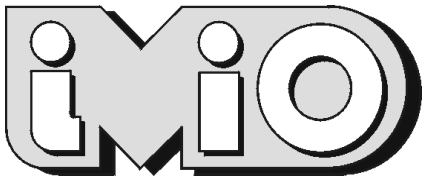
INSTITUTE OF MICROELECTRONICS AND OPTOELECTRONICS



ANNUAL REPORT

2012

Edited by Agnieszka Mossakowska-Wyszyńska

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From the Director

This Annual Report summarizes the research activities of the Institute in 2012, as well as the teaching activities in the academic year 2011/2012. The activities of the Institute in the field of electronics and computer engineering are concentrated in the area of broadly defined microelectronics, optoelectronics and photonics. These include VLSI systems, microelectronic and nanoelectronic semiconductor devices, hybrid circuits (e.g. microwave, optoelectronic), sensors, microsystems, laser optoelectronics, electronic imaging and image processing. It is worth to emphasize that research activities of the Institute span modelling, CAD, manufacturing and diagnostics.

The Institute of Microelectronics & Optoelectronics (IMiO) was founded in 1970. It evolved from the Chair of Radio Engineering established by Professor Janusz Groszkowski in 1929. Our Institute is linked with the beginnings of the Faculty of Electronics and Information Technology through the person of Prof. Groszkowski, who worked in IMiO until his death, as well as the territory – half of the Institute is situated in the Building of Radio Engineering on the Warsaw University of Technology campus. Here the Institute's Technology Centre is located. It includes laboratories of silicon processing (clean-room), hybrid technologies and assembly techniques, fibre optic and integrated optoelectronic device fabrication, laser optoelectronics, characterization of new electronic and photonic materials and manufacturing processes. These laboratories developed their activities based on research projects financed by Polish government as well as those within 6th and 7th UE Framework Programme. The institute is a beneficiary of three investment projects of the Innovative Economy Operational Programme. As a result a 11 high-tech laboratories offering high quality scientific services in the field of advanced electronic and photonic technologies are being established in IMiO. All of these labs had reached their full operational readiness by the end of 2012.

In the field of teaching (three-level structure – B.Sc., M.Sc. and Ph.D. studies) the Institute continued to improve its contribution in the Electronics and Computer Engineering area (led together with the Institute of Electronic Systems) for on-campus studies. Since 2012 IMiO provides a M.Sc. teaching program Microelectronics, Photonics and Nanotechnology. The involvement of the Institute in distance learning studies of Electronics and Telecommunications is also worth mentioning, especially post-diploma studies in the domain of tools and techniques of virtual education that began in 2004. Since 2009 IMiO provides a teaching program for the students of the Faculty of Management with the aim of educating future managers of electronic equipment production.

IMiO inspired and was actively involved in the organization of a series of popular-science lectures aimed to encourage secondary-school students to continue their education at our Faculty. The Institute aims for its teaching activities to meet the challenge of the development of modern technology and information society.

I express my sincere appreciation to all colleagues for your achievements which determined the position of our Institute in the Faculty of Electronics and Information Technology.
Thank you very much for your cooperation in the creative development of the Institute.

Warsaw, January 2013

Professor Paweł Szczepański, Prof., Ph.D., D.Sc.

CONTENTS:

1. GENERAL INFORMATION

1.1. Organisation of the Institute and Areas of its Activities

The Institute of Microelectronics and Optoelectronics is a part of the Faculty of Electronics and Information Technology - the largest Faculty of the Warsaw University of Technology.

Our Institute consists of five divisions:

- Microelectronics and Nanoelectronics Devices Division;
- VLSI Engineering and Design Automation Division;
- Image and Microwave Photonics Division;
- Microsystem and Electronic Material Technology Division;
- Optoelectronics Division.

During the past thirty-three years of research in the area of microelectronics and optoelectronics the Institute has built its competence in:

- modelling of physical effects in modern semiconductor devices;
- silicon processing and its modelling, non-standard dielectric layer deposition techniques;
- developing methods and measurement systems to characterize electronic materials and devices;
- generation of microwaves, microwave measurement techniques, and numerical methods for electromagnetism;
- processing, designing, optimisation techniques and development of VLSI (very large scale integration of circuits) computer-aided tools;
- design and technology of thick-film hybrid circuits, fabrication of thick-film microsystems;
- modelling and design of sensors and optical-waveguide microsystems;
- laser physics (Fabry-Perot and distributed feedback lasers), laser spectroscopy of solid state active materials, and applications of lasers in medicine, manufacturing and telecommunications;
- fabrication and characterisation of optoelectronics elements and devices including fibre sensors, photovoltaics;
- silicon carbide processing for high-temperature, high-power and high-frequency electronics
- computer-aided design of photo electronic image devices, image processing and visualisation of results of experiments with image devices;
- vacuum science and technology - computer-aided design of vacuum systems, modelling of the gas flow in vacuum systems, studies of gas parameter distribution in calibration chambers (vacuum metrology).

The research activities are supported by projects financed by the State Committee for Scientific Research and those within 7th UE Framework Programme, IDESA, NANOSIL.

The results of our scientific activities were published in many papers submitted to prestigious international scientific journals and presented at national and mostly at international conferences in the form of communications as well as the invited lectures.

1.2. Board of Directors

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1.3. Microelectronics and Nanoelectronics Devices Division

Head of the Division

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Bogdan Majkusiak, Ph.D., D.Sc.	Tenured Professor
Lidia Łukasiak, Ph.D., D.Sc.	Professor
Andrzej Mazurak, Ph.D.	Assistant Professor
Robert Mroczyński, Ph.D.	Assistant Professor
Zbigniew Pióro, Ph.D.	Assistant Professor
Sławomir Szostak, Ph.D.	Assistant Professor
Jakub Walczak, Ph.D.	Assistant Professor
Agnieszka Zaręba, M.Sc.	Assistant Professor
Jan Gibki, Ph.D.	Senior Lecturer
Józef Maciak, M.Sc.	Senior Lecturer
Antoni Siennicki, Ph.D.	Senior Lecturer

Junior academic staff

Jakub Jasiński, M.Sc.	Assistant
Dominik Tanous , M.Sc.	Ph.D. Student

Technical and administrative staff

Witold Ciemiewski,
Kazimierz Dalbiak,
Krzysztof Krogulski

The research carried out in the Microelectronics and Nanoelectronics Devices Division falls into three main areas, namely: technology, diagnostics and modelling of semiconductor structures, as well as applications of microcontrollers.

To name a few examples of its research topics:

- Diagnostics and characterisation of properties of single and double insulating layers (gate stack including ultra thin oxide layers) by means of electrical measurements analysis;
- Wear-out and degradation processes in MOS structures (breakdown of dielectrics layers, hot carriers effects, radiation damage effects);
- Transport mechanism and quantum effects in MOS structures (transistor, tunnel diode) with ultra thin oxide;
- New materials (semiconductors and dielectrics) for microelectronics applications (e.g.: silicon carbide, gallium nitride, silicon-germanium, germanium)
- Theoretical studies on MOS-SOI (silicon-on-insulator) and Si:Ge (silicon-germanium) MOS structure physics (modelling of devices behaviour and modelling for characterisation and diagnostics);
- Nanoelectronic phenomena and devices (e.g. tunnel and resonance tunnel diodes and transistors, Coulomb blockade diode, single-electron transistors, memories);
- PECVD deposition of ultra thin dielectric layers for MOSFET gate dielectric (SiO_2, Si_3N_4, SiO_xN_y);
- Ultra shallow implantation from r.f. plasma;
- Very low temperature processing of test structure;
- Fabrication of ultrathin amorphous silicon layers by PECVD
- Fabrication of double barrier structures and devices;
- MEMS/MOEMS processing;
- Silicon photonic devices fabrication.

1.4. VLSI Engineering and Design Automation Division

Head of the Division

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Witold Pleskacz, Ph.D., D.Sc.	Professor
Elżbieta Piwowarska, Ph.D.	Docent
Grzegorz Janczyk, Ph.D.	Assistant Professor
Zbigniew Jaworski, Ph.D.	Assistant Professor
Dominik Kasprowicz, Ph.D.	Assistant Professor
Marek Niewiński, Ph.D.	Assistant Professor
Andrzej Wielgus, Ph.D.	Assistant Professor
Adam Wojtasik, Ph.D.	Assistant Professor

Junior academic staff

Marek Ciepłucha, M.Sc.	Ph.D. Student
Jacek Grądzki, M.Sc.	Ph.D. Student
Andrzej Grodzicki, M.Sc.	Ph.D. Student
Jakub Kopański, M.Sc.	Ph.D. Student
Aleksander Koter, M.Sc.	Ph.D. Student
Arkadiusz Łuczyk, M.Sc.	Assistant
Michał Łukaszewicz, M.Sc.	Ph.D. Student
Krzysztof Marcinek, M.Sc.	Ph.D. Student
Piotr Mierzwiński, M.Sc.	Ph.D. Student
Krzysztof Siwiec, M.Sc.	Ph.D. Student
Michał Staniewski, M.Sc.	Ph.D. Student

Technical and administrative staff

Jerzy Gempel, M.Sc.
Stanisław Jeszka, M.Sc.

The research carried out in the division falls into several main areas: development of IC design methodologies and tools, design of digital and analog integrated circuits for nonstandard demanding applications, investigations of new devices and circuits for future generations of microelectronic systems.

Current research projects in the Division include:

- methodologies of integrated circuit design for manufacturability: application of statistical process and device simulation in IC design, investigations of spatial on-chip correlation of random process disturbances, analysis of layout sensitivity to spot defects,

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- development of CAD tools for integrated circuit design and verification, with special emphasis on analog full custom ASICs design,
- design of digital, analog and mixed signal VLSI circuits for special applications such as innovative AD converters, data processing in physical experiments and medical equipment, RF front ends for wireless data transmission etc.,
- modeling and control of leakage currents in nanometer digital circuits,
- investigations and development of new VESTIC microelectronic technology.

1.5. Image and Microwave Photonics Division

Head of the Division

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Piotr Garbat, Ph.D.	Assistant Professor
Jerzy Piotrowski, Ph.D.	Assistant Professor
Marek Sutkowski, Ph.D.	Assistant Professor
Agnieszka Szymańska, Ph.D.	Assistant Professor
Piotr Witoński, Ph.D.	Assistant Professor
Jerzy Skulski, M.Sc.	Senior Lecturer

Junior academic staff

Krzysztof Madziar, M.Sc.	Assistant

Technical and administrative staff

Jerzy Domański, M.Sc.
Bożena Janus

The main areas of activity of the Division are education and research, both in the field of the technology of electronic imaging devices, digital image processing, propagative electronics and microwave photonics.

Members of the academic staff are involved in research and development works on:

- theoretical principles of image modelling, processing and analysis;
- application of image processing methods for diagnostic control and measurement systems in industry, medicine, research and commerce;
- image acquisition in polarization imaging systems and optical image processing;
- 3D Vision methods and algorithms;
- electro optic effects in liquid crystals and their applications to LCD and photo refractive phenomena in liquid crystals;
- an analysis of the oscillation conditions, frequency stabilisation and synthesis in microwave bands;
- measurement techniques of microwave circuits and devices parameters with emphasis on automation and computerisation of measurement methods;
- modelling and computer aided design of microwave devices and circuits;
- controlling of microwave circuits parameters by means of optical signals;
- investigations and modelling of optical-microwave frequency conversion processes;
- modelling of optically controlled microwave devices, as photodiodes, photo-varactors, phototransistors;
- modelling of optoelectronic and microwave devices for data transmission networks.

1.6. Electronic Materials and Microsystem Technology Division

Head of the Division

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Ryszard Kisiel, Ph.D., D.Sc.	Professor
Mikołaj Baszun, Ph.D.	Assistant Professor
Piotr Firek, Ph.D.	Assistant Professor
Jerzy Kalenik, Ph.D.	Assistant Professor
Stanisław Pietruszko, Ph.D.	Assistant Professor
Mateusz Śmietana, Ph.D.	Assistant Professor
Aleksander Werbowy, Ph.D.	Assistant Professor

Junior academic staff

Tymoteusz Ciuk, M.Sc.	Ph.D. Student
Jakub Grochowski, M.Sc.	Ph.D. Student
Piotr Knyps, M.Sc.	Ph.D. Student
Krystian Król, M.Sc.	Ph.D. Student
Mateusz Mroczkowski, M.Sc.	Assistant ,Ph.D. Student
Andrzej Stefański, M.Sc.	Ph.D. Student
Andrzej Taube, M.Sc.	Ph.D. Student

Science research staff

Małgorzta Kalisz, Ph.D.	Assistant Professor
Mariusz Sochacki, Ph.D.	Assistant Professor

Technical and administrative staff

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The research activity of the Division concentrates on optoelectronics (e.g., measuring systems using fiber optic sensors), and hybrid technologies and the development of wide bandgap semiconductor technology in the design, modelling and manufacturing of microelectronic devices operating at high temperatures, including power semiconductor devices.. Fundamental and applied research are carried out. Research groups are organised for defined tasks.

The main research areas are as follows:

- the use of graphene in the design of photodetectors for the far-infrared range with the electrical and optical characterization of graphene produced on different substrates, or a transferred onto the substrate;
- the design, modelling and fabrication of microelectronic devices based on silicon carbide (SiC) technology;
- the development of electrical characterization methods for the determination of energy distribution of traps in MOS devices;
- designing, modelling and fabrication of microelectronic and optoelectronic devices using transparent dielectric and conductive oxides Fabrication and characterization of high-k dielectric layers;
- fabrication and investigation of the following optoelectronic devices: integrated passive and active light wave guiding structures (modulators, bistable switches etc.) and fibre optic sensors;
- computer engineering for fibre optics;
- new Surface Mount Technologies SMT on printed circuit boards;
- application of thin and thick film technology in hybrid devices and thick film sensors fabrication;
- investigation of the electronic structure, stability and optical properties of amorphous silicon and its devices (thin film transistors, solar cells, etc.);
- Design, fabrication and characterization of multi-junction photovoltaic cells with high energy efficiency
- design and monitoring of photovoltaic systems, strategy for development of photovoltaics;
- electronic packaging technology;
- plasma deposition of nanocrystalline diamond (NCD), diamond-like carbon (DLC) thin films and their application in fibre optic and waveguide sensing structures.

1.7. Optoelectronics Division

Head of the Division

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Agnieszka Mossakowska-Wyszyńska, Ph.D.	Assistant Professor
Ryszard Piramidowicz, Ph.D.	Assistant Professor
Anna Tyszka-Zawadzka, Ph.D.	Assistant Professor
Piotr Warda, Ph.D.	Assistant Professor

Junior academic staff

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Zuzanna Boruc, M.Sc.	Ph.D. Student
Bartosz Fetliński, M.Sc.	Ph.D. Student
Anna Jusza, M.Sc.	Ph.D. Student
Katarzyna Ławniczuk, M.Sc.	Ph.D. Student
Stanisław Stopiński, M.Sc.	Ph.D. Student
Katrin Welikow, M.Sc.	Ph.D. Student

Science research staff

Marcin Koba, Ph.D.	Assistant Professor

Technical and administrative staff

Maciej Juźwik, M.Sc.
Wojciech Kamiński, Ph.D.

The activity of the Optoelectronics Division is concentrated on education as well as on various areas of optoelectronic research in the field of laser physics, new optical waveguide materials and structures, laser spectroscopy, laser construction and laser applications in medicine and air pollution monitoring.

Photovoltaics laboratory, as a part of the Division, serves as a focal point for conducting and stimulating research and demonstration activities; educating students; organizing technical meetings, workshops, symposia and conferences; disseminating information and addressing environmental issues.

The academic staff of the Division gives lectures in photonics, laser physics, laser technology, laser applications, laser spectroscopy, integrated optoelectronics and optical computing, all of which are accompanied by appropriate laboratory class activities.

The main research activity of the Division comprises:

- solid state laser construction and their applications in materials processing;
- spectroscopic research of new laser materials, investigation of the excitation processes in rare earth doped dielectric materials, research of blue up-conversion laser structures, waveguide lasers;
- theoretical research of laser generation in planar, fibre and hollow waveguide gas lasers, analysis of light generation in DFB (distributed feedback) structures, photonic crystals structures and in lasers with non-linear optical elements, investigation of the statistical properties of the light generated in various laser structures;
- nano-optical structures and photonic band-gap materials;
- optimisation of the construction of ion gas lasers, investigation of the processes in discharge tube ceramic ion laser and laser operation in various cavity geometry, investigation of light generation in ion gas lasers for medical applications;
- spectroscopic and theoretical research of light generation in silicon photonic lasers.

