Microsystems and Components (CIMC) in Novi Sad, Faculty of Electronic Engineering in Niš and attended MIEL 2010 Conference that was held in Niš. Dr. Smetana is the leader of the Integrated Ceramic Technology (ICT) group at ISAS. Special field of his interest focuses on the development of packaging concepts for power and automotive hybrid microelectronics with regard to thermal and thermal-mechanical aspects, as well on the evaluation of thick film and LTCC-materials for sensor and actuator applications.

The main aspects of Dr. Smetana's visit to CIMC comprised dissemination of research results of ISAS and CIMC team obtained during the work in the scope of this project, as well as setting directions for the future cooperation between ISAS and CIMC. Also dr. Walter Smetana and Dr. Ljiljana Zivanov discussed about continuing their cooperation after finishing the ReCIMiCo project.

Result of this discussion, was "Agreement on Research and Business-technical Cooperation" which was signed 20.07.2010.

Meetings in Novi Sad were followed up with participation of Dr. Smetana at MIEL 2010 conference in Niš. Afterwards, Dr. Smetana held one presentation entitled "Ceramic microstructure activities at the ICeT- (Integrated Ceramic Technology) Laboratory" at Faculty of Electronic Engineering, University of Niš where he presented ICT group and their research activities.

Report on the visit of Walter Smetana

Prof.Dr. Walter Smetana from Institute of Sensor and Actuator Systems (ISAS), Vienna University of Technology realised this short term mobility in the scope of the INCO project "Reinforcement of the Center for Integrated Microsystems and Components" proposal no. 043669. Dr. Smetana visited Center for Integrated Microsystems and Components (CIMC), Faculty of Technical Sciences in Novi Sad. The visit took place in the period from the 27th to the 30th of August 2010. Dr. Smetana is currently the leader of the Integrated Ceramic Technology (ICT) team at ISAS.

Center for Integrated Microsystems and Components
Faculty of Technical Sciences,
Novi Sad

Institute for Sensor and Actuator Systems,
Faculty of Electrical Engineering and
Information Technology,
Vienna

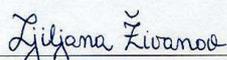
Subject: Agreement on Research and Business-technical Cooperation

The objective of this Agreement is strengthening of bilateral relations in research and business-technical cooperation between Institute for Sensor and Actuator Systems, Faculty of Electrical Engineering and Information Technology, Vienna and Center for Integrated Microsystems and Components, Faculty of Technical Sciences, Novi Sad. The ongoing cooperation between group from Prof.Dr Walter Smetana and us has been proven as a very successful one during the last five years. Accomplished achievements can be seen through results attained within several joint international projects, a large number of smaller individual projects, a substantial number of scientific papers published in international journals and presented at conferences, exchange of equipment and knowledge.

We strongly believe that is in the best interest of both institutions that present cooperation continues in the same manner. Also, there is always a possibility to enrich and expand activities cooperation activities stated within this agreement. The expansion could be seen through more frequent exchange of knowledge, people and resources, preparation of new international projects, reciprocity of student visits and/or organisation of short lectures/courses, or in the any other way that representatives of both institutions find adequate and prosperous.

Representatives of both institutions are determined to conspire in efforts to maintain and expand the existent cooperation. They also believe that deepening of established good relations can and will be beneficial to both institutions and all employed individuals.

At July, the 20th, 2010



Prof. Dr Ljiljana Živanov,

Center for Integrated Microsystems and Components
Faculty of Technical Sciences,
Novi Sad



Prof.Dr Michael Vellekoop,

for Institute for Sensor and Actuator Systems,
Faculty of Electrical Engineering and
Information Technology,
Vienna

He gave presentation on “Design, modelling, fabrication and characterisation of LTCC sensors for pressure detection”.

During this visit Dr. Smetana participated at meetings held in order to discuss and set directions for the future cooperation between ISAS and CIMC. Also, Dr. Smetana was co-mentor of PhD student Goran Radosavljević and he was a member of the committee board for defense of Radosavljević’s dissertation on 28th of August, 2010.



Defense of Radosavljević’s doctoral thesis

Mobility report for Jovan Matovic, 24.-26.09.2010.

During his previous visits to CIMC (05.-07.03.2010.), Dr. Jovan Matovic accepted the invitation to give overview lecture about new trends in the field of nano membranes, at the end of the ReCIMiCo project. We special pronounce on research and developed work at ISAS. Lecture entitled “Nanomembrane R&D work at ISAS, TU Wien, Austria”.

This presentation gives the theoretical and experimental investigations on the proton/ ion transport in electrically isolated nanochannels, predominately aimed to be used for Polymer Enhanced Membrane Fuel Cells (PEMFC) applications. The design and fabrication of the nanochannel test device, used as a powerful test fixture for better understanding of proton/ ion transport within nanochannels, is discussed in details. Obtained results, will help us to design optimal proton conductive isolating nanochannels in novel type of ultrathin PEMFC membranes (by using top-down approach), analog to the selective proton/ ion transport in biological cells.

The proton exchange barrier or Proton Exchange Membrane (PEM) is the critical part of a fuel cell. The basic function of membrane is to enable proton transport, while being simultaneously impermeable for electron and gas. Typically, membranes for the PEM fuel cells are made of perfluorocarbon-sulfonic acid ionomer (PSA). The best known material of this class is Nafion. Nafion has a unique interpenetrating structure of hydrophobic perfluorocarbon regions providing thermal and chemical resistance, mechanical strength and diffusional resistance combined with hydrophilic regions of water clusters surrounding charged sulfonic acid groups which allow selective proton transport. For these reasons, Nafion, although introduced in the mid-1960s, is still considered the benchmark against which most of the new materials are compared.

At the molecular level, proton transport may follow two principal mechanisms: (a) diffusion mechanism via H_3O^+ ion as a carrier or ‘vehicle’ and (b) proton hopping mechanism (Grotthuss transport). Contemporary PEFCs are exclusively based on the vehicle mechanism.

Mobility report for Roman Sordjan, 24.-26.09.2010

CIMC invited Dr. Roman Sordjan from Milan Polytechnic Interuniversity Centre Como, Italy to give the lecture on exciting physical properties and possible application of grapheme, entitled “Graphene Nanodevices”.

Roman Sordjan and his colleagues from Nanoscale Device Group, Como, Italy have published some very interesting papers about single grapheme transistor logic gates and Integrated Complementary inverter in Journal Applied Physics Letter during 2009 year.

Also Dr. Roman Sordjan presents grapheme nano ribbon memory cell with special pronounce on digital wave forms on its output. Second interesting field which he presents is grapheme nano mechanics.

Grapheme has low built in tension $T=12\text{nN}$ and large Young's module $E=0,43\text{tPa}$. Interuniversity Centre, the Laboratory for Epitaxial Nanostructures on Silicon and Spintronics (L-NESS), Nanoscale Device Group, Como, certainly, one of the most prestigious centre in Europe, provided the unique opportunity to CIMC members not only to get acquainted with the state of the art equipment and methods but to get the latest information of the trends in current and hints on future research topics and challenge CIMC position and potential to be suitable partner for future projects. Above all, very close personal contacts with Interuniversity Centre Como expert is one of the benefit deriving from this visit, but also prerequisite for potential joint activities

2.3 WP 4 Investment to human capital

2.3.1 Objectives of the WP4

To further reinforce human resources of CIMC two new young researchers were hired during the first year. Both researcher enrolled PhD studies. During the whole project period new young researchers have continued their studies and have improved their skills and scientific knowledge.

In reporting period they published 16 papers:

1. Stojanović, Goran; Radovanović, Milan; Malešev, Mirjana; Radonjanin, Vlastimir, "Monitoring of Water Content in Building Materials Using a Wireless Passive Sensor." *Sensors* 2010, 10(5), 4270-4280; doi:10.3390/s100504270.
2. Goran Stojanović, Milan Radovanović, Vasa Radonić, "Designed, simulation and analysis of novel fractal integrated transformers", *MMS 2007 Mediteranean Microwave Symposium*, 14-18. may 2007, Budapest, Hungary, pp. 105-108, ISBN: 978-963-87244-4-1.
3. Goran Stojanović, Milan Radovanović, Marija Maletin, Ljubica Nikolić: "Electrical characterisation of nanostructured titania coatings deposited on interdigitated electrode system for sensors applications", *Electroceramics XI*, Manchester: 01-04 September, 2008, F-025-P,
4. Nikola Lečić, Milan Radovanović, Ljiljana Živanov, Nadja Adamović, Jovan Matović, "Electrical characterization of nanochannels using impedance spectroscopy", *Second ReCIMiCo Workshop*, 5-6 Mach 2010. ISBN: 978-86-7892-287-
5. Milan Radovanović, Goran Stojanović, Mirjana Malešev, Vlastimir Radonjanin, "An innovative design of a cheap LC sensor for monitoring water content in construction materials", *Second ReCIMiCo Workshop*, 5-6 Mach 2010. ISBN: 978-86-7892-287-9.
6. Milan Radovanović, Mirjana Malešev, Vlastimir Radonjanin, Goran Stojanović, "Innovative design of a cheap wireless sensor for monitoring water content in construction materials", *Junior Scientist Conference 2010*, Viena, Austria, 7-9 April 2010, pp. 191-192, ISBN: 978-3-200-01797-9.
7. Milan Radovanović, Marija Maletin, Ljubica Nikolić, Goran Stojanović, "Investigation of electrical parameters of nanostructured titania coatings deposited on interdigitated electrode system", *The Seventh Students' Meeting*, SM-2007, 6-8. December 2007, Novi Sad, Serbia (rad objavljen u izvodu).
8. Goran Stojanović, Milan Radovanović, Vasa Radonjić, "A New Fractal-Based Design of Stacked Integrated Transformers", *Active and Passive Electronic Components*, Volume 2008 (2008), Article ID 134805, 8 pages doi: 10.1155/2008/134805.
9. Mirjana Maksimović, Goran Radosavljević, Milan Radovanović, Goran Stojanović, "Primena bežičnog LC senzora za merenje koncentracije vode u građevinskim materijalima", *INFOTEH 2010*, Jahorina, Republika Srpska, Mart 17-19, 2010.
10. Milan Radovanović, Goran Stojanović, Mirjana Malešev, Vlastimir Radonjanin, "Novi dizajn bežičnog LC senzora za praćenje koncentracije vlage u građevinskim materijalima", *ETTRAN 2010*, Donji Milanovac, 7-11 Jun 2010.
11. Goran Stojanović, Miloš Živanov, Miloš Slankamenac, Andrea Marić, Goran Radosavljević, Milan Radovanović, "Realizacija mikro senzora visokih performansi za rad u ekstremnim uslovima okruženja", *INTERREGIOSCI 2010*, pp. 69-70, Novi Sad, April 2010.
12. Obradovic Đorđe, Miloš Živanov, "Advanced Solution for Gamma Photon Detection", „Junior Scientist Conference 2010-Science and technology for the future“, Vienna: 7-9 april 2010, str.149-150, ISBN 978-3-200-01797-9
13. Đorđe Obradović, Miloš Slankamenac, Miloš Živanov, "Kontrolna jedinica za napajanje elektronskih sklopova u modulu za merenja u nezacevljenim bušotinama", „Energija, ekonomija, ekologija“, ISSN br. 0354-8651, UDC: 622.241.03 : 622.12, broj 3, godina X, str. 63 - 66, 2008.
14. Đorđe Obradović, Vladimir Milosavljević, Miloš Živanov, "Hardverska realizacije elektronskog bloka za obradu impulsa sa gama scintilacionog detektora", „Energija, ekonomija, ekologija“, ISSN br. 3554-8651, UDC:620.9, broj 3, godina XII, str.257-263, mart 2010.
15. Živanov Miloš, Obradović Đorđe, Milosavljevic Vladimir, "Instrument za merenje prirodne gama radioaktivnosti", strane.1-8, Fakultet tehnickih nauka, 2010.
16. Živanov Miloš, Milosavljevic Vladimir, Brkić Miodrag, Cvijić Nebojša, Dogan Viktor, Obradović Đorđe, "Sonda za merenje temperature, prirodne gama radioaktivnosti i spojeva cevi", strane.1-8, Fakultet tehnickih nauka, 2010.



Two new young researchers are working in the laboratory

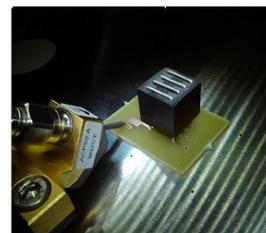
During Project all pieces of equipment purchased in the scope of the ReCIMICo project in the first years have been successfully exploited and members of CIMC staff were fully trained for their usage.

The following measuring methods has been developed:

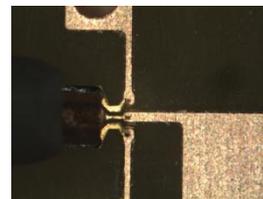
- Determination of electrical and magnetic characteristics of materials in the high frequency range 10MHz to 50GHz using N5230A PNA-L Agilent Vector Network Analyzer VNA and N4693A Ecal module,
- Characterisation of micro inductors fabricated in the LTCC technology using RF/Microwave Wafer Probe Station, SUSS PM5, HF precision cable PC-2.4mm 50GHz and $|Z|$ probe and VNA
- Measurement of optical signals with TLS-55C Tunable laser source C-Band and WDM Optical Spectrum Analyzer kit, JDSU and WDM Optical Spectrum Analyzer, EXFO,
- Verification and testing of FPGA based 8051 IP core using Agilent 16901A 2-slot Logic Analysis System Mainframe
- Determination of electrical characteristics of electric components in the high frequency range 10MHz to 50GHz using N5230A PNA-L Agilent Vector Network Analyzer VNA and N4693A Ecal module,
- A determination of electrical characteristics of different dual-band filters topology fabricated in PCB technology and LTCC technology up to 40GHz.
- Characterisation of micro transformers fabricated in the LTCC technology using RF/Microwave Wafer Probe Station, SUSS PM5, HF precision cable PC-2.4mm 50GHz and $|Z|$ probe and VNA
- The principle of measurement of optical amplifiers of amorphous chalcogenide semiconductors doped with erbium has also been developed. For these measurements followed a experimental setting was used. Laser light source is Agilent 81949A, which emits light in the wavelength range of 1518 to 1630 nm, while the output can be changed in the range of 5 to 30 mW.



(a)



(b)



(c)

(a) Measurement set-up for characterization of ferrite transformer placed on the wafer probe station PM5, (b) measurement set-up and SMD bead 48-057-38, (c) a view to a GSG probes placed on the PCB contacts.

2.4 WP 5 Network and dissemination

2.4.1 Objectives of the WP5

- To disseminate results of the Project on domestic and regional (WBC) level,
- To support dissemination of scientific knowledge and expertise of CIMC and EU partnering institutions staff on domestic and international level,
- To promote networking with other European research institutions in the field,
- To promote CIMC as a regional research leader in its fields of work,
- To strengthen CIMC position in international research and industrial communities,
- To foster new domestic and international joint research projects,

2.4.2 List of WP5 Deliverables

Table 2.4.1: Deliverables List

List of all deliverables, giving date of submission and any proposed revision to plans.

Del. no.	Deliverable name	Work package no.	Date due	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
D5-2	Printed materials from workshop 1	WP5	February, 2009	February, 2009	6		1
D5-3	Printed materials from workshop 2	WP5	June, 2010	June, 2010	6		1
D5-5	Project manager's report on distribution of travel grants for the first workshop	WP5	30.09.2008	30.09.2008	4		1
D5-5	Project manager's report on distribution of travel grants for the second workshop	WP5	15.03.2010	15.03.2010	4		1

D5-6	Reports from CIMC staff to the coordinator regarding their Project funded participation in international and regional conferences	WP5	08.-13.09.2007	08.-13.09.2007	9	1
			08.-13.09.2007	08.-13.09.2007		
			22.-30.09.2007	22.-30.09.2007		
			22.-30.09.2007	22.-30.09.2007		
			13.-18.10.2007	13.-18.10.2007		
			13.-18.10.2007	13.-18.10.2007		
			03.-07.05.2008	03.-07.05.2008		
			18.-23.05.2009	18.-23.05.2009		
			18.-23.05.2009	18.-23.05.2009		
			18.-23.05.2009	18.-23.05.2009		
			18.-23.06. 2009	18.-23.06. 2009		
			12.-14.10.2009	12.-14.10.2009		
			12.-14.10.2009	12.-14.10.2009		
			12.-14.10.2009	12.-14.10.2009		
			21.-24.09.2009	21.-24.09.2009		
			21.-24.09.2009	21.-24.09.2009		
			04.-08.05.2009	04.-08.05.2009		
06.-13.12.2009	06.-13.12.2009					
16.-19.05.2010	16.-19.05.2010					
18.- 21.07.2010	18.- 21.07.2010					
06.-08.09.2010	06.-08.09.2010					
06.-08.09.2010	06.-08.09.2010					
06.-08.09.2010	06.-08.09.2010					

2.4.3 List of Milestone

Table 2.4.2: Milestones List

List of all milestones, giving date of achievement and any proposed revision to plans.

Milestone no.	Milestone name	Work package no.	Date due	Actual/Forecast delivery date	Lead contractor
M5-1	Printed materials from workshop 1	WP5	February, 2009	February, 2009	
M5-2	Printed materials from workshop 2	WP5	June, 2010	June, 2010	1
M18	Project manager's report on distribution of travel grants for the second workshop	WP5	15.03.2010	15.03.2010	1

2.4.4 First Workshop organization

The first workshop entitled "Design and Characterisation of Integrated Microsystems and Components" was planned during the first half life of the Project and was held on the 29th and 30th September, 2008 in Novi Sad.

The workshop comprised two major issues: presentation of research capacities at CIMC, including the presentation of purchased and up-graded equipment and its capabilities, and presentation of newly acquired knowledge and scientific topics of interest. While both topics addressed by the workshop are complementary and of interest to research and industry communities, the first was slightly more intended for regional and domestic partners and provides them with an overview of measurement and characterization techniques available at CIMC, that can be used in the future collaboration. The Second topic presented current research directions and achievements at CIMC, and provided all participants with an insight into current research and knowledge-base existing at CIMC.

We distributed the Call for Participation using the own mail exploder, the ReCIMICo partners used their networks such as conference announcement lists known to the academic partners or business contacts of the enterprises to spread the information.

Call for Participation is also posted on CIMC project and ReCIMiCo website (http://www.ftn.ns.ac.yu/recimico/index.php?option=com_content&task=view&id=9&Itemid=1 and http://www.cimc.rs/index.php?option=com_content&view=article&id=9%3A1st-workshop&catid=3%3Anews&Itemid=5&lang=en). The invitation posters were printed additionally. Summarizing the attendance, we achieved 61 registrations. Finally, 55 people attended the workshop. 27 CIMC ReCIMiCo project staff attended the workshop.

The main aim of the workshop was to present the integrated results of the work done in the past 18 months from the beginning of ReCIMiCo project. The focus was on the presentation of purchased and upgraded equipment. In addition to a few introductory conventional presentations, a lot of time was dedicated to demonstration of the newly acquired knowledge and scientific topics of interest.