1.8. Statistical Data

SPECIFICATION	2011	2012	DIFFERENCE
Academic staff	84	82	-2
Tenured professors	10	10	0
Professors	6	6	0
Docent	1	1	0
Assistant professors	31	33	+2
Senior lecturers	4	4	0
Assistants and Ph.D. students	32	28	-4
Science research staff	6	7	+1
Technical and Administrative staff	22	17	-5
Computers	265	273	+8
Library resources - Books (number of volumes)	3625	3645	+20
Teaching activities	66	61	-5
Basic courses	31	32	+1
Advanced courses	16	19	+3
Special courses	19	10	-9
Research projects	39	40	+1
Granted by the University	6	8	+2
Granted by State Institutions	23	24	+1
Granted by International Institutions	9	7	-2
Others projects	1	1	0
Degrees awarded	55	74	+19
D.Sc. degrees	2	0	-2
Ph.D. degrees	4	3	-1
M.Sc. degrees	20	22	+2
B.Sc. degrees	29	49	+20
Publications	159	136	-23
Sci.-tech. books	7	11	+4
Sci.-tech. papers in journals	84	56	-28
Sci.-tech. papers in conference proceedings	68	69	+1
Patents	7	4	-3
Conferences	35	28	-7
Awards	9	13	+4

2. STAFF

2.1. Senior Academic Staff

Mikołaj Baszun, M.Sc. (‘69), Ph.D. (‘77), Computer engineering, Assistant Professor, full time, Electronic Materials and Microsystem Technology Division, Member of Polish Acoustics Association (’01), WUT Rector’s Collective Award (‘06), President’s of the Republic of Poland Gold Medal for Long-Term Service (‘08).

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Piotr Garbat, M.Sc.(‘00), Ph.D. (‘05), Image and Video Processing, Techniques, Computer Vision, 3D Data Processing in Multimedia Applications. Assistant Professor, full time, Image and Microwave Photonics Division, Member of SPIE (‘01-), Member of Polish Liquid Crystal Society (‘09-).

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Grzegorz Janczyk: M.Sc. (‘99) with honors, Ph.D. (‘05), VLSI Engineering and Automation Division, Assistant Professor, full time, IEEE member (‘00-).

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Zbigniew Jaworski, M.Sc. (‘90), Ph.D. (‘97), Microelectronics, Assistant Professor, full time, VLSI Engineering and Design Automation Division, Minister’s of Education and Science Team Prize (’06).

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2.3. Science Research Staff

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Mateusz Mroczkowski	M.Sc.	Science Assistant	+48 222347779	423b GR
Mariusz Sochacki	Ph.D.	Science Assistant Professor	+48 222347932	232 GR
Stanisław Stopiński	M.Sc.	Design Engineer	+48 222345047	127 GR
Katrin Welikow	M.Sc.	Design Engineer	+48 222345047	127 GR

2.4. Technical and Administrative Staff

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Kazimierz Dalbiak		Senior Foreman	+48 222347534	335 GR
Jerzy Domański	M.Sc.	Senior R&D Engineer	+48 222345419	148 GE
Jerzy Gempel	M.Sc.	Senior R&D Engineer	+48 222347207	356a GE
Bożena Janus		Senior Technical Clerk	+48 222347939	51 GE
Stanisław Jeszka	M.Sc.	Senior R&D Engineer	+48 222347207	356a GE
Maciej Juźwik	M.Sc.	Main Administr. Specialist	+48 222347782	26 GR
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Krzysztof Krogulski		Senior Technician	+48 222347535	275 GE
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3. TEACHING ACTIVITIES

3.1. Basic Courses

[Edu1] **Algorithms and Data Structures** (Algorytmy i struktury danych), **AISDE**, Adam Wojtasik

[Edu2] **Application of Matlab in Calculation Methods** (Matlab w zastosowanych metodach obliczeniowych) **MZMO**, Mikołaj Baszun

[Edu3] **Computer-Aided Design of Printed-Board Circuits** (Wspomaganie komputerowe projektowania obwodów drukowanych), **PADS**, Ryszard Kisiel, Jerzy Kalenik

[Edu4] **Design of Analog Circuits for VLSI Systems** (Projektowanie układów analogowych dla systemów VLSI), **PUAV** Wiesław Kuźmicz

[Edu5] **Digital Circuits** (Układy cyfrowe), **UCYF**, Elżbieta Piwowarska

[Edu6] **Electronic Elements and Circuits** (Elementy i układy elektroniczne), **ELIU**, Andrzej Pfitzner

[Edu7] **Electronics 1** (Elektronika 1), **ELE1**, Andrzej Jakubowski, Sławomir Szostak

[Edu8] **Electronics 2** (Elektronika 2), **ELE2**, Zbigniew Pióro

[Edu9] **Equipment - Programming Synthesis of Digital Systems** (Synteza sprzętowo – programowa systemów cyfrowych), **SSP**, Elżbieta Piwowarska

[Edu10] **Fields and waves**, (Pola i fale), **POFA**, Jerzy Piotrowski

[Edu11] **Fundamentals of Circuit and System Technology** (Podstawy technologii układów i systemów), **PTUIS**, Romuald Beck

[Edu12] **Fundamentals of Lasers** (Lasery - kurs podstawowy), **LKP,** Paweł Szczepański

[Edu13] **Fundamentals of Microelectronics** (Podstawy mikroelektroniki), **PMK**, Wiesław Kuźmicz

[Edu14] **Fundamentals of Microprocessor Techniques** (Podstawy techniki mikroprocesorowej), **TMIK**, Lidia Łukasiak

[Edu15] **Fundamentals of Microwave Engineering** (Podstawy techniki w.cz.), **TWCZ**, Bogdan Galwas

[Edu16] **Fundamentals of Photonics** (Podstawy fotoniki), **FOT**, Michał Malinowski

[Edu17] **Fundamentals of Solid State Electronics** (Elektronika ciała stałego), **ELCS**, Jan Szmidt, Witold Pleskacz

[Edu18] **Hybrid Systems** (Układy hybrydowe), **UKH**, Ryszard Kisiel

[Edu19] **Integrated Optoelectronics** (Optoelektronika zintegrowana), **OZT**, Michał Malinowski

[Edu20] **Introduction to Microsystems** (Wstęp do mikrosystemów), **WMS,** Zbigniew Pióro

[Edu21] **Introduction to Numerical Methods** (Wstęp do metod numerycznych), **WDMNM**, Jerzy Krupka

[Edu22] **Introduction to Programming** (Podstawy programowania), **PRM**, Michał Borecki

[Edu23] **Introduction to the UNIX System** (Użytkowanie systemu UNIX), **USUX**, Andrzej Wielgus

[Edu24] **Ligthwave Telecommunication** (Telekomunikacja optofalowa), **TEOP**, Bogdan Galwas

[Edu25] **Methods of Image Acquisition and Processing for Photography**, (Metody rejestracji i obróbki obrazów w fotografii), **TROOF**, Marek Sutkowski

[Edu26] **Object Programming** (Programowanie obiektowe), **PROE**, Adam Wojtasik

[Edu27] **Object Programming in Java** (Praktyka programowania obiektowego w Javie), **PPOJ**, Adam Wojtasik

[Edu28] **Operating Systems** (Systemy operacyjne), **SOE**, Andrzej Wielgus

[Edu29] **Optoelectronic Devices and Systems** (Elementy i systemy optoelektroniczne), **ESO**, Marcin Kaczkan

[Edu30] **Physical Fundamentals of Information Processing** (Fizyczne podstawy przetwarzania informacji), **FPPI**, Bogdan Majkusiak

[Edu31] **Programming microcontrollers in C language** (Programowanie mikrokontrolerów w języku C), **PMIK**, Sławomir Szostak

[Edu32] **Semiconductor Devices** (Przyrządy półprzewodnikowe), **PP**, Andrzej Jakubowski, Andrzej Pfitzner

3.2. Advanced Courses

[Edu33] **3D Vision Systems** (Systemy wizji 3D), **SWIZ**, Jerzy Woźnicki

[Edu34] **Advanced Microelectronic and Optoelectronic Technologies** (Zaawansowane technologie mikroelektroniczne i optoelektronczne), **ZTMO**, Romuald Beck

[Edu35] **Computational Methods in Microelectronics and Photonics** (Metody obliczeniowe w mikroelektronice i fotonice), **MOBI**, Andrzej Pfitzner

[Edu36] **Digital Image Processing** (Cyfrowe przetwarzanie obrazów), **CPOO**, Piotr Garbat

[Edu37] **Electronic and Photonic Devices for Telecommunication** (Przyrządy elektroniki i fotoniki dla telekomunikacji), **PEFT**, Bogdan Galwas

[Edu38] **Fiber-Optic Communication** (Komunikacja światłowodowa), **KOS**, Ryszard Piramidowicz

[Edu39] **Fundamentals of Nanoelectronics and Nanophotonics** (Podstawy nanoelektroniki i nanofotoniki), **NANO**, Bogdan Majkusiak, Paweł Szczepański

[Edu40] **Fundamentals of Photovoltaics** (Podstawy fotowoltaiki), **PFOT,** Stanisław Pietruszko

[Edu41] **Integrated and Logic Circuits for Optoelectronics** (Zintegrowane układy optoelektroniczne i optyczne układy logiczne), **ZOUL**, Michał Malinowski

[Edu42] **Introduction to Digital VLSI System Design** (Projektowanie scalonych systemów cyfrowych), **PSSC**, Elżbieta Piwowarska

[Edu43] **Laboratory of Fundamentals of Nanoelectronics and Nanophotonics** (Pracownia podstaw nanoelektroniki i nanofotoniki), **PNAN**, Bogdan Majkusiak, Paweł Szczepański

[Edu44] **Monte Carlo Methods - Fundamentals and Applications** (Metody Monte Carlo - podstawy i zastosowania), **MMC**, Marek Niewiński

[Edu45] **Nanostructures and Nanosystems** (Nanostruktury i nanosystemy), **NIN**, Jan Szmidt, Aleksander Werbowy

[Edu46] **Nanotechnologies** (Nanotechnologie), **NAN**, Jan Szmidt

[Edu47] **Optical Waveguide Lasers and Amplifiers**(Wzmacniacze i lasery światłowodowe), **WLS**, Ryszard Piramidowicz

[Edu48] **Photovoltaic Systems** (Systemy fotowoltaiczne), **SFOT,** Stanisław Pietruszko

[Edu49] **Semiconductor Photonic Devices** (Fotoniczne przyrządy półprzewodnikowe), **FPP**, Paweł Szczepański

[Edu50] **Vision Monitoring Systems** (Systemy monitoringu wizyjnego), **SYMW**, Jerzy Woźnicki

[Edu51] **VLSI System Design** (Projektowanie systemów scalonych w technice VLSI), **PSSV**, Wiesław Kuźmicz, Zbigniew Jaworski

3.3. Courses in English

[Edu52] **Electronics 1, EELE1,** Bogdan Majkusiak

[Edu53] **Physics 3, EPHY3,** Bogdan Majkusiak

[Edu54] **Quality Management, EQUMA,** Zdzisław Mączeński

3.4. Courses for other Faculties

[Edu55] **Electomagnetic Compatibility, Faculty of Management** (Kompatybilność elektromagnetyczna, Wydział Zarządzania), **KOMEL**, Jerzy Piotrowski

[Edu56] **Electronic Equipment Assembly Processes, Faculty of Management,** (Inżynieria montażu urządzeń elektronicznych, Wydział Zarządzania), **IMUEL**, Ryszard Kisiel

[Edu57] **Electronic Equipment Design Techniques, Faculty of Management,** (Techniki konstrukcji urządzeń elektronicznych, Wydział Zarządzania), **TKUE**, Ryszard Kisiel

[Edu58] **Electronic Material and Structure Production Engineering, Faculty of Management** (Inżynieria produkcji materiałów i struktur elektronicznych, Wydział Zarządzania), **INMAS**, Mikołaj Baszun

[Edu59] **Electronics 1, Faculty of Mechatronics** (Elektronika 1, Wydział Mechatroniki), **ELE1**, Andrzej Jakubowski, Sławomir Szostak

[Edu60] **Electronics 2, Faculty of Mechatronics** (Elektronika 2, Wydział Mechatroniki), **ELE2**, Zbigniew Pióro

[Edu61] **Specific testing and certification of products, Faculty of Management** (Specyficzne badania i certyfikacja wyrobów, Wydział Zarządzania), **SPECY**, Piotr Kamiński

4. RESEARCH PROJECTS

Project definitions and descriptions - prepared by Project Leaders.

4.1. Projects Granted by the University

[Pro1] **The Development of Design, Processing and Testing Methods of the Electronic Devices and Materials for Microelectronics and Optoelectronics** (Rozwój metod wytwarzania i badania materiałów oraz modelowania i charakteryzacji przyrządów w dziedzinie mikroelektroniki i optoelektroniki), project leader: Paweł Szczepański, June 2011 - March 2012, **sub-projects:**

[Pro1.1] **Development of layout editing software for VESTIC integrated circuits** (Oprogramowanie do projektowania topografii układów scalonych VESTIC) project leader: Wiesław Kuźmicz

In this project a new layout editor dedicated for VESTIC integarted circuits will be developed. This editor must allow to design and verify layouts that include shapes such as circles and semi-circles, non-Manhattan paths, rectangles with rounded corners. Such shapes do not appear in traditional CMOS layouts. In addition, accuracy below 1 nm is required. This new layotu editor will be based on a new layout data structures and new layout transformation algorithms.

[Pro1.2] **Modeling and investigation of optically active photonic materials and micro- and nano-structures** (Modelowanie i badanie aktywnych optycznie mikro- i nano-struktur oraz materiałów fotonicznych), project leader: Michał Malinowski

The project is focused on development of modeling tools for optical passive and active micro-photonic devices such as; planar and fiber waveguides, amplifiers and lasers, nonlinear optical high-finesse (ring, DFB/DBR, photonic crystal) resonators, power optimization and quantum noise analysis of amplifiers and lasers, laser action studies in new solid-state lasers, including waveguide and photonic crystal structures.

The program includes spectroscopic investigations of rare-earth activated solids for technological and biological applications. This concerns bulk monocrystalline, nanocrystalline and glassy matrix for various phosphors, including white light and up-conversion phosphors, sensors, photovoltaics, lasers and amplifiers.

[Pro1.3] **Self-aligned gate MOSFET test structures technology** (Struktury testowe MOSFET w technologii samocentrującej bramki),project leader: Romuald B. Beck

The aim of this project is to design and fabricate test structures that enable tuning the self-aligned gate MOSFET technology based on refractory metals. Using these structures the process flow for such a technology will be optimized.

[Pro1.4] **Structures and materials for sensor microsystems technology** (Konstrukcje i materiały dla mikrosystemowych technik sensorowych), project leader: Jan Szmidt

[Pro1.5] **The use of photonic techniques in microwave filters applications and investigations of 3D imaging systems** (Wykorzystanie technik fotonicznych w układach filtrów mikrofalowych oraz badanie parametrów systemów obrazowania 3D), project leader: Janusz Parka

The project aims in experimental study of the use of photonic technology in microwave filters circuits. Microwave photonic filters are recently under interest due to uncomplicated tuning possibilities, easy reconfiguration, immunity for external distortions and wide frequency range of operation. Application properties and modeling of such microwave filters will be under investigation. Several microwave-photonic filter setups will be measured and characterized.

Novel 3D imaging techniques with use of LC devices are investigated. Advanced implementation of numerical procedures in data acquisition and image processing using dedicated hardware processors is examined.

[Pro2] **The Development of Design, Processing and Testing Methods of the Electronic Devices and Materials for Microelectronics and Optoelectronics** (Rozwój metod wytwarzania i badania materiałów oraz modelowania i charakteryzacji przyrządów w dziedzinie mikroelektroniki i optoelektroniki), project leader: Paweł Szczepański, June 2012 - May 2013, **sub-projects:**

[Pro2.1] **Analysis of bridging faults tolerance of digital circuits implementing fuzzy operations** (Badanie odporności na zwarcia cyfrowych bloków realizujących operacje rozmyte), project leader: Andrzej Pfitzner

Fuzzy systems are used to deal with the imprecise knowledge of the real systems. Therefore, they should tolerate imprecision of the processed information.

The goal of this project is to analyze the tolerance of digital fuzzy circuits to bridging faults (faults caused by short defects). Several fuzzy operators are taken into account. The appropriate digital circuits are synthesized and analyzed in the following way. Layout analysis allows to estimate the probabilities of shorts that may occur in a real integrated circuit and to establish a set of all possible shorts to consider during the next steps. A series of electrical simulations should be perform for all considered shorts introduced to the circuit netlist in order to identify the actual behavior of a faulty circuit and to compare it with the behavior of the correct circuit. Finally, we are able to classify how the faulty behavior affects fuzzy processing.

[Pro2.2] **Investigation and modeling of photonic structures and characterization of optically active materials** (Badania i modelowanie struktur fotonicznych oraz charakteryzacja ośrodków optycznie aktywnych), project leader: Michał Malinowski

The project is focused on spectroscopic investigation and optical modeling of passive and active micro-photonic devices such as; planar and fiber waveguides, amplifiers and lasers, development of optical modeling tools for nonlinear optical high-finesse (ring, DFB/DBR, photonic crystal) resonators, power optimization and quantum noise analysis of amplifiers and lasers, laser action studies in new solid-state lasers, including waveguide and photonic crystal structures.

The program includes spectroscopic investigations of rare-earth activated solids for technological and biological applications. This concerns bulk monocrystalline, nanocrystalline, ceramic, polymer and glassy matrix for various phosphors, including white light and up-conversion phosphors, sensors, photovoltaics, lasers and amplifiers.