Following the workshop preparation phase is reported. It gives information which activities have been carried out in order get people registered for the ReCIMiCo workshop. This includes selecting potential participants, the installation of a mailing list, and using the project partner's networks to invite people. Additionally, the CIMC organizer has been made do distribute the Call for Participation and to promote the workshop on project website. Furthermore the section workshop preparation contains detailed information about the invited and registered people (e.g. invitees per Member State).

The workshop happening is described in details. First of all information is given on the participants, like participants per state and participants per institutions. The workshop is reported, starting from the introduction to the life presentations of the ReCIMiCo project. The workshop itself focused on slideshow and purchased equipment presentation as well as presentation of newly acquired knowledge.

During the first workshop 20 presentations from 6 thematic fields were demonstrated: Microsystem technology (MT) - 4 presentations, Transfer micro to nano technology (TMN) - 4 presentations, Optoelectronic components (OC) – 4 presentations, Design and simulation of microelectronic components and circuits (DS) – 3 presentations, Embedded systems and informatics (ESI) – 3 presentations and Experimental characterisation of materials and components (EC) - 2 presentations.

Microsystem technology (MT) - *W. Smetana*, ISAS, Vienna, Austria, "LTCC-technology for Microsystem Applications"; *V. Jovic*, IHTM, Belgrade, Serbia, "Anisotropic chemical etching of {111} oriented Si-application in MEMS technologies"; *D.Randjelovic*, IHTM, Belgrade, Serbia, "Multipurpose MEMS thermal sensor based on thermopiles - summary of theoretical and experimental research and future plans", *V. Crnojevic – Bengin*, CIMC, Serbia, "Metamaterials unit cells for filtering applications".

Transfer micro to nano technology (TMN) - *R. Šordjan*, ICC, Italy, "Vertical arrays of nanofluidic channels fabricated without nanolithography"; *M. Sataric*, CIMC, Serbia, "Tuning microtubule motor proteins by cell's intrinsic electric fields", *K. Raleva*, FEIT, Skopje, Macedonia, "Modeling thermal effects in nano-devices"; *J. Matovic*, ISAS, Vienna, Austria, "Proton conduction in nanochannels biomimetic electronic components".

Optoelectronic components (OC) – *Z. Djinovic*, IMA, Austria, "In-line liquid concentration measurement in nanoliter volume using fiber optic low coherence interferometry"; *M. Slankamenac*, CIMC, Serbia, "Electrical switching effects in the chalcogenide glassy semiconductor"; *N. Stojanovic*, CIMC, Serbia, "Measurement of optical signals with optical spectrum analyzer"; *F. Softic*, FEE, Banja Luka, B&H, "Modeling and design of temperature compensated optoelectronic components and sensors".

Design and simulation of microelectronic components and circuits (DS) – *A. Djugova*, CIMC, Serbia, "S-parameters and noise figure of a two-stage LNA in SiGe BiCMOS 0.35 μ m technology"; *J. Radic*, CIMC, Serbia, "Low noise amplifier with multiple usage of polarization current"; *S. Djuric*, CIMC, Serbia, "Design and optimization of geometrical parameters of inductive displacement sensor".

Embedded systems and informatics (ESI) – *P. Radivojac* SI, Indiana University, Bloomington, (guest speaker), "Determination methods for protein identification and quantification from tandem mass spectrometry data"; *S. Mooney*, CCBB, Indiana University School of Medicine, (guest speaker), "Enabling the next generation of biomedical research with translational informatics"; *R. Struharik*, CIMC, Serbia, "Design, verification and testing of FPGA based 8051 IP core".

Experimental characterisation of materials and components (EC) - *G. Radosavljevic*, CIMC, Serbia, "Characterisation of micro-inductors fabricated in the LTCC technology"; *V.Radonic and N. Blaz*, CIMC, Serbia, "Determination electrical and magnetic characteristics of materials".

After termination of First ReCIMiCo Workshop a brief report, photos and presentations are presented on project website (http://www.ftn.ns.ac.yu/recimico/index.php?option=com_content&task=view&id=7&Itemid=1).

Also, we published the Proceeding of First ReCIMiCo Workshop entitled “Design and Characterization of Integrated Microsystems and Components” is published.

2.4.5 Second Workshop organization

The second workshop entitled “New Trends in Integrated Microsystems and Components” was planned during the second half life of the Project and was held on the 5th and 6th March, 2010 in Novi Sad.

The workshop comprised two major issues: presentation of research capacities at CIMC, including the presentation of purchased and up-graded equipment and its capabilities, and presentation of newly acquired knowledge and scientific topics of interest. While both topics addressed by the workshop are complementary and of interest to research and industry communities, the first was slightly more intended for regional and domestic partners and provides them with an overview of measurement and characterization techniques available at CIMC, that can be used in the future collaboration. The first topic presented current research directions and achievements at CIMC, and provided all participants with an insight into current research and knowledge-base existing at CIMC.

We distributed the Call for Participation using the own mail exploder, the ReCIMiCo partners used their networks such as conference announcement lists known to the academic partners or business contacts of the enterprises to spread the information.

Call for Participation is also posted on CIMC project and ReCIMiCo website (http://www.ftn.ns.ac.yu/recimico/index.php?option=com_content&task=view&id=22&Itemid=1 and http://www.cimc.rs/index.php?option=com_content&view=article&id=80%3Asecond-recimico-workshop&catid=3%3Anews&Itemid=5&lang=en). The invitation posters were printed additionally. Summarizing the attendance, we achieved 61 registrations. Finally, 58 people attended the workshop: 25 CIMC ReCIMiCo project staff, 4 EU partners, 9 WBC, 2 EU guests (Krzysztof Zaraska, IET, Krakow, Poland and Konstantinos Giannakopoulos, IMS, Greece) and 9 guests from Serbia (IHTM and IMSI, Belgrade). Travel grants of WBC partners for the second workshop were distributed to eight people.

The main aim of the workshop was to present the integrated results of the work done in the past 34 months from the beginning of ReCIMiCo project. The focus was on the presentation of purchased and upgraded equipment. In addition to a few introductory conventional presentations, a lot of time was dedicated to demonstration of the newly acquired knowledge and scientific topics of interest.

During the Workshop, 20 papers by authors from 4 countries (Austria, Bosnia and Herzegovina, Poland and Serbia) were presented in 3 oral sessions. The talks covered five major research topics: Microsystem technologies, Nanoelectronics components, New trends in microsensor technologies, Characterisation and modeling of optoelectronics components and New trends in logic integrated circuits. The first group of workshop papers represent some research topics in MICROSYSTEM TECHNOLOGIES.

In “Mask/maskless etching behavior of convex corners at the ridges oriented in $\langle 110 \rangle$ direction on $\{100\}$ Si”, by V. Jović et al., authors have presented results obtained for the anisotropic etching of ridge-like structures oriented along $\langle 110 \rangle$ direction in TMAH (25 wt. %) and KOH (30 wt. %) water solution at the etching temperature of 80 °C where the structures are first mask and then maskless anisotropic etched. The ridge structures investigated by maskless etching are convex prismatic edges included by $\{100\}$ and $\{111\}$ planes. From analytical relations and experimental results, the ratio between the etching rates for the $\{hk\}$ (fast-etching plane at the edge step) and $\{100\}$ planes is found for both applied solutions. The second, third and the fourth paper, that fall into the Microsystem technologies group, are addressing some issues in LTCC (Low Temperature Cofired Ceramics) technology. The second paper in this group, “Application of high-resolution X-ray imaging for inspection of LTCC vias” by K. Zaraska (from Poland) et al., investigates the use of precision (5 μ m/pixel) non-destructive X-ray imaging (radiography) for fault detection in LTCC vias. To test the method several different LTCC structures, exhibiting different kinds of faults, have been examined. It is found that, for typical materials used in the LTCC process, high contrast images can be obtained due to large differences in mass attenuation coefficients between the substrate and conductive (path and via fill) material. In the paper “High temperature characteristics of various LTCC-tapes” M. Unger et al.

investigated high-temperature properties of samples made of off-the-shelf LTCC-tapes. Thermal coefficient of expansion, Young's modulus and permittivity were investigated for various ceramic materials up to 800K and 1000K. Additionally, square shaped capacitor samples with co-fired Ag-electrodes were manufactured and an impedance scan was recorded from DC to 3 MHz again up to 1000 K. In the fourth paper, "Thick-film vs. LTCC technology for fabrication of microwave passive circuits" by *N. Janković* et al., a super-compact dual-band resonator based on 3-D Hilbert fractal curve, fabricated in both thick-film (TF) and LTCC technology, was presented. It has been shown that TF fabrication process suffers from drawbacks that cause remarkable line degradation and discrepancies between simulation and fabricated dimensions of the resonator. For the same structure LTCC technology confirmed that it has better potential for multilayer passive devices fabrication. The fifth paper in this group, "High quality PCB inductors" by *G. Radosavljević* et al., provides an insight in design, simulation and characterisation of integrated micro-inductors fabricated in the standard PCB technology and intended for operation in the low radio-frequency range. Inductors are designed to occupy the same area on the chip but with different distribution of conductive segments. Presented inductor designs are compared according to the simulation results and measured data. The sixth paper in the Microsystem technologies group is "Novel super-compact stopband filter with grounded patch resonators" by *V. Radonić* et al. In this paper, novel metamaterial unit cells based on the square grounded patch are proposed and applied in the microstrip filter design. Characteristics of the proposed filter are compared with state-of-the-art stopband filters of similar type in terms of size, performance and fabrication complexity. It has been shown that the fabricated fourth-order filter outperforms all previously published stopband filters of that type.