[Pro2.3] **Preparation and characterization of MOSFETs structures made in self-aligned technology** (Wytwarzanie i charakteryzacja struktur MOSFET wykonanych w technologii samocentrującej), project leader: Romuald B. Beck

In this work there have been developed a new masks set of MOS/MIS test structures. The kit allows for the fabrication of semiconductor devices by using six completely different technologies. The modular concept of the design allows for comprehensive and reliable characterization of fabricated test structures. The versatility of designed masks also underlines the possibility to fabricate test structures on various types of semiconductor substrates.

In the course of this work refractory metal layers deposition by a vacuum evaporation method using a high energy electrons beam gun were also developed. The effect of the basic parameters of the deposition process onto growth kinetics and the resistivity of the obtained conductive layers. As a metal gate in the final test MOS structures molybdenum was choosen.

By using a new mask set MOS test structures were fabricated by using self-aligned technology. The results indicated that obtained devices are operating according to assumptions, although the resulting electrical performance and reliability are not satisfactory and there is needed further work to optimize the technology of MOS structures.

[Pro2.4] **Structures, technologies and materials for sensor microsystem technology** (Konstrukcje, technologie i materiały dla mikrosystemowych technik sensorowych), project leader: Jan Szmidt

[Pro2.5] **The acquisition and signal processing to analyze the shape of the 3D objects in the THz and optical fiber Bragg gratings** (Pozyskiwanie i przetwarzanie sygnałów do analizy kształtu obiektów 3D w zakresie THz oraz światłowodowych siatek Bragga), project leader: Janusz Parka

[Pro3] **Microstructured polymer optical fibers for application in access networks** (Mikrostrukturalne światłowody polimerowe do zastosowań w sieciach dostępowych), project leader: Katrin Welikow, June 2012 – December 2012

The aim of this work was to design, develop, manufacture and fully characterize parameters of microstructured polymer optical fiber with limited propagation and bending losses, enlarged modal area and limited number of guided modes.

The fiber was manufactured by an external partner and then fully characterized in terms of application in FTTH systems. Carried study enhanced the development of measurement setups and measurement methods dedicated to microstructured fibers.

[Pro4] **Solar-pumped fiber laser** (Laser włóknowy zasilany promieniowaniem słonecznym, grant Koła Naukowego Optoelektroniki), project leader: Ryszard Piramidowicz, co-workers - Students Association of Optoelectronics: Krzysztof Anders, Bartosz Fetliński, Anna Jusza, Paweł Gdula, Katrin Welikow, Piotr Florczyk, Paweł Kluz, Łukasz Sudoł, Arkadiusz Szydlik, June 2012 – December 2012

The main aim of the following project was to design, develop and characterize parameters of the solar-pumped fiber laser operating at 1550 nm (near-infrared range). This project is coherent with the ongoing research on expanding the areas of optical power supply applications.

The proposed solution was optimized by means of power consumption and user's safety. Performed tests confirmed practical application of designed system, as well as possibility of its implementation in: low-power laser systems mounted on artificial satellites, the air pollution monitoring systems, optical communication systems and simple laser systems for applications in the field (laser rangefinders, laser designators, lidars etc.)

[Pro5] **Spectral analysis of nano-coated optical fiber sensors working on surface plasmon resonance *(SPR) effect*** (Analiza spektralna czujników światłowodowych z nanopokryciami pracującymi w oparciu o zjawisko powierzchniowego rezonansu plazmonów (SPR)), project leader: Mateusz Śmietana, June 2012 – December 2012

The aim of the project is mainly purchasing of equipment, i.e., spectrometer and fusion splicer, required for in-depth analysis of fabricated in IM&O's clean-room labs wide gamut of optical fiber sensors, including those based on surface plasmon resonance (SPR) effect. As a result of the project a set of SPR sensor samples is fabricated and examined using the purchased equipment from the point of view of their sensitivity and functional properties.

[Pro6] **TFT thin-film structures based on a new generation of amorphous semiconductors** (Struktury cienkowarstwowe typu TFT oparte o półprzewodniki amorficzne nowej generacji), project leader: Robert Mroczyński, co-workers: Piotr Firek, Adrian Krysiński, Magdalena Szymańska, June 2012 – December 2012

In the course of this work there has been designed the technology of thin film transistor (TFT) structures. In addition, the technology of indium gallium zinc oxide (IGZO) and high-k gate dielectric layers obtained by reactive magnetron sputtering method were also developed. Dielectric layers investigations were extended to the application of high-k layers

fabricated by ALD method (research collaboration with the Institute of Physics of the Polish Academy of Sciences). In order to select the most favorable semiconductor and dielectric layer in the final TFT structure, structural and electrical characterization were performed. As the gate dielectric hafnium dioxide (HfO2) was chosen.

The fabricated TFT transistors, despite the fact that those were the first structures obtained at the Institute of Microelectronics and Optoelectronics, Warsaw University of Technology, demonstrated relatively good and repeatable electrical properties.

This project allowed the integration of Young Scientists and Graduates who are interested in technology and characterization of TFT structures, pursuing their work in two Divisions at the Institute of Microelectronics and Optoelectronics. Obtained results were also used for the preparation of several publications on the ELTE Conference in 2013. Moreover, findings resulted from this work were a part of an application for a research project on the basis of scientific co-operation with the Institute of Electron Technology.

[Pro7] **The on-board computer for supersonic missiles** (System komputera pokładowego do rakiety naddźwiękowej, grant Koła Naukowego Mikrosystemów ONYKS), project leader: Zbigniew Pióro, co-workers - Students Association of Microsystems ONYKS: Radosław Papis, Michał Waśkiewicz, Michał Wszeborowski, Adam Szewczyk, Mateusz Kamiński, June 2012 – December 2012

The main aim of the project is to develop a small system which could control the two-stage rocket. An additional function of the device is the ability to log flight data on a storage medium. The electronics was developed based on accelerometers and gyroscopes made in MEMS technology and silicon pressure sensors. This part of the project also assumed that the system can activate the parachutes and the second stage engine, which has also been implemented. The remaining scope of work of the project was to develop the control algorithm missile missiles in flight and are still ongoing work in this direction. There will also work on the development of the technology of producing this type of equipment.

[Pro8] **The study of optical properties of erbium doped materials for short wavelength upconversion lasers** (Badania właściwości optycznych ośrodków aktywnych domieszkowanych jonami erbu do zastosowań w układach laserów z konwersją wzbudzenia na zakres krótkofalowy), project leader: Krzysztof Anders, June 2012 – December 2012

Continuous demand for compact and efficient laser sources operating in short-wavelength spectral range has resulted in dynamic development of both semiconductor and diode pumped solid state lasers. Undoubtedly, semiconductor lasers are presently the most intensively investigated field of active materials and a number of impressive results has been achieved, including violet GaN laser diodes. Nevertheless, solid state lasers are constantly considered as irreplaceable in all applications requiring excellent optical parameters of the beam together with high power levels. What is more, solid state lasers offer light emission in spectral ranges not available to semiconductor lasers, like blue-green and orange, obtained via harmonic generation or up-conversion phenomena.

Among various rare earth ions, employed in solid state laser systems, trivalent erbium seems to be one of the most attractive, and not only due to its excellent amplifying and lasing properties in the infrared. Its rich energy level structure enables also several potential laser channels in the short-wavelength part of spectrum, including the most demanded green lasing. This laser potential has been confirmed for several up-conversion pumped crystalline materials, as well as active fluoride fibers . Nevertheless, the up-conversion phenomena and lasing potential of telluride and ZBLAN glasses still remain not fully explored.

This project is focused on the studies on up-conversion phenomena in erbium doped telluride and ZBLAN glasses. The set of samples has been carefully investigated by means of highly-resolved laser spectroscopy, with specific attention focused on analysis of up-conversion processes resulting in short-wavelength emission under infrared (808 nm, 980 nm, 1480 nm) and red (657 nm) pumping by commercially available semiconductor lasers diodes. As a result the possible up-conversion pathways were proposed and briefly discussed, giving a good starting point for optimization of glass composition, active dopant levels and excitation conditions, which, in turn, enabled first technological attempts to fiber drawing.

4.2. Projects Granted by the Ministry of Science and Higher education

[Pro9] **Design and manufacturing of complete microwave sensor based measurement system intended for electromagnetic properties investigations of grapheme** (Opracowanie systemu z mikrofalową głowicą pomiarową w postaci rezonatora dielektrycznego do badań właściwości elektrycznych grafenu), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jerzy Krupka, October 2010 – March 2013

The main goal of this project is to design and manufacture of complete apparatus for contactless sheet resistance and conductivity measurements of epitaxial graphene. The most important parts of the system are microwave sensors with dielectric resonators that allow measurements of graphene deposited on a small 10 mm x 10 mm semi-insulating silicon carbide substrates. Three different microwave heads will be constructed. In the addition automatic vector network analyser will be purchased which is intended for the resonance frequency and Q-factor measurement of microwave sensors. For each measurement head appropriate software based on numerical solutions of Maxwell’s equations will be developed which is necessary for the determination of the electromagnetic material properties such as the sheet resistance from measurement data.

[Pro10] **Feasibility study of the novel nanometric silicon transistors and modelling of them for computer aided design of integrated circuits** (Badania właściwości nanometrowych tranzystorów krzemowych o nowej konstrukcji i ich modelowanie dla potrzeb wspomagania projektowania (CAD) układów scalonych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Andrzej Pfitzner , April 2010 – April 2012

The goal of this project is a feasibility study of the field-effect and bipolar transistors as the devices of novel technology: *Vertical Slit Transistor based Integrated Circuits* (VeSTICs), proposed by W. Mały. Original geometry of the devices of vertical nanometric active region and symmetrically placed vertical volume contacts allows to reach extremely regular layout of the circuit, better heat transfer, larger scale of integration and even real 3D integration. Project includes optimization of the devices design, especially of the new, twin gate junction-less transistor *Vertical-Slit Field-Effect Transistor* (VeSFET) with regard to chosen electrical parameters, and development of the analytical models destined to circuit simulation.

[Pro11] **High temperature spectroscopy of rare-earth doped crystals and nanocrystals for luminescence thermometry applications** (Spektroskopia wysokotemperaturowa kryształów i nanokryształów tlenkowych domieszkowanych jonami ziem rzadkich dla zastosowań w termometrii luminescencyjnej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał Malinowski, August 2009 – February 2012

Phosphor thermometry is being used for non-contact measurements in difficult and hostile high temperature environments. In particular, temperature measurements inside various engines, jet turbines or similar devices are especially amenable to fluorescence techniques. Suitable phosphors could cover temperature ranges from –265 to 1600 °C. The aim of this work is to study the temperature dependence of the luminescence spectra and decays characteristics of rare-earth (Tb, Dy, Eu) activated nanopowders and thin films of YAM, YAG and Y_2O_3 crystals. Also, the temperature dependence of the up-conversion emissions will be studied over a wide temperature range.

[Pro12] **Investigation of coherent radiation sources for photonic integreated circuits made in SOI technology** (Badania nad źródłami promieniowania koherentnego dla fotonicznych układów zintegrowanych wykonanych w technologii krzemowej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Szczepański, co-workers: Romuald B.Beck, Bogdan Majkusiak, Michał Malinowski, Ryszard Piramidowicz, Anna Tyszka-Zawadzka, Agnieszka Mossakowska-Wyszyńska, Jakub Walczak, Piotr Warda, Kamila Leśniewska-Matys, Marcin Koba, Robert Mroczyński, October 2010 – October 2013

The aims of the project is to create original models, verified experimentally, describing the properties of radiation sources made in silicon technology and implemented for integrated circuits photonic, to prepare technologies for the implementation of test structures and their implementation, as well as an electrical and optical characterization of structures obtained to verify the theoretical models.

The research focuses on two fully monolithic solutions implemented entirely within the Group IV materials. The first one concerns the generation of Raman radiation in SOI waveguide structure (a "rib") with LED PIN. In this case, the work will involve the development of theoretical models of the radiation generation based on two complementary formalisms, first: the wave approach and the theory of coupled wave modes; second: the transition matrix formalism; for the DFB and DBR laser structures and the structures based on photonic crystals.

The second case relates to nano-electronic and photonic (NEF) silicon structures in which the generation of photons can be caused by the current flow through the pn junction. The structure of metal-SiO2-well quantum-SiO2-Si with the pn junction made on silicon substrate will be analyzed. It is also planned to produce nanocrystallines with various sizes in other types of layers, i.e. silicon nitride and oxide-silicon nitride in order to investigate the changes of the generated radiation wavelength. The resulting structure will be subjected to electrical characterization as well as will be performed the spectral measurements of emitted light. Characteristics obtained will be used for verification of theoretical models.

[Pro13] **Long-period grating structures for monitoring of deformation and defects in structural materials** (Struktury długookresowych siatek światłowodowych do monitorowania odkształceń i uszkodzeń materiałów konstrukcyjnych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Mateusz Śmietana, April 2012 – March 2014

Precise monitoring of destruction or deformation in structural and composite materials is one of the biggest challenges of today's science. Applied there optical fiber sensors offer a number of desired properties, including small weight and size, low power consumption, E-M immunity, high sensitivity, resistance to corrosive chemicals and long-term robustness. Within the scope of the project there is foreseen designing, fabrication and investigations on long-period fiber gratings (LPFGs), optical structures showing sensitivity to tension, bending and twist – factors existing in structural materials. The LPFGs will be mounted on the surface of the materials as well as embedded in them.

[Pro14] **Modeling and investigation of the double barrier metal-oxide-semicondutor tunnel structures,** (Modelowanie i badanie struktur tunelowych typu metal-izolator-półprzewodnik (MIS) z podwójną barierą potencjału), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Bogdan Majkusiak, co-workers: Romuald B. Beck, Andrzej Jakubowski, Lidia Łukasiak, Jakub Walczak, Robert Mroczyński, Agnieszka Zaręba, Sławomir Szostak, Andrzej Mazurak, Jarosław Grabowski, Grzegorz Głuszko, March 2010 – March 2013

The aim of the project is to develop and verify a theoretical model of the double barrier MOS tunnel diode as well to fabricate the test structures and investigate them by means of the theoretical model as a characterization tool.

[Pro15] **Modeling of light generation in photonic crystal lasers based on coupled mode theory** (Modelowanie generacji promieniowania w laserach z ośrodkiem aktywnym w postaci kryształu fotonicznego bazujące na teorii modów sprzężonych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Marcin Koba, April 2012 – April 2014

This project aims to develop a numerical model for linear (i.e. threshold) and nonlinear (i.e. above threshold) analysis of two-dimensional (2D) photonic crystal (PC) lasers. The calculations are based on the coupled mode theory and the energy theorem. Analyzed structures are composed of circular pillars arranged in a square or triangular lattice, and enclosed within square regions. The PC structures are studied for electromagnetic field with TE and TM polarization.

[Pro16] **New optoelectronics devices for intelligent classification of organic and biologic liquids.** (Nowe przyrządy optoelektroniczne do inteligentnej klasyfikacji cieczy organicznych i biologicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, November 2010 – October 2013

We highlight the main differences between the liquid classification method proposed in grant and other known methods, pointing out that the proposed microliter photonic sensor setup with local heating and optical capillaries offers a new approach to liquid examination using the index of refraction, turbidity, surface tension, viscosity and vapor pressure as the determining parameters, which can be correlated with biological or chemical information. The novelty of the proposed approach to sensor devices lies in the use of time-domain data and neural network processing, which gives more information about the liquid in question than the traditional static sample examination approach. In the first part of grant, we investigate the operating principles and various aspects of the construction of the optical capillary head. We look at two different cases: (1) transparent liquids and (2) highly turbid liquids, the latter described as an emulsion of particles in a colloidal solution. We go on to examine the possibilities of using replaceable components as a practical means of realizing the systems. The second part of our work considers the principles of optoelectronic intensity signal detection, including the aspects of speed, accuracy and simplicity of the test instrument and ways of reducing the dependence of the sensor's sensitivity on ambient conditions. The principles of sensor operation will be described using two practical examples. The first involves recognition of liquids of different chemical origin containing alcohols and glycols and an examination of the composition of bio-fuels. The second example deals with a new method of mastitis classification using optical capillary sensors. In this context, we discuss the relationship of the physically measured test-cycle data and the proper choice of features for the artificial neural network classification algorithm that we use. We demonstrate that combined biological, chemical and physical analysis also leads to proper feature selection and sample classification.

[Pro17] **Structural camera 3D-HD** (Strukturalna kamera 3D-HD), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Piotr Garbat, co-worker: Marek Sutkowski, April 2010 – April 2012

Measurement is based on the active fringe projection method and HD-resolution video camera. This solution offers a much shorter measurement time in comparison with measurements using other standard techniques based on structural light methods.