The second group of papers addresses some important issues in NANO-ELECTRONICS COMPONENTS. The first contribution to this group is "A nonlinear model for determining the nano-ionic current along microtubules" by *D. Sekulić* et al. This paper presents a model in which each tubulin dimer protein is an electric element with capacitive, resistive and incrementally negative conductive properties due to polyelectrolyte nature of microtubules (MTs) in cytosol. The particular attention was paid to the role of nano-pores (NPs) existing between neighbouring dimmers within a MT wall as these NPs are candidates to explain some properties of MTs resembling to unipolar transistors. The paper "Nanofluidic proton conductive structure: design and characterization" by *N. Adamović* et al. demonstrates theoretical and experimental investigations on the proton/ ion transport in electrically isolated nanochannels that are predominately aimed for Polymer Enhanced Membrane Fuel Cells (PEMFC) applications. The design and fabrication of the nanochannel test device is discussed in details. Obtained results will pave the way to optimal proton conductive isolating nanochannels design in novel type of ultrathin PEMFC. The last paper in this group, "Electrical characterization of nanochannels using impedance spectroscopy" by *N. Lečić* et al., presents a description of ion transport through geometrically defined nanochannels. The model of ion transport in nanochannels filled with electrolytes was obtained using impedance spectroscopy measurements. The model shows importance of the geometrical parameters of the nanometer-sized aperture, the surface charge density and the effect of electrical double layer. The regulation of ion flow is demonstrated by pH adjustments of electrolyte.

Next group of papers represents NEW TRENDS IN MICROSENSOR TECHNOLOGIES.

In the paper, "LTCC micro force sensor" by *G. Radosavljević* et al., a resonant force LTCC sensor designed for the operation in the MHz range and for 0 N to 6 N load is presented. The used LTCC tape is characterised to demonstrate its mechanical and electrical properties at room temperature. Theoretical model of the sensor is developed to predict its behaviour. Performance of the fabricated sensor is experimentally verified and obtained results show good agreement with the ones derived from the theoretical model. "Design of the electronics for the vacuum transmitter based on IHTM thermopile sensor", by *D. Randelović* et al., presents the main directions in the design of the electronic vacuum transmitter front-end that is based on multipurpose IHTM MEMS sensors with thermopiles. The first part of the paper gives a performance overview of the multipurpose thermopile based sensors used for vacuum measurement. In the next part, the chosen approach and problems with integration of the thermopile sensor and the existing electronics are described. In the final part possible solutions for the sensor-specific front end have been analyzed. The next paper in this group is "An innovative design of a cheap LC sensor for monitoring water content in construction material" by *M. Radovanović* et al. It presents an innovative design of a cheap, wireless, passive LC sensor and its application for monitoring of water content in construction materials. Water

content has been determined for clay brick and aerated autoclaved concrete block, that are widely used construction materials. “Miniaturized inductive displacement sensor applicable in robotics” by *S. Đurić* et al., presents a miniaturized version of the already proposed inductive displacement sensor. Due to sensor ability to measure displacement in two directions, it is possible to determine vertical component of ground reaction force as well tangential component.

The next five papers address some issues in CHARACTERIZATION AND MODELING OF OPTOELECTRONICS COMPONENTS.

In “Modeling and analysis of temperature characteristics of solar cell and photovoltaic module” *F. Softić* et al. present models of solar cell and photovoltaic module where temperature influence on solar cell and photovoltaic module parameters is simulated and analyzed. Described models are applied on real modules and simulation results are given. The second contribution to this group is “Modeling of electrothermal nonlinear switching effects in amorphous semiconductors” where *M. Slankamenac* et al. derived theoretical models of electrothermal nonlinear switching effects in amorphous semiconductors. Proposed models have been verified experimentally with the switching component based on chalcogenide glassy semiconductor $\text{Cu}_{10}(\text{AsSe}_{1.4}\text{I}_{0.2})_{90}$. In the paper “Structural characterization of polymer composite materials by optical coherence tomography” *Z. Đinović* et al. presented optical coherence tomography as a non-destructive technique for characterization of multilayer composite structures composed of polymer layers or matrix and reinforced fibers. “In-house fabrication of OLED for educational purposes” by *N. Bednar* et al, describes in detail fabrication process of OLED that is carried out at the faculty laboratories. Organic materials and some fabrication techniques, widely used in organic electronic, are presented. Two types of OLEDs based on a transition metal-ligand complex were fabricated. While the first type is made on a rigid glass substrate the second OLED is realized on a flexible plastic. The last paper in the Characterisation and modeling of optoelectronics components group is “WDM system modeling” by *N. Stojanović* et al. demonstrates simulation of the WDM system where some system properties (BW, attenuation) were investigated.

The last group of papers shows some research results in NEW TRENDS IN LOGIC INTEGRATED CIRCUITS.

In the first paper “Design of multiple valued CMOS logic integrated circuits” *Z. Bundalo* et al. considered and described the possibilities and methods for design of multiple valued (MV) CMOS logic integrated circuits where the main attention is devoted to their synthesis and optimization. The design was practically implemented on personal computer and illustrated on MV logic circuits with logic basis of 5. The last paper in the Proceedings is “Advanced verification of Xilinx FPGA based design” by *R. Struharik* et al. This paper presents novel capabilities for hardware testing that are available to the FPGA designers. Using an 8051 micro-controller core intended for FPGA implementation as an example, one possible way of verifying the correct operation of the core is presented.

After termination of Second ReCIMiCo Workshop a brief report, photos and presentations are presented on project website (http://www.cimc.rs/index.php?option=com_content&view=article&id=84%3Asecond-recimico-workshop&catid=3%3Anews&Itemid=5&lang=en).

Also, we published the Proceeding of Second ReCIMiCo Workshop entitled “New Trends in Integrated Microsystems and Components”

2.4.6 International conferences

Planned number of conference participation was 28 and realized number was 30. Planed amount (in 2006) for participation of international conferences (500€) and regional (250€) were lower then realized amount. So it is the reason for deviation of WP5 planned amount of 4715,06€.

Thirty visits to international conferences were made (4 papers were awarded) and short reports from all visits are presented below:

Report on the activities preformed during the Eurocon 2007 Conference

The IEEE Region 8 Eurocon 2007 Conference "Computer as a tool" was held in Warsaw, Poland in September 2007 (September 9th - 12th). In addition to a rich technical program, this conference included a great variety of educational, professional and social activities, overview of IEEE activities and services.

The Eurocon 2007 Conference was held in the historical Main Building of the Warsaw University of Technology constructed in the first half of 19th century.

The Conference started on Sunday, September 9th, 2007 with tutorials. The official Opening Ceremony, was held on Monday, 10th September 2007. It was followed by Opening Lectures by Prof. Robert Weigel (TU Erlangen, Germany), Prof. Janusz Kacprzyk (IBS-Polish Academy of Science), Prof. Baldomir Zajc (Univ. of Ljubljana, Slovenia).

After that, in the afternoon session "M4-4 Modeling and Simulation", Dr Ljiljana Zivanov has presented orally her paper "Modeling of T-type LC EMI chip filters using a commercial electromagnetic simulator". The authors of this paper were Viktor Maric, Obrad Aleksic, Ljiljana Zivanov and Miloljub Lukovic. After brief and successful presentation, Dr Zivanov has answered on several questions about her research.

During the afternoon poster session, we have the opportunity for establishing new and maintaining old contacts among our colleagues in the same scientific research fields.

On the third day of the Eurocon Conference, the morning session started with the plenary lecture "Digital Power - Variable Speed Generation" by Wlodzimierz Koczara, from the Warsaw University of Technology. Right after that, Dr Mirjana Damnjanovic has presented orally paper entitled "Common Mode Chokes for EMI Suppression in Telecommunication Systems". The main interest in this paper was about the modeling the ferrite components for EMI suppression and the influence of dimensions on the electrical characteristics of such components.

The conference was closed on September 12th. We got back in Novi Sad following day (on September 13th 2007).

Report for Eurocon 2007, Sep 9-12 2007. Warsaw Poland – Vasa Radonic

One of the very important strategic objectives of Center for Integrated Microsystems and Components (CIMC) is to improve performances of their reserchers. During the INCO project: "Reinforcement of the Center for Integrated Microsystems and Components", proposal no. 043669 I attended to Eurocon conference (Computer as a tool 2007) that held in Warsaw, Poland between 9th and 12th of October 2007. On this conference I presented the paper "Accuracy of EM Simulation Tools in Modeling of Resonant Left-Handed Microstrip Lines" in the poster section. Also, this visit improved my knowledge in the field of microwaves.

A Report on the participation to the 30th International Semiconductor Conference (CAS 2007) A. Maric and G. Radosavljevic

This event is taking place every year since 1978. It was organized until 1996 as annual Semiconductor Conference (in Romanian Conferinta Anuala de Semiconductoare - CAS). Starting with the year 1991, CAS was opened to the international scientific community and changed its name to accordingly to the International Semiconductor Conference still maintaining the same acronym (CAS). Starting with the 1995 edition, the conference has been on IEEE event, beginning sponsored by the IEEE Electron Device Society.