[Pro18] **Technology and characterization of MIS structures with double gate dielectric stacks for non-volatile semiconductor memory (NVSM) applications** (Technologia i charakteryzacja struktur MIS z podwójną warstwą dielektryka bramkowego dla zastosowań w nieulotnych pamięciach półprzewodnikowych (NVSM)), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Robert Paweł Mroczyński, co-workers: Andrzej Jakubowski, Romuald Beck, Agnieszka Zaręba, Sławomir Szostak, Grzegorz Głuszko, Jarosław Grabowski August 2009 – August 2012

The aim of this work is development technology of MIS structures with double gate dielectric stacks based on high-k dielectric layers (e.g. hafnium dioxide – HfO_2). The first objective of this project is to design a new set of photolitography masks with MIS/MISFET structures, allowing fabrication of semiconductor devices in self-aligned or non-self aligned technology. In the second part, MIS devices with different gate dielectric structures will be fabricated. The gate structure will consist of pedestal layer obtained by plasma enhanced chemical vapor deposition (PECVD) and high-k dielectric layer (fabricated by MOCVD, ALD, reactive sputtering) as top layer. In the third part of this work fabricated MIS devices will be fully characterized by means of electrical characterization (capacitance-voltage and current-voltage characteristics, charge pumping, CVS and CCS) and investigated from the viewpoint of non-volatile semiconductor memory (NVSM) applications. Significant part of this work will be also investigations of radiation damage influence onto electrical properties of MIS/MISFET devices with double gate dielectric stacks.

[Pro19] **The new optoelectronics method of intelligent classification of liquid bio-fuels properties with optical capillary use** (Nowa metoda optoelektroniczna inteligentnej klasyfikacji właściwości użytkowych biopaliw ciekłych z wykorzystaniem kapilar optycznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał Borecki, March 2009 – March 2012

The proposed microliter photonic sensor setup with local heating and optical capillaries offers a new approach to liquid examination using the index of refraction, turbidity, surface tension, viscosity and vapor pressure as the determining parameters, which can be correlated with biological or chemical information. The novelty of the proposed approach to sensor devices lies in the use of time-domain data and neural network processing, which gives more information about the liquid in question than the traditional static sample examination approach.

In the first part of our work, we analyze the operating principles and various aspects of the construction of the optical capillary head. We look at transparent liquids. We go on to discuss the possibilities of using replaceable heads as a practical means of realizing the systems. The second part of our work discusses the principles of optoelectronic intensity signal detection, including the aspects of speed, accuracy and simplicity of the test instrument and ways of reducing the

dependence of the sensor's sensitivity.

The principles of sensor operation will be described using examples of liquid fuels and bio-fuels. In this context, we discuss the relationship of the physically measured test-cycle data and the proper choice of features for the artificial neural network classification algorithm that we use. We intend to demonstrate that combined biological, chemical and physical analysis also leads to proper feature selection and sample classification.

[Pro20] **Tunable liquid crystal devices working on THz and GHz range,** (Przestrajalne ciekłokrystaliczne przetworniki na zakres THz i GHz.), Consortium: Military University of Technology, Warsaw University of Technology, Polish Academy of Sciences, Wrocław University of Technology, Przemysłowe Centrum Optyki, project leader: Janusz Parka, co-workers: Bogdan Galwas, Marek Sutkowski, Piotr Gabrat, Agnieszka Szymańska, Jerzy Piotrowski, Krzysztof Madziar, December 2010 – December 2012

The main goal of the project is to develop and produce a tunable liquid crystal devices working in 5-100 GHz and 0,3-6 THz ranges. These devices with active area of few sq. centimeters can be applied as tunable phase shifters, phase correctors, modulators etc.

[Pro21] **Universal laser source for medical applications,** (Uniwersalne źródło promieniowania laserowego do zastosowań medycznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Wojciech Kamiński, March 2009 – March 2012

The scientific aim of the project is to research all effects appearing in ion laser tubes, especially to find knew effects which are not known in literature. These effects could have significant influence on parameters of argon-krypton ion lasers which are developed and produced in Institute of Microelectronics and Optoelectronics. The analysis of discovered effects allows defining laser parameters important for medical application.

4.3. Projects Granted by National Centre for Research and Development

[Pro22] **Dual-mode blocks of the integrated circuit GALILEO and GPS signal receiver in nanometer CMOS technology for precise positioning of mobile objects**, (Bloki dwusystemowego, scalonego odbiornika sygnałów nawigacji satelitarnej GALILEO i GPS w technologii nanometrowej CMOS do dokładnego pozycjonowania obiektów przenośnych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Witold Pleskacz, co-workers: Tomasz Borejko, Andrzej Berent, Jacek Grądzki, Aleksander Koter, Wiesław Kuźmicz, Arkadiusz Łuczyk, Krzysztof Marcinek, Krzysztof Siwiec, March 2011 - February 2014

The aim of the project is to design and manufacture IC prototypes of the component blocks of an independent dual receiver for the European satellite navigation system called Galileo as well as for the American GPS-Navstar. The additional goals are to run and characterize a complex electronic system built with above blocks. The designed system will receive navigation data from both satellite systems simultaneously. This will significantly improve the accuracy of positioning and will be invaluable in urban areas where skyscrapers often block the satellite signal from one system. The existence of a second system will be crucial to determine the position and user will not need to worry about which system is currently used.

Positive results of developed solution in industrial environment will begin the process of full silicon integration as a SoC (System on Chip). Practical importance of the project results to industry and the possibility of using the results of the project by other entities will be unquestionable. These include high-tech companies (e.g. microelectronics) and commercial institutions, which are producing and integrating satellite navigation systems in various areas of civil applications where satellite navigation is very quickly gaining new followers and new uses. Designed two-mode receiver (Galileo-GPS) will provide greater accuracy and reliability of measurements compared with single-system receivers (GPS only). This will form the basis for next generation services and applications based on satellite data, which will benefit users from the industry, scientific institutions, public administration as well as individual customers.

[Pro23] **Integrated circuit technology for measurement of psychophysiological parameters under dynamic conditions** (Mikroukładowa technologia pomiaru parametrów psychofizjologicznych w warunkach dynamicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Witold Pleskacz, October 2012 – September 2015

The project aims to develop a new integrated circuit technology enabling the measurement of psychophysiological parameters under dynamic conditions. It will allow integration of multiple systems and measuring circuits inside the IC chip. Solution developed in the design will reduce the dimensions of the current applied solutions, increase reliability, lower power consumption and increase the possibility of applications.

New integrated circuit technology for measurement of psychophysiological parameters will be implemented through two parallel developed original solutions: bioSoC and bioSiP. BioSoC is a specialized integrated circuit, with the analog-digital signal processing paths and microcontroller for processing and analyzing data. BioSiP is a minimodule developed for integrating functions and measurement capabilities of modern diagnostic equipment. The developed measurement system will be attractive as a new generation of mobile devices, component monitoring systems and health care.

The project will result in measurement modules made on basis of the bioSiP and the bioSoC technology. Modules will be a part of drivers monitoring stand.

During realization of bioSoC modules, projects of following blocks will be developed: EKG measurement chain, EMG measurement chain, resuscitation rate measurement chain, sigma-delta A/C converter, power management block, I/O interfaces, microcontroller and RTC clock. Blocks will be integrated in a silicon die, which will be fabricated and packaged in plastic or ceramic pack.

During realization of bioSiP modules, projects of chosen sets of bioSiP modules and complete research stand will be developed. The stand will be used to perform necessary tests of developed modules, including experimental tests of drivers. Software controlling bioSiP modules and research stand controlling system will be created.

[Pro24] **Light sources with cold emitters** (Źródła światła z zimnymi emiterami), Tele & Radio Research Institute, Institute of Physics of The Polish Academy of Sciences, Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, co-worker: Piotr Firek, Jerzy Kalenik, November 2012 – October 2015

The practical goal of the project is to elaborate a repetitive, stable in emission and highly efficient source of light with field emitter prepared from nannocomposite carbonaceous-nickel film (C-Ni). Our previous studies (performed during realization of MNT ERA NET project) enabled for an elaboration of technology for preparation of highly efficient field emission C-Ni films. These films are obtained by PVD as well as by PVD/CVD methods. In this project we will examine reasons and mechanisms of phenomena harmful for efficiency and stability of field emission from the films working in model system that is very closed to proposed for light source production. For achieve this goal there will be performed following groups of tasks:

1) studies of stability and durability of emitters prepared of nanocomposite C-Ni films;
2) characterization by TEM and SEM of C-Ni film before and after application in a cathode;
3) elaboration of energy-efficient and stable supplying system.

[Pro25] **Optical fiber sensors with nanofilms for examination of bioliquids** (Nanowarstwowe czujniki światłowodowe do biodiagnostyki cieczy), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Mateusz Śmietana, October 2011- September 2014

The aim of this project is to develop a technology, fabricate and conduct a complex characterization of modern optical fiber sensing structures nanocoated with overlays, which make them possible long-term monitoring of variations in properties of the liquids or state of the sensors' surface. In order to achieve this aim, depending on the foreseen application of the sensors, we will employ various vapor based deposition methods allowing for deposition of a wide range of films, followed by their plasma based processing. There is foreseen two main fields of applications, i.e., liquids containing components of biological origins forming biofilms on the sensor's surface (e.g. antigens, proteins, DNA, enzymes or bacteria) and oily liquids technologically modified (thermally or chemically). It must be noticed, that these liquids differ much, not only from a point of view of their origins, but first of all from the point of view of their physical and chemical properties. That fact forces application of different technology used for deposition and surface processing of the films for each of the applications.

[Pro26] **VESTIC: a new manufacturing technology for integrated circuits** (VESTIC: nowy sposób wytwarzania układów scalonych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Wiesław Kuźmicz, December 2012 – November 2015

The topic of the project is VESTIC – a new manufacturing technology for silicon-based monolithic integrated circuits. The goal of the project is to develop a version of it mature enough for industrial applications. The advantages of VESTIC are: highly regular structure of circuits built of 3D active components, a new transistor named VeSFET, which is an ideal active device for ultra-low power circuits, simple shapes on lithographic masks making nanometer-size components easier to manufacture. The VESTIC-based circuits can be manufactured using the same processes and materials that are used in standard CMOS technology; however, the sequence of operations is different. It is expected that the VESTIC-based circuits will be less expensive and the NRE costs of new designs will also be significantly lower. The expected results of the project are: manufacturing process suitable for a pilot fab line for ASICs and demonstrators: digital and analog circuits.

4.4. Projects Granted by the National Science Centre

[Pro27] **Highly sensitive ISFET matrix transistors with functional dielectrics on new generation** (Wysokoczułe matryce tranzystorowych struktur typu ISFET z funkcjonalnymi dielektrykami nowej generacji), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Piotr Firek, co-workers: Jan Szmidt, Mateusz Śmietana, Mariusz Sochacki, Aleksander Werbowy, Ryszard Kisiel, Michał Borecki, Robert Mroczyński, Ryszard Jachowicz, jerzy Weremczuk, Daniel Paczesny, Grzegorz Tarapata, Krzysztof Zdunek, Katarzyna Nowakowska-Langier, April 2011- April 2014

The aim of the project is to elaborate of the technology of Ion Sensitive Field Efect Transistor - ISFET) with the gate dielectric layers made of various materials that determine sensitivity of every element of the matrix. There are used common dielectric layers such as: SiO_2, SiO_xN_y, but also these with the specific properties: $BaTiO_3$, HfO_2 which are characterized by the high value of relative dielectric, DLC (Diamond-Like Carbon) that are biocompatible, and the new generation dielectrics with the highly promising properties, such as Al_2O_3 i AlN.

[Pro28] **Implementation of HDR methods in video security systems,** (System pozyskiwania obrazów 3D z analizą polaryzacyjną), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jerzy Woźnicki, co-workers: Marek Sutkowski, Piotr Garbat, Janusz Parka, May 2011 – May 2013

In the work the 3D imaging set-up for shape measurements of the moving objects will be developed and build. During recording process the polarization of the light is analysed. This will allow to use this system in special environment conditions, i.e. dust, steam, fog, smoke.

[Pro29] **New processes and technology for assembly and hermetic SiC high temperature packages** (Nowoczesne procesy i technologie na potrzeby montażu i hermetyzacji elektroniki wysokotemperaturowej na bazie SiC), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Kisiel, co-workers: Marek Guziewicz, Włodzimierz Strupiński, Zbigniew Szczepański, Mariusz Sochacki, Jan Szmidt, Piotr Firek, Małgorzata Kalisz, Teodor Paweł Gotszalk, Jarosław Kraśniewski, Aneta Olga Hakpa, Aleksander Werbowy, Maciej Oleksy, April 2011 – April 2014

The aim of the project is to elaborate prototype packages for SiC high temperature devices able to continuous work at 350 °C and short term work at temperature of 500°C. To fulfill these requirements it is necessary to elaborate assembly technology of SiC devices to ceramic substrate as well as electrical package interconnectors that are able to work in such high temperatures.

[Pro30] **Technology and characterization of ultrathin silicon layers formed by means of PECVD for nanelectronic applications** (Technologia i charakteryzacja ultracienkich warstw krzemu wytwarzanych metodą PECVD na potrzeby struktur nanoelektronicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Romuald B.Beck, August 2012 – August 2015

The main aim of this project is to screen experimentally the possibility of using PECVD as a method of formation of ultrathin silicon layers in nanodevices basing on double barrier structure (i.e. with ultrathin layers stack: insulator-silicon-insulator).

Within this project we plan optimization of Si PECVD in order to achieve full control of growth of the Si layer in ultrathin range, while preserving possibly best properties of this layer at the same time. We will also investigate dependencies between processes used (and their parameters) and electrophysical properties which are critical for application of the studied technologies to manufacturing the nanodevices basing on such a stack (tunneling and resonant tunneling, Coulomb blockade, or 3D quantum dots). Special attention will also be paid to analysis of influence of high temperature processing, namely thermal annealing and/or oxidation, which may be used for improving the quality of the layers and their interfaces, but also – for obtaining 3D quantum dots embedded in dielectric layer.

Fabricated, within the scope of this project structures will be studied mainly be means of electrical characterization methods of purposely designed test structures. Careful analysis of voltage-current and capacitance-voltage characteristics, measured under within wide range of temperatures and frequencies, using appropriate theoretical models, we will derive information among others on: mechanisms of charge carriers transport, their mobility, density and localization (in space and energy) of traps and other uncompensated charges, resistivity to voltage stresses and breakdown effects.

Particular attention will be paid to screening on the measured electrical characteristics the effects related with resonant tunneling, Coulomb blockade, presence of quantum dots and charging/discharging of traps (which can be applied for nano-flash memories).

Other methods (mainly: spectroscopic ellipsometry, HRTEM, SIMS and XPS) will be used to analyze composition and structure of the Si layers in order to correlate changes of these properties (e.g. resulting from medium- and high – temperature processing) with electrical behavior of characterized test structures.

Hence, accumulation of knowledge on the possible fields of application of PECVD ultrathin silicon layers to manufacturing of nanoelectronic devices will become inevitable result of this project.

On the other hand, scale of possible variability of electrophysical properties of these layers themselves, as well as of structures based on them will allow for more realistic modeling and simulation of novel nanodevices electrical behavior, thus allowing quicker progress in theoretical works and design of such devices.

As a result, knowledge and skills acquired within the scope of this project may shorten significantly the time between demonstrators and commercial production of silicon based nanoelectronic structures. Thus, results achieved during this project will be of great interest not only for scientific community, but also, in longer term, by industry.

[Pro31] **The conditions of short-wavelength emission excitation in optically active low-phonon glasses and composite materials pumped with pressure-tuned laser diodes** (Warunki wzbudzania emisji krótkofalowej w aktywnych optycznie szkłach niskofonowych i materiałach kompozytowych pompowanych przestrajalnymi ciśnieniowo diodami laserowymi), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Piramidowicz, August 2012 – February 2015

Short-wavelength radiation, typically understood as near-UV, violet up to blue-green, is important to many aspects of life, society, and technology. As such it has been addressed often in science and technology in the past several decades. Noncoherent short-wavelength radiation, starting at about 100 nm is present in sunlight, although due to absorption in upper atmosphere, very little reaches Earth's surface. The so-called black lights, or Wood light (filtered broadband radiation of e.g. SrB4O7:Eu2+) and mercury vapour fluorescent UV lamps are typically used for germicidal purposes. Gas-discharge lamps and flash lamps emitting incoherent, broadband radiation due to arc discharge in noble gas plasma, are used e.g. in special lighting, pumping of solid state lasers (including laser at the National Ignition Facility in the USA) or for stimulating or characterizing various biological processes. Better efficiency, longer lifetimes, faster on-off times, dimming capability, less heat generation, together with comparatively lower price, make wide band gap semiconductor

light emitting diodes (LEDs) take over from lamp sources, specifically in areas like lighting (and exciting filtering phosphors), bio-imaging or biostimulating processes in medicine and life sciences.

The scientific goal of the project is investigation and versatile analysis of main physical mechanisms of shortwavelength emission and lasing in novel optical materials activated with selected rare-earth ions excited by unique infrared, pressure-tuned laser diodes. Initial research enables formulation of the main hypothesis that careful choice of excitation combined with matrix properties and dopant concentration optimizations, allows controlling character and dynamics of upconversion processes, enabling to precisely tailor luminescent properties of the investigated materials. This applies specifically to vitroceramic composites and, being the most promising direction, polymers activated with rare earth nanocrystallites. As the final result we expect significant broadening and systematization of knowledge on up-conversion mechanisms (and specifically various types of energy transfers) shaping short-wavelength luminescent properties under IR excitation in low phonon glasses and composite materials. Wide lineup of investigated hosts and concentrations along with novel experimental approach based on unique, pressure-tuned diode laser excitation, is to yield new knowledge that would disturb technologies of photonic materials and devices.

[Pro32] **The influence of subsurface doping of silicon carbide (4H-SiC) by ion implantation on electrophysical properties of MOS structures fabricated by thermal oxidation** (Wpływ przypowierzchniowego domieszkowania węglika krzemu 4H-SiC techniką implantacji jonów na właściwości elekrofizyczne struktur MOS otrzymywanych w wyniku utleniania termicznego), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, co-workers: Jerzy Żuk, Jacek Szuber, Bogusława Adamowicz, Mariusz Sochacki, Włodzimierz Strupiński, Małgorzata Kalisz, Piotr Firek, Aleksander Werbowy, Alina Domanowska, Piotr Kościelniak, Norbert Kwietniewski, Krystian Król, April 2011- April 2014

The main objective of the project is primarily to understand the processes taking place in the SiO2/SiC interface in the presence of nitrogen and an explaination of the reasons of the lower density of surface states including gate dielectric technology development towards commercialization of MOSFET transistors. The role of carbon in surafce states creation and the role of nitrogen in reduction of the surface states density including the nature of chemical bonds in the interface will be investigated by profiling X-ray Photoelectron Spectroscopy (XPS) and profiling Auger Electron Microscopy (SAM). The second stream of research is an extraction of electrical parameters of MOS structures and the determination of the relationship between electrical parameters and the fabrication technology. The parameters of thermal oxidation will be proposed to implement the process into simulation software. The electrical simulation will take into account the technology details if the correlation is obtained through the experimental work.

4.5. Projects Granted by International Institutions

[Pro33] **Future Internet Engineering,** (Inżynieria Internetu Przyszłości), EU Innovative Economy Programme, POIG.01.01.02-00-045/09, project leader: Paweł Szczepański, co-workers: Piotr Witoński, Paweł Gdula, Katrin Welikow, Krzysztof Anders, January 2010 – December 2012

The project covers the development and testing of infrastructure and services for the future generation Internet, i.e. IPv6 Internet and Future Internet. It is expected that new generations of Internet (one of the research priorities in the scope of European Union Framework Programmes) will contribute substantially to civilizational development in Europe by using their capabilities in all or almost all areas of human activity.

The aim of this project, in the scope of IPv6 Internet, is to develop a methodology for the evolutionary replacement of current version of IP (IPv4) in the national network by the IPv6 protocol and to propose new network solutions and services resulting from IPv6. The aim of this project, in the scope of Future Internet, is to develop and to test a proposal of a new architecture based on the resources virtualization along with new mechanisms and algorithms concerning the crucial aspects of network operations. The goal of the project is to create a national test network environment for the IPv6 Internet and Future Internet, enabling research and development activities based on the experimental verification.

[Pro34] **IDESA – 2 „Implementation of widespread IC design skills in advanced deep submicron technologies at European Academia”,** (IDESA-2 “Rozpowszechnienie umiejętności projektowania submikronowych układów scalonych w europejskich wyższych uczelniach”), EU structural project, project leader: Wiesław Kuźmicz, September 2010 – August 2012

The goal of this project is to train the staff of European universities in design of integrated circuits to be implemented in state-of-the-art deep submicron technologies. Based on examples of practical designs a series of intensive 5-day hands-on courses have been prepared and are given at numerous sites throughout Europe. IMiO WUT staff members were among those preparing the courses and are active as lecturers.

[Pro35] **Innovative technologies of multi-functional materials and structures for nanoelectronics, photonics, spintronics and sensors InTechFun,** (Innowacyjne technologie wielofunkcyjnych materiałów i struktur dla nanoelektroniki, fotoniki, spintroniki i technik sensorowych InTechFun), EU structural project, project leaders: Jan Szmidt, Wojciech Gwarek (The Institute of Radioelectronics WUT), project coordinator: Institute of Electron Technology, polish partners: Institute of Electron Technology, Institute of Physics Polish Academy of Science, Silesian University of Technology, Technical University of Lodz, Military University of Technology, 2009 – 2013

The main aim of this project is to integrate different semiconductors and technologies and develop new semiconductor devices based on creative and innovative technological solutions and designs. The project is focused on wide bandgap materials like zinc oxide and related films, gallium nitride and related epitaxial layers, silicon carbide. The functional thin layers for ohmic and rectifying contacts, interconnections, gate dielectrics and passivation have been developing based on four material groups: stable thermal oxides, nitrides, carbides and borides. The thin film technology includes fabrication and patterning of metallic, dielectric and epitaxial layers developed as separate and multi-purpose modules which could be integrated in full cycle of device fabrication at last stage of the project. Demonstrators of electronic and optoelectronic devices and sensors will be the final result of different materials integration.

Expected results:

1. Design, fabrication, development and characterization of SiC MOSFET transistors.
2. Design, fabrication, development and characterization of HEMT AlGaN/GaN transistors on silicon substrate.
3. Design, fabrication, development and characterization of multi-parameter classifier of liquid bio-fuels quality.

[Pro36] **Micro and nano-systems in chemistry and biomedical diagnostic - Task 2A: Capillary microfluidic sensors use in fertility diagnostics** (Mikro i nanosystemy w chemii i diagnostyce biomedycznej MNS-DIAG), EU structural project**,** project leader: Jan Szmidt, co-worker: Michał Borecki, February 2009 – September 2012

The aim of 2A task of grant is a construction of sensor that uses new method of optoelectronic diagnostics of woman fertility. The sensor works using optical capillary in which the vaginal fluid is examined. Unlike the classical fiber optic sensors which rely on changes in light propagation inside the fiber as affected by outside conditions, the optical capillary sensors rely on changes of light transmission in capillaries filled with the analyzed liquid, which opens new interesting possibilities for the applications of those sensors, while raising specific issues relating to the construction, materials and technology of those sensors.

The construction and technological aspects of filling and positioning of the sample of the liquid into the capillary, capillary heating and optical signal coupling are under examination. The application aspects of mammals as cow and woman fertility diagnostics will be discussed, in particular sample pre-treatment and stage, reference points setting and signal processing.

[Pro37] **Nanocoated Optical Fiber Sensors for Biodiagnostics of Liquids,** EU structural project, project leader: Mateusz Śmietana, November 2011- October 2013

The project is carried out within the Action 1.2: „Strengthening the human resources potential of science" of the Innovative Economy Operational Programme by increasing dynamic development of scientific careers of members of the research teams as well as supporting their already established international scientific collaboration. The task realized by the team within this project is working out a technology for fabrication of long-period gratings coated with films of nanometric thickness. The work done within the task will include detail characterization of the developed structures as sensors for detection of variations in optical properties of liquids. There is foreseen capability for long-term monitoring of the optical properties of liquids containing substances of biological origins or monitoring of the presence of e.g. selected microorganisms, on the surface of the sensors. The sensing structures will be fabricated and modeled in collaboration with Université du Québec en Outaouais (Canada) and Indian Institute of Technology (Indie), respectively. The thin dielectric films will be deposited on the surface of the sensors using mainly plasma methods, which have been intensively developed in laboratories of Warsaw University of Technology and Technical University of Lodz.

[Pro38] **PARADIGM Photonic advanced research and development for integrated generic manufacturing** (Zaawansowane badania nad rozwojem generycznych technologii fotonicznych układów scalonych), EU structural project, project leader: Paweł Szczepański, co-worker: Katarzyna Ławniczuk, September 2011 – September 2014

The aim of the PARADIGM project is to create a paradigm shift in the development and manufacturing of photonic integrated components and circuits based on Indium Phosphide. This shift will result in the cost and time reduction of design, development, manufacturing and packaging based on generic foundry concept. The generic concept, as it is in micro-electronics and CMOS technology, enables realization of multi-functional circuits using only a set of standard building blocks. By introducing the generic concept to photonics field, realization of application specific photonic integrated circuits (APSICs) would be possible within standardized technological processes, and as a result functionally advanced photonic circuits would be introduced to our daily usage, daily life.

Institute of Microelectronics and Optoelectronics, Warsaw University of Technology, as its aim within the project, proposed establishing an Eastern Europe Design Hub (EEDH). EEDH will offer the state-of-the-art expertise in design, development and characterization of ASPICs to companies and research institution form Eastern part of Europe. By having an access to the advanced photonic technologies, establishing a laboratory of photonic component's and circuit's characterization, providing access to the most up-to-date software and simulators, EEDH will become a strategic partner in photonics in Eastern Europe part. Additionally EEDH creates an awareness of generic concept and ASPICs within Eastern Europe mainly by disseminating the knowledge of the potential of integrated photonics, its applications and generic fabrication model.

More information about the PARADIGM project is available on the website: www.paradigm.jeppix.eu.

[Pro39] **Technology of new generation of hydrogen and hydrogen compounds sensor for over normative conditions applications POIG "DETEH,"** (Opracowanie technologii nowej generacji czujnika wodoru i jego związków do zastosowań w warunkach ponadnormatywnych), EU structural project, project leader: Jan Szmidt, co-workers: J.Kalenik, P.Firek, A.Werbowy, M.Śmietana, July 2009 – June 2014

The main purpose of the project is the study on technology of new generation sensor of hydrogen and his compounds for over normative conditions applications e.g. high temperature, high pressure or aggressive environment. The research aims of the project are connected with carbon nanomaterials technology with Pd nanograins (in sensor active area) and investigations of connection between structure of sensor active layers and their reaction on hydrogen, hydrogen compounds presence.

4.6. Other Projects

[Pro40] **Upgrade of vocational skills in field of application of ecological and effective energy solutions in Poland. Photovoltaic systems**, (Wspieranie kwalifikacji zawodowych w zakresie stosowania ekologicznych i efektywnych rozwiązań elektro-energetycznych w Polsce. Systemy fotowoltaiczne), National Fund for Environmental Protection and Water Management, Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Maciej Juźwik, co-workers: Piotr Knyps, Bartosz Fetliński, Ewa Piórecka, Jakub Wiśniewski, December 2010 –September 2012

Goal of the project is to improve vocational skills of people working in renewable energy and related sectors and increase awareness of progress in photovoltaic technologies among general public. To achieve this goal number (about 53) training seminars will be organized within given timeframe and in locations through Poland (there will be at least one training seminar in each voivodeship). Syllabus of each training seminar includes basics of photovoltaics effects, manufacturing technology of PV cells and modules, performance of different technologies in natural working conditions, practical guidelines for installers of grid-connected and autonomous systems as well as existing financial support mechanisms available for prospective investors in Poland. We estimate number of participants to reach 1600 at the end of project.

5. DEGREES AWARDED

5.1. Ph.D. Degrees

[PhD1] Piotr Caban, **The technology of manufacturing AlGaN/GaN/SiC semiconductor heterostructures using Vapour Phase Epitaxy for the purpose of transistors with two-dimensional electron gas (HEMT)** (Wytwarzanie heterostruktur półprzewodnikowych AlGaN/GaN/SiC metodą epitaksji z fazy gazowej na potrzeby konstrukcji tranzystorów z dwuwymiarowym gazem elektronowym HEMT), supervisor: Jan Szmidt, 10 January 2012

[PhD2] Konrad Kiełbasiński, **Lead-free thick film resistors technology for surface mount components (SMD)** (Technologia bezołowiowych rezystorów grubowarstwowych na potrzeby podzespołów montowanych powierzchniowo SMD), supervisor: Małgorzata Jakubowska, 6 March 2012

[PhD3] Krzysztof Kłos, **MOCVD Growth of HgCdTe Using Interdiffused Multilayer Process** (Wzrost warstw tellurku kadmowo-rtęciowego (HgCdTe) metodą MOCVD przy wykorzystaniu interdyfuzji warstw CdTe i HgTe),supervisor: Jan Szmidt, 10 January 2012

5.2. M.Sc. Degrees

[MSc1] Adam Andrzejewski, **The design of programmable AB class power amplifier in UMC CMOS 90 nm technology** (Projekt programowalnego wzmacniacza mocy klasy AB w technologii UMC CMOS 90 nm), advisor: Witold Pleskacz, very good

[MSc2] Szymon Boniecki, **Non-linear effects in fibre links** (Badanie zjawisk nieliniowych w łączach światłowodowych), advisor: Agnieszka Szymańska, good

[MSc3] Michał Brzeziński, **Project of digital-to-analog converter in UMC CMOS 90 nm technology** (Projekt przetwornika cyfrowo-analogowego w technologii UMC CMOS 90 nm), advisor: Witold Pleskacz, very good

[MSc4] Przemysław Mirosław Chełstowski, **Automatic generation of behavioral models of RAM and ROM** (Automatyczna generacja modeli behawioralnych pamięci RAM i ROM), advisor: Zbigniew Jaworski, very good

[MSc5] Tymoteusz Kacper Ciuk, **Technology and characterisation of graphene-based field-effect structure** (Technologia i charakteryzacja struktury polowej na podłożu grafenowym), advisor: Jan Szmidt, excellent

[MSc6] Michał Czesak, **Hardware design and software implementation for universal electrogustometer** (Opracowanie części sprzętowej i implementacja oprogramowania dla elektrogustometru uniwersalnego), advisor: Witold Pleskacz, excellent

[MSc7] Kamil Glimasiński, **Research on affect of shadowing on photovoltaic system performance based on Provincial Specialist Hospital in Łódź** (Badanie wpływu zacienienia na wydajność systemu fotowoltaicznego na przykładzie Wojewódzkiego Specjalistycznego Szpitala w Łodzi), advisor: Michał Malinowski, good

[MSc8] Damian Andrzej Głowacki, **3D object modeling using the Kinect sensor** (Modelowanie obiektów 3D z wykorzystaniem kamery Kinect), advisor: Piotr Garbat, good

[MSc9] Jakub Grochowski, **P-n junction fabricated using transparent metal oxides - structural, optical and electrical characterization** (Złącze p-n utworzone z półprzewodnikowych tlenków metali przejściowych - badania strukturalne i elektrooptyczne), advisor: Ryszard Kisiel, excellent

[MSc10] Konrad Jaworski, **Application of atomic force microscopy (AFM) for surface characterization of SiC-based structures** (Zastosowanie mikroskopu AFM do badania powierzchni struktur wytwarzanych w technologii SiC), advisor: Jan Szmidt, very good

[MSc11] Paweł Piotr Karczewski, **Low-power wind turbine controller** (Kontroler elektrowni wiatrowej małej mocy), advisor: Sławomir Szostak, very good

[MSc12] Łukasz Kasztelan, **Wireless sensor network for temperature monitoring of conveyers elements** (Bezprzewodowa sieć czujników do monitorowania temperatury elementów taśmociągu), advisor: Zbigniew Pióro, good

[MSc13] Marcin Paweł Myczka, **Hardware-software implementation of the estimation algorithm in the intelligent cyclic A/D converters** (Sprzętowo-programowa implementacja algorytmu estymacji inteligentnego cyklicznego przetwornika A/C), advisor: Zbigniew Jaworski, very good

[MSc14] Bartosz Piotr Potrykus, **Bridging faults in DSM CMOS circuits** (Zwarcia rezystywne w układach DSM CMOS), advisor: Andrzej Wielgus, very good

[MSc15] Jakub Pruk, **Research on the impact of temperature on the energy yield of a photovoltaic module** (Badanie wpływu temperatury na uzysk energetyczny modułu fotowoltaicznego), advisor: Stanisław Pietruszko, good

[MSc16] Tomasz Rogalski, **The analysis of 2 year performance of four photovoltaic systems made in different manufacturing technologies and various materials: copper indium di-selenide, amorphous silicon, crystalline silicon and silicon with heterojunction (HIT)** (Analiza wieloletniej pracy czterech systemów fotowoltaicznych wykonanych z di-selenku indowomiedziowego, krzemu z heterozłączem, krzemu monokrystalicznego oraz krzemu amorficznego), advisor: Michał Malinowski, good

[MSc17] Emil Piotr Rosłanowski, **Design of integrated battery voltage sensor** (Projekt scalonego czujnika stanu naładowania baterii), advisor: Witold Pleskacz, excellent

[MSc18] Marek Michał Sanaluta, **Characterization and optimization of a MEMS accelerometers settings for vibration measurements of mechanical structures components** (Charakteryzacja i optymalizacja ustawień akcelerometrów typu MEMS przeznaczonych do pomiarów wibracji wybranych podzespołów konstrukcji mechanicznych), advisor: Zbigniew Pióro, very good

[MSc19] Karol Sokolik, **Analysis and prospects of energy harvesting techniques for wireless sensor networks** (Analiza i perspektywy rozwoju sposobów pozyskiwania energii w bezprzewodowych sieciach czujnikowych), advisor: Zbigniew Pióro, excellent