Conference	Participant
EUROCON 2007	Lj. Zivanov
	M. Damnjanovic
	M. Videnovic Mistic
	V. Radonic
IMAPS 2007	A. Maric
	G. Radosavljevic
CAS 2007	A. Maric
ETS 2008	G. Radosavljevic
ETS 2008	A. Djugova
EuMC 2008	V. Crnojevic-Bengin
MMS 2008	V. Radonic
IEEE SENSOR 2008	A. Maric
	G. Radosavljevic
INTERMAG 2008	S. Djuric
EUROCON 2009	A. Djugova
	M. Damnjanovic
	Lj. Zivanov
SENSORCOM 2009	S. Djuric
CAS 2009	A. Maric
	G. Radosavljevic
	N. Blaz
IMAPS 2009	A. Maric
	G. Radosavljevic
INTERMAG 2010	S. Djuric
IDESA 2009	Alena Djugova
MIEL 2010	G. Radosavljevic
PRIME 2010	Alena Djugova
EPE-PMC 2010	Mirjana Damnjanovic
EPE-PMC 2010	Goran Stojanovic
EPE-PMC 2010	S. Djuric

The CAS program includes a total number of 130 papers (118 regular and 12 invited). The authors are from 18 countries on 4 continents (12 countries from Europe, 2 from Africa 4, from Asia and 2 from Nord America).

Our paper entitled “The fabrication process of RF inductor structures in the LTCC technology” was in M1 session – Advanced Microwave Devices and Circuits – Oral presentations.

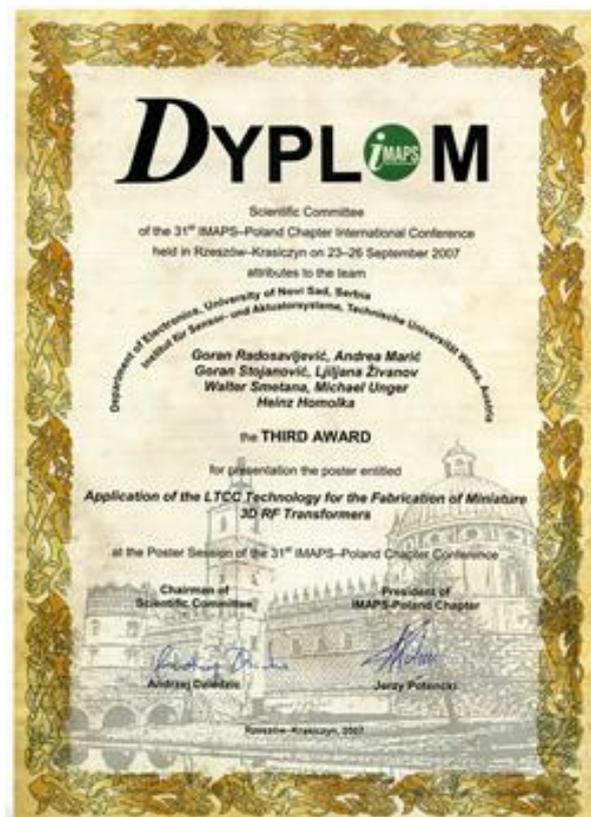
A Report on the participation to the XXXI International Conference and Exhibition IMAPS Poland 2007 – A. Maric and G.Radosavljevic

This year’s Conference took place in a year very important for Polish IMAPS Society, in year of 25th Anniversary of bringing Polish Chapter into being, in year in which world wide IMAPS will celebrate 40th Anniversary.

The Conference program includes over 110 papers. More than 150 authors from Poland, Austria, Bulgaria, Czech Republic, England, France, Germany, Hungary, Ireland, Romania, Serbia, Slovakia, Slovenia, Switzerland, Taiwan, Ukraine, USA, have contributed for IMAPS 2007.

Conference was held in scenery of 16th century Renaissance Krasicki’s family residence, The combination of history in this place created unique atmosphere and wonderful back ground for fruitful discussion, exchange of opinions and experiences on all topics of our meeting.

Our paper entitled “Application of the LTCC technology for the fabrication of miniature 3D RF transformers” was framed in session devoted to LTCC technology and was awarded.



Report on the activities performed during the Intermag Europe 2008 Conference

The IEEE International Magnetism Conference Intermag Europe 2008 was held in Madrid, Spain in May 2008 (May 4th – 8th). Intermag is the premier conference on Applied Magnetism and related technologies. The Conference included an exciting and informative set of symposia, tutorial sessions and invited talks as well as regular oral and poster presentations and technical exhibitions reviewing the latest developments in these fields.

Intermag Europe 2008 was held at the Palacio Municipal de Congresos. This building, designed by Architect Ricardo Bofill, was inaugurated in 1993 and, since then, it has hosted close to 3,000 events and welcomed almost 11,000,000 visitors. It has two auditoriums, large exhibition areas, an all-purpose hall with an area of 2,200 m², and thirty rooms and halls with different capacities. It is located in the “Campo de las Naciones”, the new financial hub of the city.

The Conference started on Sunday, May 4th, 2008 with tutorial “Multiferroics”, 5:00 – 7:00 pm, Speakers were James Scott, Wilfrid Prellier, Gopalan Srinivasa. From Monday 5th to Thursday 8th invited and accepted papers were presented in morning and afternoon sessions either as oral or poster presentation. This year’s Nobel Laureates in Physics, Prof. Albert Fert and Prof. Peter Gruber held special lectures as part of a GMR Nobel Celebration. A GMR Nobel Celebration was arranged for the evening on Monday May 5th, where Prof. Gruber delivered a lecture on “From Spin Waves to Giant Magnetoresistance and Beyond” and Prof. Fert lectured on “Emerging Directions in Spintronics.”

On Tuesday 6th, in the afternoon session “Transformers and Inductors II”, Snezana Djuric presented paper “A Novel Approach to Extending the Linearity Range of Inductive Displacement sensor.” The authors of this paper were Mirjana Damnjanovic, Ljiljana Zivanov, Laszlo Nagy, Snezana Djuric and Branimir Biberdzic. The paper was being presented as a poster from 14:30 – 18:30 pm. In the paper we presented a

new idea to improving the characteristics of inductive displacement sensor supported by a good agreement between calculated and measured results. The paper was accepted for publication in the special October 2008 issue of IEEE Transactions on Magnetics. Many colleagues were interested in our work and new contacts were established. Snezana Djuric got back in Novi Sad following day, on May 7th 2008.

Short Report from IEEE SENSOR 2008 Conference (G.Radosavljevic and A. Maric) – The 7th IEEE Sensors Conference 2008 was organized by the Institute for Microelectronics and Microsystems (IMM-CNR), with the support of Italian Association on Sensors and Microsystems (AISEM). The conference was held in the period from the 26th to the 29th of September, 2008 in Grand hotel Tiziano e dei Congressi, Lece, Italy. The topics covered at the conference were dealing with phenomena, modeling and evaluation, chemical and gas sensors, biosensors, optical, mechanical and physical sensors, sensor/actuator systems, sensor networks and sensor applications. The conference program included over 400 papers and authors arrived from Italy, Germany, USA, Taiwan, Switzerland, The Nederland, Japan, China, Austria, Serbia etc. The paper entitled “Performance Improvement of a Resonant Pressure Sensor by Means of Model Based Design Optimisation” was framed in section devoted to physic sensors.

Short report from EuMC 2008 Conference (Dr Vesna Crnojevic-Bengin) – EuMC 2008 Conference (European Microwave Conference, part of the European Microwave Week, EuMW) was held in Amsterdam, the Netherlands, from October 27th through 31st 2008. The European Microwave Week 2008 continues the series of successful microwave events, since its start in 1998 with its 11th Conference and Exhibition Week. This conference series has continued to grow and is now the premier event in this field in Europe. The European Microwave Week consists of four conferences: the 38th European Microwave Conference (EuMC), the 3rd European Microwave Integrated Circuits Conference (EuMIC), the 1st European Wireless Technology Conference (EuWiT), and the 5th European Radar Conference (EuRAD). The Week provides the opportunity to attend these four conferences, various workshops and short courses given by leading experts in the field. In addition to the conferences the European Microwave Exhibition provides a unique market place for the delegates to engage with the leading companies on the largest trade show on RF and Microwaves in Europe.

Dr Crnojevic-Bengin attended the Conference and presented a scientific paper entitled ‘Novel Left-Handed Unit Cell for Multi-Band Filtering Applications’ by Vasa Radonić, Vesna Crnojević-Bengin, and Branka Jokanović. The paper was presented as oral, in the Section EuMC36 - Metamaterial and EBG II.

Mediterranean Microwave Symposium (MMS 2008) Oct 14,2008 - Oct 16,2008 Damascus, Syria – Vasa Radonic

One of the very important strategic objectives of Center for Integrated Microsystems and Components (CIMC) is to improve performances of their reserchers. During the INCO project: “Reinforcement of the Center for Integrated Microsystems and Components”, proposal no. 043669 I attended to Mediterranean Microwave Symposium conference (MMS 2008) that held in Damascus, Syria between 14th and 16th of October 2008. On this conference I presented the paper “Novel Unit Cell Based on the Grounded Patch for Filter Applications“in the poster section. Also, this visit improved my knowledge in the field of microwaves. Moreover, I received the award for the best student paper.



Conference



Gala diner

Short Report from EUROCON 2009 Conference (A. Djugova) - The IEEE Region 8 Conference EUROCON has a very famous history. The first Eurocon was in 1971 in Lausanne, Switzerland. Then after 12 years brake new renovated biennale EUROCON started in 2001. EUROCON 2009 was held in Saint-Petersburg, Russia in May 2009 (18. – 23.05.2009). The Conference was devoted to the 150 anniversary of great Russian scientist Alexander S. Popov, which was the first to openly demonstrate radio signals transmission and receiving on May 7, 1895. The main Conference venue was Saint Petersburg Electrotechnical University “LETI” which was lucky to have Alexander S. Popov as the first elected Director. However Alexander Popov contributed also to other different areas of electrophysics and electromechanics hence EUROCON 2009 topics represented all modern trends and directions in the field of Electrical Engineering including historical and educational aspects.

The Conference started on Monday the 18th of May, 2009 with a plenary session in “LETI”. Then all participants were transferred to the A.S. Popov Central Museum of Communications to attend the solemn unveiling of the Shilling’s Milestone Plaque and view a vast Museum exposition including remarkable Alfred Nobel exhibition.