[MSc20] Maciej Janusz Walasik, **Passive Optical Network - Network analysis and implementation** (Pasywna sieć optyczna - analiza i projekt łącza), advisor: Agnieszka Szymańska, very good

[MSc21] Piotr Wnuk, **Wireless sensor networks for the protection of cultural heritage** (Zastosowanie sieci WSN do ochrony dóbr kultury), advisor: Zbigniew Pióro, good

[MSc22] Michał Wszeborowski, **IC temperature sensor design in AMS 0,35 μm technology** (Scalony czujnik temperatury w technologii AMS CMOS 0,35 μm), advisor: Witold Pleskacz, very good

5.3. B.Sc. Degrees

[BSc1] Piotr Czaplejewicz, **Analyses of the 11-year performance of the photovoltaic system with thin-film amorphous silicon** (Analiza 11-letniej pracy systemu fotowoltaicznego z modułami cienkowarstwowymi z krzemu amorficznego), advisor: Stanisław Pietruszko, good

[BSc2] Adam Damian Damięcki, **Diamond layers for sensoring** (Warstwy diamentowe na potrzeby sensory ki), advisor: Piotr Firek, fairly good

[BSc3] Mariusz Derlecki, **Implementation of Intermediate Frequency circuit for Bluetooth receiver in UMC MOS 130 nm technology** (Implementacja toru pośredniej częstotliwości odbiornika Bluetooth w technologii UMC CMOS 130 nm), advisor: Witold Pleskacz, good

[BSc4] Maciej Jerzy Domosud, **Developing applications for the spectroscopic measurements of dielectric laser materials** (Opracowanie aplikacji do pomiarów spektroskopowych dielektrycznych materiałów laserowych), advisor: Marcin Piotr Kaczkan, good

[BSc5] Damian Drewulski, **High Dynamic Range technique in security systems** (Technika High Dynamic Range w systemach bezpieczeństwa), advisor: Marek Sutkowski, good

[BSc6] Patryk Fiutowski, **Processing of sequences of directional point clouds** (Przetwarzanie sekwencji kierunkowych chmur punktów), advisor: Piotr Garbat, good

[BSc7] Artur Fronk, **Methods of synchronous signal processing for microliquid optoelectronic sensors** (Metody synchronicznego przetwarzania sygnałów dla mikrocieczowych czujników optoelektronicznych), advisor: Michał Borecki, good

[BSc8] Bartosz Furman, **Biometric face identification system** (Biometryczny system identyfikacji twarzy), advisor: Marek Sutkowski, good

[BSc9] Łukasz Gęśla, **Design and implemantation of environment for WIMS' input data generation in high-level programming language for reactor Maria at Institute of Energy Atomic POLATOM** (Opracowanie i implementacja w języku wysokiego poziomu środowiska do generacji danych wejściowych dla programu obliczeń neutronowo-fizycznych WIMS dla reaktora Maria w Instytucie Energii Atomowej POLATOM), advisor: Arkadiusz Władysław Łuczyk, good

[BSc10] Marek Krzysztof Gumiński, **VHDL models of digital blocks implementing selected operations on fuzzy logic sets** (Modele VHDL bloków cyfrowych realizujących wybrane operacje na zbiorach rozmytych), advisor: Andrzej Wielgus, good

[BSc11] Łukasz Hołownia, **High Dynamic Range technique in security systems** (Technika High Dynamic Range w systemach bezpieczeństwa), advisor: Marek Sutkowski, good

[BSc12] Kosma Jędrzejewski, **Design and construction of sun-tracking system for photovoltaic systems** (Opracowanie kompletnego systemu nadążnego do systemów fotowoltaicznych), advisor: Michał Malinowski, good

[BSc13] Paweł Klata, **Analog-digital design using PSoC microsystem** (Projekt układu analogowo-cyfrowego z wykorzystaniem układu PSoC), advisor: Elżbieta Piwowarska, good

[BSc14] Agnieszka Anna Klimas, **Design and implementation of temperature controller system for helium cryostat** (Projekt i realizacja układu sterowania temperaturą kriostatu helowego), advisor: Marcin Piotr Kaczkan, good

[BSc15] Tomasz Korba, **Wireless communication system using Bluetooth technology** (System bezprzewodowej komunikacji z wykorzystaniem standardu Bluetooth), advisor: Arkadiusz Władysław Łuczyk, good

[BSc16] Patryk Józef Kotrasiński, **Implementation of basic standard cells for UMC CMOS 90 nm technology in accordance with DFM rules (**Implementacja prostych komórek standardowych dla technologii UMC CMOS 90 nm z uwzględnieniem reguł DMF), advisor: Arkadiusz Władysław Łuczyk, good

[BSc17] Beata Kowalska, **Selected problems of modeling charge carriers transport in the transistor VeSFET** (Wybrane problemy modelowania transportu nośników ładunku w tranzystorze VeSFET), advisor: Andrzej Pfitzner, good

[BSc18] Adrian Krysiński, **Thin-film transistors (TFT) with layers made with plasma enhanced chemical vapour deposition (PECVD) method** (Tranzystory cienkowarstwowe TFT z warstwami wytwarzanymi metodą chemicznego osadzania z fazy lotnej wspomaganego plazmą (PECVD)), advisor: Robert Paweł Mroczyński, very good

[BSc19] Michał Ksionek, **Technology of laser trimming thick film resistors** (Technologia laserowej korekcji rezystorów grubowarstwowych), advisor: Jerzy Kalenik, good

[BSc20] Jerzy Krzysztof Kurnik, **Web application for database management** (Aplikacja webowa do zarządzania bazą danych), advisor: Piotr Witoński, good

[BSc21] Patryk Lalik, **Project and programming of the vacuum furnace parameters control station** (Projekt i oprogramowanie stanowiska do kontroli parametrów pieca próżniowego), advisor: Ryszard Kisiel, very good

[BSc22] Krzysztof Madej, **Study on properties of the transistor VeSFET with self-heating effects** (Badanie właściwości tranzystora VeSFET z uwzględnieniem samodogrzewania), advisor: Andrzej Pfitzner, very good

[BSc23] Piotr Paweł Malec, **Hardware implementation of convolution operation** (Sprzętowa realizacja operacji splotu sygnałów), advisor: Zbigniew Jaworski, very good

[BSc24] Marcin Malinowski, **Project of driver for data transmitting in GSM network and ETHERNET** (Projekt sterownika do transmisji danych w sieci GSM oraz ETHERNET), advisor: Witold Pleskacz, very good

[BSc25] Bartosz Milewski, **Design and implementation of dual - gate FET mixer** (Projekt i realizacja mieszacza mikrofalowego z dwubramkowym tranzystorem FET), advisor: Bogdan Galwas, good

[BSc26] Jakub Łukasz Milewski, **Development of a micro-heater for use in sensors** (Opracowanie konstrukcji mikrogrzejnika do wykorzystania w czujnikach), advisor: Jerzy Kalenik, good

[BSc27] Karol Mrowiec, **Implementation of digital demodulator 13,56 MHz radio receiver in CMOS 90nm technology** (Implementacja cyfrowego demodulatora dla odbiornika radiowego 13,56 MHz w technologii CMOS 90nm), advisor: Witold Pleskacz, good

[BSc28] Hilary Musaringo, **Influence of the vacuum evaporation deposition process parameters on selected properties of deposited film layers** (Wpływ parametrów naparowania próżniowego na wybrane właściwości naniesionych warstw), advisor: Piotr Firek, good

[BSc29] Maria Teresa Obstawska, **Stereoscopic registration of static scene** (Rejestracja stereoskopowa sceny statycznej), advisor: Marek Sutkowski, good

[BSc30] Tomasz Oczkowski, **Analog to digital Flash converter design in 90nm technology** (Projekt przetwornika analogowo-cyfrowego w technologii 90 nm), advisor: Zbigniew Jaworski, good

[BSc31] Piotr Okrasa, **Research of transmission parameters in plastic optical fibers** (Badania parametrów transmisyjnych światłowodów polimerowych), advisor: Ryszard Piramidowicz, good

[BSc32] Maciej Patyński, **It network design in multi-branch company** (Projekt sieci teleinformatycznej w firmie wielooddziałowej), advisor: Agnieszka Szymańska, very good

[BSc33] Marek Józef Pettka, **Analysis of implementation possibilities for IPv6 protocol in enterprise network based on protocol IPv4** (Analiza możliwości wdrożenia protokołu IPv6 w sieci komputerowej przedsiębiorstwa działającej w oparciu o IPv4), advisor: Krzysztof Michał Madziar, very good

[BSc34] Marcin Piechocki, **Optical network project based on 100 Gbit Ethernet standard** (Projekt sieci optycznej opartej na standardzie 100 Gbit Ethernet), advisor: Agnieszka Szymańska, good

[BSc35] Kamil Piekoszewski, **Hardware implementation of wavelet transform for the diagnosis of heart problems - HDL model** (Sprzętowa realizacja transformaty falkowej dla potrzeb diagnostyki zaburzeń serca - model HDL), advisor: Elżbieta Piwowarska, good

[BSc36] Daniel Gracjan Pietroń, **Implementation of the Bluetooth receiver RF front-end in the CMOS-RF 130nm technology** (Implementacja toru wielkiej częstotliwości odbiornika Bluetooth w technologii CMOS-RF 130 nm), advisor: Witold Pleskacz, good

[BSc37] Jakub Mateusz Sokołowski, **Multitasking driver with programmable system on chip** (Wielokontekstowy sterownik programowalny wykorzystujący układ PSOC), advisor: Sławomir Szostak, good

[BSc38] Bartłomiej Stonio, **Etching of the aluminum nitride thin films** (Trawienie cienkich warstw azotku glinu), advisor: Piotr Firek, good

[BSc39] Paweł Strzelczyk, **Fuzzy flip-flop design in nanometer CMOS technology** (Projekt przerzutnika rozmytego w nanometrowej technologii CMOS), advisor: Andrzej Wielgus, very good

[BSc40] Bartosz Michał Swacha, **Analog circuits based on dual-gate transistors** (Układy analogowe oparte na tranzystorach dwubramkowych), advisor: Dominik Krzysztof Kasprowicz, good

[BSc41] Jerzy Andrzej Szałygin, **Simulation studies of a VeSFET transistor's characteristics , having regard to a distortions of the volume channel** (Badania symulacyjne charakterystyk tranzystora VeSFET z uwzględnieniem zaburzeń kształtu kanału objętościowego), advisor: Andrzej Pfitzner, good

[BSc42] Michał Szulowski, **Software for laboratory workstation dedicated to measurement of bipolar low power and low frequency transistor fB frequency based on the analysis of current amplification transfer characteristics** (Oprogramowanie laboratoryjnego stanowiska do wyznaczania częstotliwości ϕB tranzystorów bipolarnych małej mocy i małej częstotliwości poprzez analizę charakterystyki przenoszenia (wzmocnienia) prądowego), advisor: Józef Maciak, very good

[BSc43] Dariusz Tyszka, **Graphical interface for the scalar circuits analyzer** (Graficzny interfejs do skalarnego analizatora obwodów), advisor: Jerzy Skulski, good

[BSc44] Krzysztof Urbański, **Model of charge compensation in high-resistivity GaP** (Model kompensacji ładunkowej w wysokorezystywnym GaP), advisor: Antoni Siennicki, good

[BSc45] Hilekaan Fidelis Wada, **Software detecting plagiarism in integrated circuis' layouts** (Oprogramowanie wspomagające wykrywanie plagiatów topografii układów scalonych), advisor: Dominik Krzysztof Kasprowicz, good

[BSc46] Piotr Wiśniewski, **Electron mobility measurement methods in MOS transistors** (Metody pomiaru ruchliwości elektronów w tranzystorach MOS), advisor: Bogdan Majkusiak, excellent

[BSc47] Piotr Adam Wysokiński, **Operational amplifier design in 65 nm technology** (Projekt wzmacniacza operacyjnego w technologii 65 nm), advisor: Zbigniew Jaworski, very good

[BSc48] Jacek Zawistowski, **Detection, counting and movement analysis of people in space covered video surveillance** (Detekcja, zliczanie i analiza ruchu osób w pomieszczeniach monitorowanych wizyjnie), advisor: Piotr Garbat, good

[BSc49] Mateusz Zgierski, **Manipulating the threshold voltage in VeSFET transistors** (Sterowanie napięciem progowym tranzystorów VeSFET), advisor: Andrzej Pfitzner, excellent

6. PUBLICATIONS

6.1. Scientific and Technical Papers published in Journals Included in the ISI[1] Database

Number	Journal	Authors	Title	Volume	Pages
[Pub1]	Acta Physica Polonica A, Polish Academy of Sciences Institute of Physics	J.D.Fidelus, A.Karbowski, J.Grabis, A.Jusza, R.Piramidowicz, R.S.Brusa, G.P.Karwasz	Positron-Annihilation, Structural and Optical Studies on Properties of Nanostructured ZrO2, ZnO, Bi2O3 and ZnO-Bi2O3	Vol. 120 No 6-A	66-68
[Pub2]	Applied Physics B	M.Klimczak, R.Piramidowicz	UV-violet emission properties of $^2F(2)_{5/2}$ energy level of Nd^{3+} ions in ZBLAN glass	106	1019-1025
[Pub3]	Applied Surface Science	A.Domanowska, M.Miczek, R.Ucka, M.Matys, B.Adamowicz, J.Żywicki, A.Taube, K.Korwin-Mikke, S.Gierałtowska, M.Sochacki	Surface photovoltage and Auger electron spectromicroscopy studies of HfO_2/SiO_2/4H-SiC and HfO_2/Al_2O_3/4H-SiC structures	258	8354-8359
[Pub4]	Ferroelectrics	P.Korpas, Ł.Ysydus, J.Krupka	Automatic split post dielectric set-up for measurements of substrates and thin conducting and ferroelectric films	Vol. 434 No 1	113-120
[Pub5]	IEEE Electron Device Letters	A.Kamath, Z.Chen, N.Shen, N.Singh, G.Q.Dim-Lee Kwong, D.Kasprowicz, A.Pfitzner, W.Mały	Realizing and and or Functions With Single Vertical-Slit Field-Effect Transistor	Vol. 33, No 2	152-154
[Pub6]	Journal of Alloys and Compounds	Z.Boruc, B.Fetliński, M.Kaczkan, S.Turczyński, D.Pawlak, M.Malinowski	Temperature and anoncentration guenching of Tb^{3+} emissions in $Y_4Al_2O_9$ crystals	532	92-97
[Pub7]	Journal of Applied Physics	K.Grodecki, J.A.Błaszczyk, W.Strupiński, A.Wysmolek, R.Stępniewski, A.Drabińska, M.Sochacki, A.Dominiak, M.Baranowski	Pinned and unpinned epitaxial grapheme layers on SiC studied by Raman spectroscopy	Vol. 111 No 11	114307-10 114307-5
[Pub8]	Journal of Lightwave Technology	M.Śmietana, D.Brabant, W.J.Bock, P.Mikulic, T.Eftimov	Refractive-Index Sensing with Inline Core-Cladding Intermodal Interferometer Based on Silicon Nitride Nano-Coated Photonic Crystal Fiber	Vol. 30 No 8	1185-1189
[Pub9]	Journal of Lightwave Technology	M.Śmietana, W.J.Bock, P.Mikulic, J.Chen	Tuned pressure sensitivity of dual resonanto long-period gratings written in boron Co-doped optical fiber	Vol. 30 No 8	1080-1084
[Pub10]	Journal of Nanoscience and Nanotechnology	J.D.Fidelus, M.Barczak, K.Michalak, Z.Fekner, A.Dużyńska, A.Jusza, R.Piramidowicz, C.J.Monty, A.Suchocki	Microstructural and optical characterization of TiO_2 doped with ytterbium synthesized by sol-gel and solar physical vapor deposition process	Vol. 12 No 5	3760-3766
[Pub11]	Journal of Physics Condensed Matter	A.Lazarowska, S.Mahlik, M.Krosnicki, M.Grinberg, M.Malinowski	Pressure-induced phase transition in $LiLuF_4:Pr^{3+}$ investigated	24	115502 9pp
[Pub12]	Liquid Crystals	M.Olifierczuk, R.Kowerdziej, L.Jaroszewicz, M.Czerwiński, J.Parka	Numerical analysis of THz metamaterial with high birefringence liquid crystal	Vol. 39, No 6	739-744
[Pub13]	Liquid Crystals	P.Perkowski, M.Mrukiewicz, K.Garbat, M.Laska, U.Chodorow, W.Piecek, R.Dąbrowski, J.Parka	Precise dielectric spectroscopy of a dual-frequency nematic mixture over a broad temperaturę range	Vol. 39, No 10	1237-1242