Scientific presentations were divided into 19 oral sessions and 3 poster sessions. In accordance with more than 150 highly qualified reviewers recommendations the Program Committee selected 471 papers for presentation and publication. A Student Paper Contest was arranged on May 19 as the special session SS3.

On Tuesday, May 19th, in the afternoon session “TPC-10:Micro and Nano Systems”, Alena Djugova has presented her paper “Basic Figures of Merit for a 1.575GHz Low Noise Amplifier in 0.35 μ m SiGe BiCMOS Technology” as a poster. The authors of this paper were Alena Djugova and Mirjana Videnovic-Misic. During this poster session, we have the opportunity for establishing new contacts with colleagues in the same scientific research field. The Conference Social Program includes Saint Petersburg evening sightseeing bus tour and a visit to the wonderful fountain center – Petershoff.

Report on the activities preformed during the Eurocon 2009 Conference Saint Petersburg, Russia

The IEEE Region 8 Eurocon 2009 Conference "Computer as a tool" was held in Saint Petersburg, Russia, in May 2009 (May 18th-23rd). The Conference was devoted to the 150 anniversary of great Russian scientist Alexander S. Popov, which was the first to openly demonstrate radio signals transmission and receiving on May 7th, 1895. The Eurocon 2009 was also devoted to another founder of modern communications – the member of Saint Petersburg Academy of Science Pavel L. Shilling, who created one of the first operating electromagnetic telegraphs. In addition to a rich technical program, this conference included a great variety of educational, professional and social activities, overview of IEEE activities and services.

The Eurocon 2009 Conference was held in the Saint Petersburg Electrotechnical University “LETI”. The Conference started on Monday, May 18th, 2009 with a plenary session in LETI. Then all participants was transferred to the A.S. Popov Central Museum of Communications to attend the solemn unveiling of the Shilling’s Milestone Plaque and view a vast Museum exposition including remarkable Alfred Nobel exhibition.



Scientific presentations were divided into 19 oral sessions and 3 poster sessions within the period of May 19th – 21st. More than 540 papers were submitted to the Conference. The Program Committee selected 471 papers for presentation and publication.

The Conference Social Program includes Saint Petersburg evening sightseeing bus tour and a visit to the wonderful fountain center – Petershoff.

In the afternoon session “TPC-6: Electrical Machines and Drives” on Wednesday, May 20th in the Assembly Hall, Dr Mirjana Damnjanovic has presented orally her paper “Displacement Inductive Sensor: Simulation Tool Algorithm”. The chairmans of this session were Alexander Mikerov from Russia and Peter Magyar from Germany.

The authors of this paper were Snezana M. Djuric, Mirjana S. Damnjanovic, Laszlo F. Nagy, Nikola M. Djuric and Ljiljana D. Zivanov. After brief and successful presentation, Dr Damnjanovic has answered on several questions about her research.

At the same time, from 14.00 to 17.00 hours, in the Conference Hall, the another session “TPC-3: Circuits and Systems” was held. In that session Dr Ljiljana Zivanov has presented orally her paper “Cascade Configuration Of Inverted T-Type LC EMI Chip Filters and its EM Simulation“. The authors of this paper were Viktor Maric, Aleksandar Menicanin, Ljiljana Zivanov and Obrad Aleksic. After brief and successful presentation, Dr Zivanov has answered on questions about her research. The chairmans of this session were Alexander Korotkov from Russia and Juha Kostamovaara from Finland.

During the afternoon poster session, we have the opportunity for establishing new and maintaining old contacts among our colleagues in the same scientific research fields.

The conference was closed on May 23rd, and we got back in Novi Sad.

Short Report from SENSORCOMM 2009 Conference (S. Djuric) - The SENSORCOMM 2009 (The Third International Conference on Sensor Technologies and Applications) is a multi-track event covering related topics on theory and practice on wired and wireless sensors and sensor networks. As a multi-track event, SENSORCOMM 2009 served as a forum for researchers from the academia and the industry, professionals, standard developers, policy makers and practitioners to exchange ideas. The topics were on techniques and applications, best practices, awareness and experiences as well as future trends and needs (both in research and practices) related to all aspects of information security, security systems and technologies.

The SENSORCOMM 2009 was held in Athens/Glyfada, Greece from 18th to 23rd June 2009. Glyfada (Greek: Γλυφάδα) is a suburb of Athens, situated in the southern parts of the Athens Metropolitan Area.

The area, which is home to many of Greece's millionaires, ministers and celebrities, stretches out from the foot of the Hymettus mountain and reaches out to embrace the Saronic Gulf. It is the largest of Athens' southern suburbs. The conference was held in Best Western Hotel Fenix, adress 1-3 Artemisiou str., conveniently located on the attractive coastal resort of Glyfada.

The conference started on Thursday, June 18th, 2009 with tutorial “Using the AMBER Data Repository to Analyze, Share and Cross-exploit Dependability Data”, 16:00 – 19:00. Speakers were Marco Vieira and Henrique Madeira, University of Coimbra, Portugal. Sessions started on Friday, June 19th. Opening session started at 9:00 AM, keynote speaker was Prof. Dr. Petre Dini speaking about “Industrial Challenges in Working with Events”. During the conference several Working group meetings, concerning security and trust, dependability, mesh networks and sensors, were held.

On Saturday 20th June, in the morning session SENSORCOMM 5: SECSSED II, Snezana Djuric presented paper “Inductive Displacement Sensor for Force Measuring in Humanoid Robotic Application – Testing the Invariance on Angular Displacement “. The authors of the paper were Snezana Djuric, Laszlo Nagy and Mirjana Damnjanovic. The paper was presented as oral presentation. Presentation lasted about 20 minutes, staring at 10:30 AM. In this session papers, relating to sensor circuits and sensor devices, were presented. In our paper we proposed a new possible application of an electromagnetic sensor. Electromagnetic sensors are mainly applicable in non-destructive evaluation techniques. We briefly described application of an electromagnetic sensor in robotics. The aim is to implement inductive displacement sensor in a foot of humanoid robot as to enable successive navigation of humanoid robot. The idea was mentioned in this paper for the first time and has been successfully developed in our next papers.

Report on the activities performed during 8th International Symposium on Electronics and Telecommunications – ETC 2008 September 25 – 26, 2008, Faculty of Electronics and Telecommunications, Timisoara, Romania

The ISETC 2008 (8th International Symposium on Electronics and Telecommunications), a scientific event organized every two years, has been organized by the Faculty of Electronics and Telecommunications

from the “Politehnica” University of Timisoara, Romania and the Association of Electrical Engineers from Timisoara in cooperation with IEEE Romania Section and the Academy of Technical Sciences from Romania. After technical revision, the accepted papers were published in dedicated volumes of the Scientific Bulletin of the “Politehnica” University of Timisoara, Transactions on Electronics and Telecommunications.

ISETC 2008 brought together members from academia and industry to present their achievements in electronics and telecommunications. Its purpose was to be a forum for technical exchange amongst scientists having interests in: Electronic Circuits, Neural Networks, Power Electronics, Robotics, Communications, Signal and Image Processing, Instrumentation and Measurements, Microwaves and Education.

The ISETC 2008 was held at the Faculty of Electronics and Telecommunications, “Politehnica” University of Timisoara from 25th to 26th September 2008. Timisoara is a city in the Banat region of western Romania.

The conference program started on Thursday morning, September 25th, 2008 with the opening plenary session followed by two keynote speakers, Dan Bedros from PDG Alcatel – Lucent Romania, and Professor Claude Berrou from the Télécom Bretagne, Brest, France, speaking about “Metamorphoses and promises of error correction coding”. Scientific presentations were divided into 6 oral sessions.

On Thursday, September 25th, in the afternoon session “Power Electronics”, Alena Djugova presented paper “Results of Inductor Modeling Using ASITIC and Cadence compared to Real austriamicrosystems Inductors Models”. The authors of the paper were Srdjan Stanarevic, Alena Djugova, and Mirjana Videnovic-Misic. The paper was presented as oral presentation. Presentation lasted about 15 minutes, starting at 18:00. In this session, papers relating to power electronics design were presented. In our paper we compared spiral inductors modeled in ASITIC and inductors modeled in Cadence Spiral Inductor Modeler with inductors from austriamicrosystems 0.35 μ m CMOS technology. The maximum Q-factor comparison for given shape and dimensions of inductor has been done with two inductors made using normal top metal and two inductors using thick top metal. The obtained results show advantages and drawbacks modeling inductors this way. Despite the limitations, the accuracy of the results that these tools provide makes them useful as a first approximation step in the design of inductors. During discussions after presentations, we had the opportunity for establishing new contacts with colleagues in the same scientific research field.

On the social event side the conference reception took place on Thursday morning, while the gala dinner took place on Thursday evening.

Short Report from IMAPS 2009 Conference (G. Radosavljevic and A. Maric) - The 33rd IMAPS Poland conference 2009 was held in the period from the 21st to the 24th of September, 2009. It was organized by the Silesian University of Technology and the IMAPS-CPMT Poland chapter and the event took place at hotel Imperium in Psczyna.

The conference scope covers topics devoted to photovoltaics and optoelectronics, hybrid and semiconductor technology, design methods and computer simulations, electronics materials and components, microcircuits applications, thick-film and thin-film sensors, packaging and PCB, quality and reliability evaluation, thermal management and education in electronics. The program included over 100 papers from more than 150 authors from Poland, Germany, Norway, Brazil, Finland, Serbia, Austria, Slovenia, United Kingdom, Switzerland, Denmark and USA.

The paper entitled “A Sensitivity Improvement of a Non Contact LTCC Resonant Pressure Sensor” was framed in section devoted to thick-film and thin-film sensors. The paper was awarded with the prize for the second best paper of the conference.



Short Report from CAS 2009 Conference (A. Maric, G. Radosavljevic, N. Blaz) - The International Semiconductor Conference CAS is an annual type event organized by the National Institute for Research and Development in Microtechnologies IMT Bucharest and co-sponsored by the IEEE Electron Devices Society. This year's event is the 32nd of an annual sequence and is the 19th edition with international participation. It was held in the period from the 12th to the 14th of October, 2009 in Sinaia, Romania.

The aim of the conference is directed towards providing a forum of debate on selected topics of scientific research and technological development. The conference is underlying the development in micro and nanotechnologies, also maintaining the traditional connection with semiconductor electronics. Topics that covered in the scope of the conference are from the domains of simulation and fabrication of microstructures and microsystems, science and technology of nanostructures and nanostructured materials, semiconductor device physics and technology, and design and technology of microelectronic components.

Report on the activities preformed during 11th Joint MMM-INTERMAG conference, Washington, DC January 18-22 2010

The 11th Joint MMM/Intermag Conference was sponsored jointly by the American Institute of Physics (PCI) and the Magnetics Society of the IEEE, in cooperation with The American Physical Society. Members of the international scientific and engineering communities interested in recent developments in fundamental and applied magnetism attended the Conference and contributed to its technical sessions. Sessions included invited and contributed papers, oral and poster presentations and invited symposia. The Conference provided an outstanding opportunity for participants to meet their colleagues and discuss new, advanced and controversial developments.

The 11th Joint Magnetism and Magnetic Materials (MMM)-Intermag Conference was held at the Marriott Wardman Park in Washington, DC from Monday, January 18 through Friday, January 22, 2010.

Washington, D.C. is the capital of the United States which welcomes 15 million visitors each year of which 1.2 million are international. The Washington Marriott Wardman Park blends landmark charm, a historic setting and modern sophistication in a downtown hotel.

The wide scientific program of the conference included multiple sessions (over 100) devoted to the latest achievements in permanent magnets production area, thin film sensors, magnetic equipment, spintronics etc. Over 1500 papers were presented during the conference. The keynote speaker was Dr. Akira Tonomura, Hitachi Ltd., RIKEN, and OIST. His talk was titled: "Observation of Microscopic Distributions of Magnetic Fields by Using Electron Waves."

On Friday, January 22, in the afternoon (oral) session (2:00 PM) HD Transformers and inductors, Snezana Djuric presented paper "Inductive displacement sensor in humanoid application." The authors of the paper were Laszlo Nagy, Snezana Djuric, Mirjana Damjanovic, Nikola Djuric, Aleksandar Menicanin and Ljiljana Zivanov. In this paper, we presented a new possible application of an inductive displacement sensor as a ground reaction force sensor, which provides dynamic balance for legged locomotion.

The use of cameras, videotaping and/or recording devices in the technical sessions was strictly prohibited.

Report of Alena Djugova on the participation in IDESA,

Activities performed during 5-day conference on advanced RF/mixed-signal IC design – "Advanced RF implementation flow", December 07 – 11, 2009, MINATEC – micro and nanotechnologies innovations campus, Grenoble, France.

IDESIA is a EC Framework 7 project, that has been identified as a support action to help universities to follow the fast pace of evolution of the IC design and implementation flows for deep submicron technologies. The goal of the project is to provide advanced training courses, targeting professors, post-docs and PhDs involved in teaching in engineering master curricula at European universities and polytechnic schools, and to develop and make available didactic material. As IDESA partners (IMEC, EPFL – École polytechnique fédérale de Lausanne, TU Delft – Delft University of Technology, STFC – Science&Technology Facilities Council, part of Research Councils UK, Slovak University of Technology in Bratislava – Faculty of Electrical Engineering and Information Technology, Warsaw University of Technology, K.U. Leuven – Katholieke Universiteit Leuven, and CEA – Commissariat à l'Énergie

Atonomique et aux Energies Alternatives) represent leaders in the area, a program board guarantee that these lecturers are state-of-the-art provided by experts in the field, selected from industry and universities and research institutes, within or outside Europe.

Advanced RF implementation flow course was held in MINATEC – micro and nanotechnologies innovations campus, Grenoble, France from 7th to 11th December 2009. The 5-day training started with a short overview of the RF 90nm IC process flow. It had covered modelling issues, microwave passive component design and simulation, testing and microwave measurements, mismatch modelling and simulation, mixed-modes SoC design and simulation, analog and RF cell trimming using digital functions, 90 nm design verification, circuit packaging and ESD-protection. Most of these lectures had a hands-on exercise with the latest tools, with an expert for help, allowing participants to experiment and to better understand the issues. One of participants was Alena Djugova, research assistant and PhD student from University of Novi Sad, Department of Power, Electronics and Communication Engineering.

Overall the course was of high quality both with respect to the lecturers and the content. The didactic material provided seems very useful for reuse at our department. Also, during this course we have the opportunity for establishing new contacts with experts and colleagues in the same scientific research field.

Report on the participation in the 27rd International Conference Microelectronics on Microelectronics MIEL 2010 – G. Radosavljević

The 27rd International Conference Microelectronics on Microelectronics MIEL 2010 conference was held in the period from the 16st to the 19th of May, 2010. It was organized by IEEE Serbia and Montenegro Section ED/SSC Chapter under the co-sponsorship of IEEE Electron Devices Society and the event took place at hotel Faculty of Electronics in Nis.

The conference scope covers topics devoted to materials and processes, technologies and devices, devices physics and modeling, process and devices simulation, circuit design and application, system design and packaging, characterization and testing, quality and reliability. The program included over 100 papers from more than 150 authors from Austria, Germany, USA, France, Serbia, Slovenia, United Kingdom, Switzerland, Poland, Bulgaria and Romania.

The paper entitled “Micro Force Sensor Fabricated in the LTCC Technology” was framed in section Microsystems Technologies.

Report on the activities performed during 6th Conference on Ph.D. Research in Microelectronics & Electronics – PRIME 2010, July 18 – 21, 2010 Berlin Institute of Technology, Germany

The PRIME 2010 (6th Conference on Ph.D. Research in Microelectronics & Electronics) has been established over the recent years as an important conference where in particular Ph.D. students can present their project results and can get in contact with people from the industry. This year, almost one hundred papers were accepted for oral and poster presentation. The topics were on techniques and applications, best practices, awareness and experiences as well as future trends and needs (both in research and practices) related to all aspects of microelectronics and electronics (Analog and digital signal processing, Computed aided design, Analog, digital, mixed-signal and RF IC design, Integrated power ICs, MEMS, VLSI and SoC applications, Visual signal processing and Sensor systems). Besides of the paper sessions a company exhibition and workshops were organized.

The PRIME 2010 was held in the western heart of Berlin at Berlin Institute of Technology from 18th to 21st July 2010.

The conference program started on Monday morning, July 19th, 2010 with the opening session followed by two renowned invited speakers, Dr. Christoph Kutter from Infineon Technologies, Germany, speaking about “Challenges and thrills in mobile phone development” and Professor Sayfe Kiaei from the Arizona State University, USA, speaking about “Bio-medical RFIC”. A comprehensive technical program featuring 18 technical sessions, one poster session, and workshops given by leading companies (Rohde & Schwarz, Computer Simulation Technology – CST, Agilent, Ansys) followed from Monday to Wednesday. In a special “company representation session”, international microelectronics companies (IMST GmbH, Broadcom Netherlands B.V, Intersil) introduced themselves, their technical working fields and job offers.

On Tuesday, May 20th, in the morning session “Low Noise Amplifiers”, Alena Djugova presented paper “Comparison of Various 2.4GHz LNA Topologies”. The authors of the paper were Alena Djugova, Jelena

Radic and Mirjana Videnovic-Misic. The paper was presented as oral presentation. Presentation lasted about 20 minutes, starting at 11:00 AM. In this session, papers relating to low noise amplifier design were presented. In our paper we briefly described LNA architectures designed in austriamicrosystems 0.35 μ m SiGe BiCMOS technology at Bluetooth 2.4GHz frequency. During discussions after presentations, we had the opportunity for establishing new contacts with colleagues in the same scientific research field. On the social event side the conference reception took place on Monday evening, while the gala dinner took place on Tuesday evening during the boat ride through the city center of Berlin.

Report on the activities preformed during 14th International Power Electronics and Motion Control Conference – EPE-PEMC 2010, 6-8 September, 2010, Ohrid, Republic of Macedonia

The main goal of EPE-PEMC 2010 was to promote and coordinate the exchange and the publication of technical, scientific and economic information in the field of Power Electronics and Motion Control. Therefore in addition to keynotes, oral and dialog presentations according to topics, the conference was joined by tutorials, special sessions, round tables, exhibitions and technical visits.

Participants had opportunity to exchange scientific ideas, obtain information about new developments, extend business activities and confirm international friendship in pleasant atmosphere of Ohrid, the birth of Slavic culture.

Ohrid and Lake Ohrid have been named a world cultural and natural heritage listed city under the protection of UNESCO since 1980. The conference was held from 6th to 8th September 2010 “Metropol Lake Resort” in Ohrid.



Two tutorials were held on Sunday, 5th September, 2010 - “Pulse Width Modulated Voltage Issues in Motor Drive Systems”, presenter assoc. Professor Firuz Zare and “Analysis of Power Electronic Circuits using the Switching Function Technique”, presenter Christo Marouchos, Ph.D. Lecture and dialog sessions started on Monday, 6th September. Sessions were arranged according to 15 different conference topics as well 15 different special sessions. The conference was closed on Wednesday, 8th September. Technical and post conference tips were organized on Thursday, 9th September.