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[Pub14]	Liquid Crystals	R.Kowerdziej, M.Olifierczuk, B.Salski, J.Parka	Tunable Negative Index Metamaterial Employing in-Plane Switching Mode at Terahertz Frequencies	Vol. 39, No 7	827-831
[Pub15]	Materials Science and Engineerig B	K.Król, M.Kalisz, M.Sochacki, J.Szmidt	The influence of oxygen ambient annealing, conditions on the quality of Al/SiO_2/n-type 4H-SiC MOS structure	Vol. 177 No 15	1314-1317
[Pub16]	Materials Science and Engineering B	A.Taube, R.Mroczyński, K.Korwin-Mikke, S.Gierałtowska, J.Szmidt, A.Piotrowska	Effect of the post-deposition annealing on electrical characteristics of MIS structures with HfO2/SiO2 gate dielectric stacks	Vol. 177 No 15	1281-1285
[Pub17]	Microelectronics Engineering	M.Kalisz, R.Mroczyński	Specific features of silicon surface region fluorination by RIE in r.f. CF_4 plasma – A novel method for improving the electrical properties of thin PECVD silicon oxide films	94	1-6
[Pub18]	Microelectronics Reliability	P.Sałek, L.Łukasiak, A.Jakubowski	New threshold voltage definition for undoped symmetrical DG MOSFET	52	294-295
[Pub19]	Microelectronics Reliability	R.Mroczyński, R.B.Beck	Reliability issues of double gate dielectric stacks based on hafnium dioxide (HfO_2) layers for non-volatile semiconductor memory (NVSM) applications	52	107-111
[Pub20]	Molecular Crystals and Liquid Crystals	U.Chodorow, J.Parka, K.Garbat, N.Pałka, K.Czupryński, L.Jaroszewicz	Spectral properties of nematic liquid crystal mixtures composed with long and short molecules in THz frequency range	561	74-81
[Pub21]	Optical Materials	K.Anders, A.Jusza, M.Baran, L.Lipińska, R.Piramidowicz	Emission properties of polymer composites doped with Er^{3+}:Y_2O_3 nanopowders	34	1964-1968
[Pub22]	Optical Materials	Z.Boruc, B.Fetliński, M.Malinowski, S.Turczyński, D.Pawlak	Optical transitions intensities of Dy^{3+}:$Y_4Al_2O_9$ crystals	No 34	2002-2007
[Pub23]	Optics Express	T.Kozacki, G.Finke, P.Garbat, W.Zaperty, M.Kujawińska	Wide angle holographic display system with spatiotemporal	Vol. 20, No 25	27473-27481
[Pub24]	Optics Letters	G.Carpintero, E.Rouvalis, K.Ławniczuk, M.Fice, C.Renaud, X.J.M.Leijtens, E.A.J.M.Bente, M.Chitoui, F.Van Dijk, A.J.Seeds	95-Ghz millimeter wave signal generation using an arrayed waveguide grating (AWG) dual wavelength semiconductor laser	Vol. 37 No 11	3657-3659
[Pub25]	Optics Letters	Z.Boruc, M.Kaczkan, B.Fetliński, S.Turczyński, M.Malinowski	Blue emission in Dy^{3+} doped $Y_4Al_2O_9$ crystals for temperature sensing	Vol. 37 No 24	5214-5216
[Pub26]	Opto-Electronics Review	A.Mossakowska-Wyszyńska	Modulation bandwidth of planar waveguide laser with 1D photonic crystal mirrors	Vol. 20 No 4	340-346
[Pub27]	Opto-Electronics Review	P.Garbat, W.Skarbek, M.Tomaszewski	Structured light camera calibration	Vol. 21, No 1	23-28
[Pub28]	Phase Transitions	U.Chodorow, J.Parka, K.Garbat, N.Pałka, K.Czupryński	Spectral investigation of nematic liquid crystals with high optical anisotropy at THz frequency range	85	337-344
[Pub29]	Progress in Electromagnetics Research - PIER	M.Koba, P.Szczepański	The threshold mode structure analysis of the two-dimensional photonic crystal lasers	125	365-389
[Pub30]	Przegląd Elektrotechniczny	A.Krysiński, A.Taube, K.Gołaszewska, M.Śmietana, R.Mroczyński, J.Szmidt	Technologia i charakteryzacja struktur tranzystorów cienkowarstwowych (TFT)	11b	1-5

[Pub31]	Przegląd Elektrotechniczny	M.Szymańska, R.Mroczyński, M.Kalisz	Charakteryzacja warstw azotku krzemu (SiN_x) wytwarzanego metodą PECVD dla zastosowań w przyrządach M(O)EMS	11b	25-28

6.2. Scientific and Technical Papers Published in Journals not Included in the ISI Database

Number	Journal	Authors	Title	Volume	Pages
[Pub32]	Elektronika	A.Kociubiński, M.Kozicki, M.Borecki, J.Kalenik	Analiza układu lokalnego ogrzewania próbki cieczy o nanolitrowej objętości w wieloparametrycznych czujnikach kapilarnych	9	91-94
[Pub33]	Elektronika	A.Taube, M.Sochacki, J.Szmidt	Symulacje i modelowanie zaawansowanych struktur tranzystorów HEMT AIGaN/GaN	9	37-40
[Pub34]	Elektronika	A.Taube, M.Sochacki, J.Szmidt	Symulacje i modelowanie tranzystorów HEMT AlGaN/GaN – wpływ przewodności cieplnej podłoża	9	33-36
[Pub35]	Elektronika	K.Król, M.Kalisz, M.Sochacki J.Szmidt	Wpływ procesu wygrzewania w atmosferze O_2 i N_2O na właciwości warstwy przejściowej dielektryk/półprzewodnik w kondensatorach MOS Al./SiO_2/4H-SiC	9	22-25
[Pub36]	Elektronika	M.Borecki, J.Kalenik, P.Pszczółkowski, E.Ciupa, M.Duk, M.L.Korwin-Pawłowski, J.Frydrych	Wieloparametryczna klasyfikacja właściwości użytkowych biopaliw ciekłych – głowica współpracująca z optrodami kapilarnymi	9	56-60
[Pub37]	Elektronika	M.Kalisz, R.Mroczyński	Enhancement of immunity on MeV electron radiation of MOS structures by means of fluorine implantation from r.f. plasma	9	82-84
[Pub38]	Elektronika	M.Mroczkowski, M.Cież, J.Kalenik	Investigation of multiple degradation and rejuvenation cycles of electroluminescent thick film structures	1	39-40
[Pub39]	Elektronika	M.Śmietana, W.J.Bock, P.Mikulic	Sterowanie odpowiedzią czujników opartych na światłowodowych siatkach długookresowych (LPG) poprzez zastosowanie cienkich pokryć	11	23-25
[Pub40]	Elektronika	P.Gdula, K.Welikow, R.Buczyński, P.Szczepański, R.Piramidowicz	Światłowody mPOF do zastosowań telekomunikacyjnych	11	29-32
[Pub41]	Elektronika	R.Kisiel, Z.Szczepański, P.Firek, M.Guziewicz, A.Krajewski	Mechanical and thermal properties of SiC – ceramics substrate interface	1	48-50
[Pub42]	Elektronika	R.Kruszka, K.Gołaszewska, A.Taube, Z.Sidor, M.Borysiewicz, Z.R.Żytkiewicz, E.Kamińska, A.Piotrowska	Kontrolowane trawienia plazmą BCI_3/Ar cienkich warstw AlGaN dla technologii tranzystorów HEMT AlGaN/GaN	9	19-24
[Pub43]	Elektronika	T.Osuch, K.Jędrzejewski, L.Lewandowski, K.Anders, P.Gdula, R.Piramidowicz	Charakteryzacja światłowodowych siatek Bragga metodą reflektometrii optycznej w dziedzinie częstotliwości	11	17-20
[Pub44]	Elektronika	Z.Szczepański, M.Borecki, D.Szmigiel, M.L.Korwin-Pawłowski	Design and realization of microfluidic capillary sensor based on a silicon structure and disposable optrodes	1	28-30
[Pub45]	Forum Akademickie	J.Woźnicki	15 lat KRASP. Dorobek jubilatki	5	25-27

[Pub46]	Journal of Materials Science and Engineering A	T.Ciuk, J.Krupka, C.Jastrzębski, J.Judek, W.Strupiński, S.Butun, E.Ozbay, M.Zdrojek	Contactless magnetoresistance in large area epitaxial grapheme grown on SiC substrates	Vol. 2 No 7	489-493
[Pub47]	Liberales – Zeszyty Naukowe Akademii Humanistycznej im. Aleksandra Gieysztora	J.Woźnicki	Romantyzm rektorów uczelni niepublicznych 1990 - 2010	No 1-2 (8-9)	243-247
[Pub48]	Materials Science Forum	E.Tymicki, K.Grasza, K.Racka, T.Łukasiewicz, M.Piersa, K.Kościewicz, D.Teklińska, R.Diduszko, P.Skupiński, R.Jakieła, J.Krupka	Effect of nitrogen doping on the growth of 4H polytype on the 6H-SiC seed by PVT method	717-720	29-32
[Pub49]	Mikroniek	R.Piramidowicz, S.Stopiński, K.Ławniczuk, P.Szczepański, X.J.M.Leijtens, M.K. Smit	A new approach to laser technology	Vol. 52 No 6	30-36
[Pub50]	Nauka	J.Woźnicki	Nowa dyscyplina – „nauki o polityce publicznej” usytuowana w dziedzinie nauk społecznych	1	133-151
[Pub51]	Ochrona przed korozją	M.Kalisz, M.Grobelny, R.Mroczyński	Wpływ ultrapłytkiej implantacji azotu na właściwości antykorozyjne powłok tlenkowych SiO2 wytwarzanych metodami plazmowymi PECVD na topie magnezu AZ91	5	262-265
[Pub52]	Photonics Letters of Poland	M.Kujawińska, G.Finke, P.Garbat, C.Faldorf, B.M.Hennelly	Wide angle digital holographic interferometry with real-time optical reconstruction	Vol. 2 No 2	48-50
[Pub53]	Polimery	P.Łoś, A.Łukomska, S.Kowalska, R.Jeziórska, J.Krupka	Właściwości kompozytów polimerowych z udziałem proszków lub płatków midzi jako napełniaczy	Vol. 57 No 5	338-346
[Pub54]	Przegląd Telekomunikacyjny-Wiadomości Telekomunikacyjne, SIGMA NOT	P.Szczepański, R.Piramidowicz, K.Welikow, M.Bugaj, P.Zwierko	System dostępowy GEPON na potrzeby Internetu Przyszłości	Vol. LXXXV No 8-9	1458-1468
[Pub55]	Przegląd Telekomunikacyjny-Wiadomości Telekomunikacyjne, SIGMA NOT	P.Szczepański, R.Piramidowicz, K.Welikow, S.Stopiński	Rozwój generycznej technologii wytwarzania fotonicznych układów scalonych na platformie fosforku indu (InP)	Vol. LXXXV No 8-9	1245-1252
[Pub56]	Solid State Phenomena	A.Łaszcz, A.Czerwiński, J.Ratajczak, A.Taube, S.Gierałtowska, A.Piotrowska, J.Kącki	Study of oxides formed in HfO2/Si structure for high-k dielectric applications	186	78-81

6.3. Scientific and Technical Papers Published in Conference Proceedings

Number	Conference	Authors	Title	City, Country	Pages
[Pub57]	7th Microwave Materials and their Applications MMA 2012, June 3- 6	P.Korpas, Ł.Usydus, J.Krupka	Split post dielectric measurement set-up for every microwave laboratory	Taipei, Taiwan	1
[Pub58]	13th International Conference on Plasma Surface Engineering, September 10-14	P.Firek, B.Stonio, R.Chodun, J.Szmidt, K.Zdunek	Plasma eatching of aluminium nitride thin films prepared by magnetron sputtering method	Garmisch-Partenkirchen, Germany	1-4

[Pub59]	15th International Workshop on Computational Electronics IWCE 2012, May 22-25	A.Mazurak, B.Majkusiak	WKB approximation based formula for tunneling probability through a multilayer potential barrier	Madison, USA	139-140
[Pub60]	17th Workshop on Dielectric in Microelectronics WoDiM 2012, June 25-27	B.Majkusiak, J.Jasiński	Small-signal admittance model as a characterization tool of the MOS diode	Dresden, Germany	2
[Pub61]	19th International Conference Mixed Design of Integrated Circuits and Systems MIXDES 2012, May 24-26	M.Brzeziński, T.Pomorski	A 6-bit 122 MS/s digital-to-analog converter for contactless applications in CMOS 90 nm technology	Warsaw, Poland	549-554
[Pub62]	19th International Conference Mixed Design of Integrated Circuits and Systems MIXDES 2012, May 24-26	K.Siwiec	Crystal oscillator with dual amplitude stabilization feedback loop	Warsaw, Poland	231-234
[Pub63]	19th International Conference Mixed Design of Integrated Circuits and Systems MIXDES 2012, May 24-26	M.Teodorowski, W.A. Pleskacz, T.Takeshian, T.Pomorski	Programmable gain amplifier for 13.56 MHz radio receiver in CMOS 90 nm technology	Warsaw, Poland	564-569
[Pub64]	19th International Conference Mixed Design of Integrated Circuits and Systems MIXDES 2012, May 24-26	A.Grodzicki	Switched capacitor low noise voltage converter design strategies in 90 nm CMOS process	Warsaw, Poland	570-573
[Pub65]	19th International Conference on Microwaves, Radar and Wireless Communications MIKON-2012, May 21-23	K.Madziar, B.Galwas	Characterization of analog optical links and their applications in microwave oscillators	Warsaw, Poland	337-342
[Pub66]	19th International Conference on Microwaves, Radar and Wireless Communications MIKON-2012, May 21-23	P.Korpas, W.Wojtasiak, J.Krupka, W.Gwarek	Inexpensive approach to dielectric measurements	Warsaw, Poland	154-157
[Pub67]	19th International Conference on Microwaves, Radar and Wireless Communications MIKON-2012, May 21-23	J.Krupka, Ł.Usydus, H.Kołtuniak	Sheet resistance and conductivity measurements of rough surface of metals on printed circuit boards and metalized ceramic substrates	Warsaw, Poland	149-153
[Pub68]	22nd International Traveling Summer School on Microwaves and Lightwaves, July 7-13	B.Galwas, F.Giannini	International Summer Schools on Microwaves and Lightwaves – The common successful initiative of the European universites	Třešť Castle, Czech Republic	1059-1062
[Pub69]	22nd SPIE International Conference on Optical Fiber Sensors OFS2012, October 15–19	M.Śmietana, W.J.Bock, P.Mikulic	Effect of high temperature on the properties of long-period gratings written in non-hydrogenated fibers with UV and electric arc	Beijing, China	84214l-1 – 84214l-4
[Pub70]	24th Symposium IS&T/SPIE on Electronic Imaging 2012, Three-Dimensional Image Processing (3DIP) and Applications, January 22-26	P.Garbat	3D multimodal data fusion system	Burlingame, California, USA	829010-1 – 829010-6
[Pub71]	24th Symposium on Electronic Imaging IS&T/SPIE, January 22-26	K.Garbat, P.Garbat, L.Jaroszewicz	Liquid crystal materials structures for image processing and 3D shape acquisition	Burlingame, California, USA	82901B-1 – 82901B-7

[Pub72]	35th International Spring Seminar on Electronics Technology ISSE 2012, May 9-13	R.Kisiel, Z.Szczepański, P.Firek, J.Grochowski, M.Myliwiec, M.Guziewicz	Silver Micropowders as SiC Die Attach Material for High Temperature Applications	Bad Ausse, Austria	144-148
[Pub73]	BIT's 2nd Annual World Congress of Nano Sciences and Technologies, October 25-28	P.Szczepański, M.Koba	Modeling of light generation in 2-D photonic crystal lasers	Qingdao, China	
[Pub74]	Conferences SPIE: Photonics Europe 2012, April 16-19	A.Tyszka-Zawadzka, P.Szczepański, M.Karpierz, A.Mossakowska-Wyszyńska, M.Bugaj	Approximate model of a DBR/F-P laser based on Raman effect in a silicon-on-insulator rib waveguide	Brussels, Belgium	84311X-1 – 84311X-10
[Pub75]	Conferences SPIE: Photonics Europe 2012, April 16-19	A.Filipkowski, P.Gdula, D.Pysz, K.Harasny, A. J.Waddie, R.Stępień, K.Borzycki, R.Piramidowicz, R.Buczyński, M. R.Taghizadeh, K.Welikow	Development of large core microstructured polymer optical fiber	Brussels, Belgium	842616-1 – 842616-7
[Pub76]	Conferences SPIE: Photonics Europe 2012, April 16-19	K.Andres, P.Florczyk, R.Stępień, D.Pysz, R.Piramidowicz	Erbium doped low phonon glasses for application in up-conversion fiber lasers	Brussels, Belgium	84260L-1 – 84260L-7
[Pub77]	Conferences SPIE: Photonics Europe 2012, April 16-19	W.Kamiński, J.Kęsik, P.Warda	Influence of noble gas additions on the output power of krypton ion laser	Brussels, Belgium	84331L-1 – 84331L-9
[Pub78]	Conferences SPIE: Photonics Europe 2012, April 16-19	W.Kamiński, J.Kasprzak, J.Kęsik, P.Warda	Ion argon-krypton for medical applications	Brussels, Belgium	84331K-1 – 84331K-8
[Pub79]	Conferences SPIE: Photonics Europe 2012, April 16-19	A.Jusza, L.Lipińska, M.Baran, P.Mergo, A.Millan, F.Dieleman, R.Piramidowicz	Luminescent properties of plymer nanocomposites activated with praseodymium doped nanocrystals	Brussels, Belgium	84351T-1 – 84351T10
[Pub80]	Conferences SPIE: Photonics Europe 2012, April 16-19	K.Welikow, P.Gdula, P.Szczepański, R.Buczyński, R.Piramidowicz	Microstructured plastic optical fibers for applications in FTTH systems	Brussels, Belgium	84261A-1 – 84261A-8
[Pub81]	Conferences SPIE: Photonics Europe 2012, April 16-19	P.Polis, A.Jusza, K.Anders, A.Jastrzębska, A.Olszyna, J.Jureczko, W.Fabianowski, A.Kunicki, R.Piramidowicz	Synthesis and characterization of RE^{3+}:Al_2O_3 nanopowders for application in the polymer based composite light source	Brussels, Belgium	84352A-1 – 84352A-8
[Pub82]	Conferences SPIE: Photonics Europe 2012, April 16-19	A.Jusza, K.Anders, A.Jastrzebska, P.Polis, A.Olszyna, J.Jureczko, W.Fabianowski, A.Kunicki, R.Piramidowicz	Synthesis and characterization of RE3+:Al2O3 nanopowders for application in the polymer based composite light sources	Brussels, Belgium	84352A-1 – 84352A-8
[Pub83]	Congress Advanced Photonics and Conference Speciality Optical Fibers & Applications, June 17-21	M.Koba, P.Szczepański	Threshold nad above threshold analysis of two-dimension square lattice index and gain coupled photonic crystal laser with transverse magnetic polarization	Colorado Springs, USA	