On Monday 6th September, in the afternoon session L15: Lecture Session: Related Topics, Snezana Djuric presented paper “Detection of ground reaction force using a miniaturized inductive displacement sensor”. The authors were Snezana Djuric, Laszlo Nagy and Mirjana Damnjanovic (https://www.conftool.com/epe-pemc2010/index.php?page=browseSessions&path=adminSessions&form_session=25).

In this paper, a miniaturized version of ground reaction force sensor, introduced earlier, was presented. The miniaturized sensor was tested and its characteristics were compared with previously developed prototype. Results showed that the miniaturized sensor had characteristics as good as previously developed prototype and due to it was more suitable for its practical implementation in robot foot.

Right after that session, the dialog session started (from 5:00 pm – 6:30 pm). In the session D8: Electromagnetic Compatibility, the Session Chair was Dr Ivo Dolezel. Dr Mirjana Damnjanovic presented the paper “Parameter extraction of ferrite transformers using S-parameters”. The authors were Mirjana Damnjanovic, Ljiljana Zivanov, Goran Radosavljevic, Andrea Maric and Aleksandar Menicanin (https://www.conftool.com/epe-pemc2010/index.php?page=browseSessions&path=adminSessions&form_session=76).

Report on the attendance of Goran Stojanovic to EPP-PEMC

Within the FP6 project INCO-CT-2006-043669-ReCIMICo, travel and accommodation costs was paid for attendance of prof. Goran Stojanovic to EPE-PEMC2010 14th International Power Electronics and Motion Control Conference, 5-10 September, 2010, Ohrid, Republic of Macedonia (www.epe-pemc2010.com).

The main goal of EPE-PEMC conference is to promote and coordinate the exchange and the publication of technical, scientific and economic information in the field of Power Electronics and Motion Control.

More than 400 participants was and more than 300 accepted papers were at this conference.

Prof. Goran Stojanović presented paper entitled “Performance analysis of LTCC transformers for application in DC/DC converters“, whose authors are G. Stojanovic, A. Maric, G. Radosavljevic, E. Labourec and W. Smetana. This paper was awarded as a best paper at the Conference.



Prof Stojanović was also the chair of the Dialog Session D1: Semiconductor Devices and Packaging. All EPE-PEMC2010 accepted papers will be included in IEEE Xplore and registered in Engineering Index.

In this paper, a characterization of ferrite transformers based on S-parameters measurement using vector network analyzer and specially developed PCB test fixture was presented. Ferrite transformers were realized with commercially available ferrite component. In order to verify the measurement procedure, the same component was tested using impedance analyzer (standard procedure) and the results were compared with proposed vector network analyzer measurement procedure. It was shown that proposed approach was efficient in predicting and analyzing the transformer performance, even in high frequency range.

2.4.7 Domestic conferences

Two visits to domestic conferences were made (one paper was awarded) and short reports from all visits are presented below:

Short Report from ETRAN 2008 Conference (G. Radosavljevic) - The Conference on Electronic, Telecommunication, Computers, Automatics and Nuclear Technique ETRAN 2008 was held from the 8th to the 12th June, 2008 in Palić, Serbia. The conference was organized by the Society for ETRAN, the Faculty of Technical Sciences (University of Novi Sad) and the School of Electrical Engineering (Belgrade University), in cooperation with the IEEE Section of Serbia and Montenegro, under the auspices of the Ministry of Science of Republic of Serbia, Provincial Secretary for Science and Technological Development of APV, Provincial Secretary for Education & Culture of APV and sponsored by economic, scientific, and public institutions.

The topics covered at the conference comprise papers from the area of electronics, microelectronics, microwave technique, materials, robotics, power electronics etc. The conference program included over 200 papers and authors arrived from Serbia, Montenegro, Macedonia, Republika Srpska, United Kingdom, USA etc.

The paper entitled “Resonant Pressure Sensor Designed for the LTCC - Technology” was presented in the MO1.5 -1-4 section.

Short Report from ETRAN 2009 Conference (M. Videnović-Misic)

The Conference on Electronic, Telecommunication, Computers, Automatics and Nuclear Technique ETRAN 2009 was held from the 15th to 18th June, 2009 in Vrnjačka Banja, Serbia. It was organised by the ETRAN Society, Technical Faculty of Čačak, Electrotechnical Faculty of Belgrade and in the co-operation with IEEE Serbia and Montenegro Section. The topics covered at the conference comprise papers from the area of electronics, microelectronics, microwave technique, materials, robotics, power electronics etc. The conference program included over 200 papers and authors arrived from Serbia, Montenegro, Macedonia, Bosnia and Hercegovina, United Kingdom, USA etc. Papers published in ETRAN 2009 Conference Proceedings: “Dependence of circuit stability and S21 on low noise amplifier circuit parameters” (Alena Djugova, Jelena Radic, Mirjana Videnovic-Misic) and “Dependence of noise figure on current reuse LNA circuit parameters” (Jelena Radic, Alena Djugova, Mirjana Videnovic-Misic). Second work was awarded as Best Paper by a Young Researcher.



2.4.8 Final version of the Project websites

CIMC web site (<http://www.cimc.rs>) and ReCIMiCo web site (<http://www.ftn.uns.ac.rs/recimico>) are regularly updated with new research results, list of scientific papers published by CIMC staff, list of novel measurement and characterization techniques offered by CIMC, as well as presentations of the networking partners, meeting minutes etc. Apart from above mentioned tasks dissemination was also performed through discussions with individual policy makers and participation of CIMC key personnel in the work of governmental advisory committees, which presents less public, but often one of the most effective means of dissemination.

2.4.9 Accomplishment of Ph.D. researches

Successfully accomplishments of three Ph. dissertations and five master's thesis have been made using new equipment and mobilities in the frame of ReCIMiCo project. Titles of Ph. D. dissertations are:

- Goran Radosavljevic, “New configuration of inductor structures and their application in RF electronics and microsensors”, by supervision of Dr. Ljiljana Zivanov and Dr. Walter Smetana, August 2010
- Vasa Radonic, “Novel configuration of left-handed unit cell and their applications”, by supervision of Dr. Vesna Crnojevic – Bengin, May 2010.
- Milos Slankamenac, “Measurement of electrical parameters and modelling of nonlinear switching effects in chalcogenide glassy semiconductors”, by supervision of Dr. Milos Zivanov.

Section 3 – Consortium management

ReCiMiCo project is SSA with one participant and therefore all activities concerning project management were done by SC of the project. Project management has been planned as WP 1.

3.1 WP1 Project management

3.1.1 Objectives of WP 1

- Insuring good coordination and supervision of the Project,
- To guaranty undisturbed implementation of the Project,
- Correlating specific tasks performed during the life of the Project,
- Organizing contingency actions and conflict resolutions if needed,

To ensure the basic infrastructure to the SSA, for coordination and administration, to make CIMC to proceed as planned, on time and within budget.

3.1.2 List of WP 1 Deliverables

Table 3.1.1: Deliverables List

List of all deliverables, giving date of submission and any proposed revision to plans.

Del. no.	Deliverable name	Work package no.	Date due	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
D1-1	Minutes of the kick-off meeting	WP1	21-22. 06 2007	21-22. 06 2007			1
D1-2	Minutes of the second Steering Committee meetings		28-30.09.2008	28-30.09.2008			
D1-3	Minutes of the third Steering Committee meetings	WP1	06.03.2010.	06.03.2010.	2		1

3.1.3 List of Milestone

Table 3.1.2: Milestones List

List of all milestones, giving date of achievement and any proposed revision to plans.

Milestone no.	Milestone name	Work package no.	Date due	Actual/Forecast delivery date	Lead contractor
M1-1	Kick-off meeting	WP1	21-22. 06 2007	Jun 2007/May 2007	
M1-2	The second Steering Committee meeting	WP1	28-30.09.2008	September 2008/ October 2008	
M1-3	The third Steering Committee meetings	WP1	06.03.2010.	Mart 2010 /February2010	1

3.1.4 Management activity

The main purpose of WP1 is to guaranty undisturbed implementation of the Project and to correlate specific tasks performed during its life, thus leading to fulfilment of Project goals and maximization of its potential impact. Apart from general management-related activities, the major task of WP1 was the organization of three meetings of Steering Committee during the Project. It is concluded that all meetings of the ReCIMiCo partners turned out to be a very constructive and fruitful meeting. All participants expressed their wishes to cooperate and to act together more closely. The main conclusions can be summarized as follows:

- It is essential to actively and extensively communicate the ReCIMiCo results to research community that forms the scientific basis for further CIMC development.
- Contacts with non ReCIMiCo members will also be actively pursued.
- Summarizing the attendance to the Kick-off meeting, Steering Committee concluded that 29 participants attended to kick-off meeting (3 participant were from WBC and 4 from EU partnering institutions. 22 CIMC ReCIMiCo project staff).
- Summarizing the attendance to the first Workshop Steering Committee concluded that it achieved 61 registrations. Finally 55 persons attended the workshop. 27 CIMC ReCIMiCo project staff attended the workshop. Four EU partners, 8 WBC, 2 guests from USA and 14 guests from Serbia.
- Summarizing the attendance to the second Workshop Steering Committee concluded that it achieved 61 registrations. Finally, 58 people attended the workshop: 25 CIMC ReCIMiCo project staff, 4 EU partners, 9 WBC, 2 EU guests and 9 guests from Serbia
- Steering Committee strongly believe that the workshops were enhanced communication between research centers with similar scientific interests, foster collaboration on all levels and identify some of the future research directions, with special attention to possible generation of new proposals.