[Pub84]	ICFCCT 2012 – International Conference on Future Communication and Computer Technology, May 19-20	M.Baszun, B.D.Czejdo, Ł.Kuc	Tesbed system for soft computing with neural networks	Beijing, China	5-9
[Pub85]	IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems DDECS 2012, April 18-20	A.Pfitzner	Keynote III – Vertical slit stransistor based integrated circuits (V eSTICs)	Tallin, Estonia	3
[Pub86]	IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems DDECS 2012, April 18-20	K.Marcinek, W.A.Pleskacz	AGATE – toward desining a low-power chip multireading processor for mobile software defined radio systems	Tallin, Estonia	26-29
[Pub87]	IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems DDECS 2012, April 18-20	K.Siwiec, T.Borejko, A.W.Pleskacz	LC-VCO design automation tool for nanometer CMOS technology	Tallin, Estonia	68-73
[Pub88]	IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems DDECS 2012, April 18-20	J.Grądzki	Low power balun design for 1.575 GHz in 90 nm CMOS technology	Tallin, Estonia	250-253
[Pub89]	II Photonics Society of Poland Symposium (c/o OPTON 2012), May 15-16	A.Mossakowska-Wyszyńska, K.Leśniewska-Matys, B.Salski	Dynamic Operation of 2D PC Phased Array Membrane Laser	Katowice, Poland	1
[Pub90]	International Conference IEEE Sensors 2012, October 28-31	M.Śmietana, W.J.Bock, P.Mikulic, J.Chen	Highly Sensitive Pressure Sensor based on Cascaded Long-period Gratings	Taipei, Taiwan	522-525
[Pub91]	International Conference on Solid-state and Integrated Circuit – ICSIC 2012, October 29-November 1	A.Kamath, Z.Chen, N.Shen, X.Li, N.Singh, G.-Q.Lo, D.L.Kwong, D.Kasprowicz, A.Pfitzner, W.Mały	Logic functionality in Vertical Slit Field effect transistor (Vesfet)	Singapore, China	Vol. 32, 84-87
[Pub92]	International Conference on Solid-state and Integrated Circuit – ICSIC 2012, October 29-November 1	Z.Chen, A.Kamath, N.Singh, N.Shen, X.Li, G.Lio, D.Kwong, D.Kasprowicz, A.Pfitzner, W.Maly	N-channel Junction-less Vertical Slit Field-Effect Transistor (VeSFET): Fabrication-based Feasibility assessment	Singapore, China	Vol. 32, 96-100
[Pub93]	International Microwave Syposium IMS 2012, June 17-22	J.Krupka, W.Gwarek, P.Korpas, W.Wojtasiak	Precise dielectric measurement set-up for every microwave laboratory	Montreal, Canada	1
[Pub94]	International Microwave Syposium IMS 2012, June 17-22	J.Krupka	Substrate measurements with split post dielectric resonator	Montreal, Canada	1
[Pub95]	International Topical Meeting on Microwave Photonic, September 11-14	G.Carpintero, E.Rouvalis, K.Ławniczuk, F.Van Dijk, M.Chtioui, C.C.Renaud, X.Leijtens, E.Bente, A.Seeds	Milimeter-wave signal generation by optical heterodyne of two channels from an arrayed waveguide grating-based multi-wavelength laser	Noordwijk, The Netherlands	51-54
[Pub96]	Konferencja ITC Young 2012, May 26-27	B.Majkusiak, D.Taunous	Modelowanie charakterystyk prądowo-napięciowych diody tunelowej metal-Izolator-półprze-wodnik z pływającą bramką	Gdańsk, Poland	321-327

[Pub97]	Krajowe Sympozjum Telekomunikacji i Teleinformatyki, September 12-14	P.Szczepański, R.Piramidowicz, K.Welikow, S.Stopiński, M.K.Smit, X.J.M.Leijtens	Rozwój generycznej technologii wytwarzania fotonicznych układów scalonych na platformie fosforku indu (InP)	Warsaw, Poland	1
[Pub98]	Krajowe Sympozjum Telekomunikacji i Teleinformatyki, September 12-14	P.Szczepański, P.Zwierko, R.Piramidowicz, P.Gdula, K.Welikow, M.Bugaj	System dostępowy GEPON na Potrzeby Internetu Przyszłości	Warsaw, Poland	1
[Pub99]	Procedia Engineering – proceedings of 26th European Conference on Solid-State Transducers, EUROSENSOR 2012, September 9-12	M.Śmietana, J.Grochowski, M.Myliwiec, Ł.Wachnicki, M.Godlewski, B.Witkowski	Compact alcohol vapor sensor based on zinc oxide nano-coating deposited by Atomic Layer Deposition method on optical fiber end-face	Cracow, Poland	No 47, 1081-1084
[Pub100]	Procedia Engineering – proceedings of 26th European Conference on Solid-State Transducers, EUROSENSOR 2012, September 9-12	M.Śmietana, F.A.Oyono, J.Grabarczyk, J.Szmidt	Refractive index sensitivity of a polymer-clad silica optical fiber structure effectively tuned by plasma deposited diamond-like carbon nano-coating	Cracow, Poland	No 47, 1037-1040
[Pub101]	X Sympozjum Techniki Laserowej, September 24-28	W.Kamiński, P.Warda, J.Kasprzak, J.Kęsik, S.Jonak	Analiza możliwości zastosowania jonowego lasera argonowo-kryptonowego jako źródła promieniowania laserowego do celów medycznych	Świnoujście, Poland	137
[Pub102]	X Sympozjum Techniki Laserowej, September 24-28	W.Kamiński, J.Kęsik, P.Warda	Analiza zjawiska konkurencji międzyliniowej w gazowych laserach jonowych	Świnoujście, Poland	95
[Pub103]	X Sympozjum Techniki Laserowej, September 24-28	A.Jusza, K.Welikow, K.Anders, P.Gdula, S.Stopiński	Bezstratny dzielnik sygnałów optycznych wykonany w technologii fotoniki scalonej	Świnoujście, Poland	120
[Pub104]	X Sympozjum Techniki Laserowej, September 24-28	M.Nakielska, A.Wajler, K.Leśniewska-Matys, A.Kozłowska, D.Podniesiński, K.Anders, T.Kordzi, R.Piramidowicz	Charakteryzacja ceramiki Co:$MgAl_2O_4$ przeznaczonej do zastosowań laserowych	Świnoujście, Poland	94
[Pub105]	X Sympozjum Techniki Laserowej, September 24-28	R.Piramidowicz, P.Szczepański, M.Smit	Fotoniczne układy scalone – nowa ścieżka rozwoju techniki laserowej	Świnoujście, Poland	22
[Pub106]	X Sympozjum Techniki Laserowej, September 24-28	A.Jusza, L.Lipińska, M.Baran, P.Mergo, P.Polis, R.Piramidowicz	Kompozytowe źródła światła białego na bazie polimerów z nanokrystalitami domieszkowanymi jonami RE^{3+}	Świnoujście, Poland	119
[Pub107]	X Sympozjum Techniki Laserowej, September 24-28	R.Piramidowicz, K.Anders, M.Malinowski	Lasery i wzmacniacze światłowodowe – wybrane aspekty materiałowe i aplikacyjne	Świnoujście, Poland	24
[Pub108]	X Sympozjum Techniki Laserowej, September 24-28	A.Tyszka-Zawadzka, P.Szczepański, A.Mossakowska-Wyszyńska, M.Karpierz, M.Bugaj	Model generacji promieniowania w falowodowym ramonowskim laserze DBR/F-P wykonanym w technologii krzemowej	Świnoujście, Poland	118
[Pub109]	X Sympozjum Techniki Laserowej, September 24-28	K.Czyż, K.Anders, P.Gdula, P.Witoński, R.Piramidowicz	Modelowanie i badanie parametrów włóknowego lasera iterbowego	Świnoujście, Poland	109

[Pub110]	X Sympozjum Techniki Laserowej, September 24-28	K.Anders, P.Witoński, R.Piramidowicz	Modelowanie parametrów akcji laserowej w erbowym laserze włóknowym z konwersją wzbudzenia	Świnoujście, Poland	108
[Pub111]	X Sympozjum Techniki Laserowej, September 24-28	P.Gdula, K.Welikow, K.Anders, A.Jusza, S.Stopiński, K.Ławniczuk, P.Szczepański, R.Piramidowicz	Nadajniki telekomunikacyjne w technologii fotoniki scalonej	Świnoujście, Poland	121
[Pub112]	X Sympozjum Techniki Laserowej, September 24-28	M.Koba, T.Osuch, P.Szczepański	Progowy model generacji promieniowania w laserach posiadających ośrodek aktywny w postaci kryształu fotonicznego o symetrii kwadratowej	Świnoujście, Poland	117
[Pub113]	X Sympozjum Techniki Laserowej, September 24-28	W.Kamiński, J.Kęsik, P.Warda, S.Jonak	Zmiana wartości mocy promieniowania laserów jonowych w obecności domieszek gazów buforowych – analiza zjawiska	Świnoujście, Poland	96
[Pub114]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	A.Kociubiński, M.Borecki, M.Kozicki, J.Kalenik	Analiza układu lokalnego ogrzewania próbki cieczy o nanlitrowej objętości w wielo-parametrycznych czujnikach kapilarnych	Darłowo, Poland	53
[Pub115]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	P.Szczepański, R.Piramidowicz, K.Welikow, K.Ławniczuk, M.K.Smit, X.J.M.Leijtens	Koncepcja technologii generycznej w fotonice. Nowe Centrum Projektowania Fotonicznych Układów Scalonych w obszarze Europy Środkowo-Wschodniej	Darłowo, Poland	1-6
[Pub116]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	R.Kruszka, K.Gołaszewska, A.Taube, Z.Sidor, B.Borysiewicz, Z.R.Żytkiewicz, E.Kamińska, A.Piotrowska	Kontrolowane trawienia plazmą BCl_3/Ar cienkich warstw AlGaN dla technologii tranzystorów HEMT AlGaN/GaN	Darłowo, Poland	164
[Pub117]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	A.Jakubowski, L.Łukasiak	Od siarczku srebra do grafenu, czyli jak półprzewodniki trafiły pod strzechy	Darłowo, Poland	21
[Pub118]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	A.Taube, M.Sochacki, J.Szmidt	Symulacje i modelowanie tranzystorów HEMT AlGaN.GaN – wpływ przewodności cieplnej podłoża	Darłowo, Poland	170
[Pub119]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	A.Taube, M.Sochacki, J.Szmidt	Symulacje i modelowanie zaawansowanych struktur tranzystorów HEMT AlGaN/GaN	Darłowo, Poland	171
[Pub120]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	A.Krysiński. ATaube, K.Gołaszewska, M.Śmietana, R.Mroczyński, J.Szmidt	Technologia i charakteryzacja struktur tranzystorów cienkowarstwowych (TFT)	Darłowo, Poland	49
[Pub121]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	K.Król, M.Kalisz, M.Sochacki, J.Szmidt	The influence of post-oxidation annealing process in O_2 and N_2O on the quality of Al/SiO_2/n-type 4H-SiC MOS interface	Darłowo, Poland	165
[Pub122]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	M.Borecki, J.Kalenik, P.Przyczółkowski, E.Ciupa, M.Korwin-Pawłowski, J.Frydrych	Wieloparametryczna klasyfikacja właściwożytkowych biopaliw ciekłych – głowica współpracująca z optrodami kapilarnymi	Darłowo, Poland	147

[Pub123]	XI Krajowa Konferencja Elektroniki KKE 2012, June 11-14	M.Kalisz, R.Mroczyński	Wzrost odporności struktur testowych MOS na promieniowanie wysokoenergetycznymi elektronami w wyniku modyfikacji obszaru granicznego SiO_2/Si we fluorowej plazmie wysokiej częstotliwości	Darłowo, Poland	50
[Pub124]	XII Konferencja Uniwersytet Wirtualny Model, Narzędzie, Praktyka, June 13-15	K.Madziar	E-LAB: Laboratorium Techniki Mikrofalowej i Optofalowej	Warsaw, Poland	1-20
[Pub125]	XXI Europhysics Conference On Atomic And Molecular Physics Of Ionized Gases ESCAMPIG, July 10-14	W.Kamiński, J.Kęsik, P.Warda	Influence of neon and argon admixtures on laser generation conditions of krypton ion lasers	Viana Castelo, Portugal	1-2

6.4. Scientific and Technical Books

Number	Authors	Publisher	Title, volume, pages
[Pub126]	P.Firek, J.Jasiński, M.Śmietana, J.Szmidt	Wydawnictwo Uczelniane Politechniki Koszalińskiej	Microelectronic Materials and Technologies: The influence of wire bonding on electric characteristics of MIS/ISFET structures, Vol.1, pp. 98-108
[Pub127]	P.Firek, H.Musaringo, J.Szmidt	Wydawnictwo Uczelniane Politechniki Koszalińskiej	Microelectronic Materials and Technologies: Properties of contacts and wire bonding for new generation of hydrogen and hydrogen compounds sensor, Vol.1, pp. 162-173
[Pub128]	M.Guziewicz, M.Wzorek, R.Kisiel	Wydawnictwo Uczelniane Politechniki Koszalińskiej	Microelectronic Materials and Technologies: Multilayer metalization for SiC die assembly and wire bonding, Vol.1, pp. 71-80
[Pub129]	R.Kisiel	Wydawnictwo BTC	Podstawy technologii montażu dla elektronikiów – wydanie II, pages 222
[Pub130]	R.Kisiel, Z.Szczepański	Wydawnictwo Uczelniane Politechniki Koszalińskiej	Microelectronic Materials and Technologies: Low tempereture sintering with the use of silver microparticles – designed assembly stand and process steps, Vol.1, pp. 51-59
[Pub131]	M.Koba, P.Szczepański	INTECH Open Science/ Open minds	Photonic Crystals – Introduction, Applications and Theory: Coupled mode of photonic crystal lasers, chapter 14, pp. 291-318
[Pub132]	R.Krenz, K.Wesołowski, P.Szczepański, P.Gdula, K.Welikow, R.Piramidowicz, P.Zwierko, M.Natkaniec	Oficyna Wydawnicza Politechniki Warszawskiej	Inżynieria Internetu Przyszłości – część I: Koncepcja systemów dostępowych do Internetu Przyszłości, pp. 27-36
[Pub133]	B.Salski, K.Leśniewska-Maty, P.Szczepański	INTECH Open Science/ Open minds	Photonic crystals – Innovative Systems, Lasers and Waveguides: On the Applicability of Photonic Crystal Membrans to Multi-Channel Propagation, chapter 7, pp. 97-122
[Pub134]	J.Woźnicki	Oficyna Wydawnicza Politechniki Warszawskiej	Benchmarking w systemie szkolnictwa wyższego. Wybrane problemy: Studia w strategiach uczelnianych, pp. 5-22
[Pub135]	J.Woźnicki	Wolters Kluwer Polska Sp. z o.o.	Kariera naukowa w Polsce. Warunki prawne, społeczne i ekonomiczne, pp.15-21
[Pub136]	J.Woźnicki	Wydawnictwa Uniwersytetu Warszawskiego	Rektorzy pro publico bono: Wkład rektorów w koncepcje rozwojowe szkolnictwa wyższego, pp. 8-13

7. PATENTS

[Pat1] J. Fidelus, R. Piramidowicz, K. Anders, A. Jusza, **Luminescent composite based on PDMS and method for producing a luminescent composite based on PDMS** (Kompozyt luminescencyjny na bazie PDMS i sposób wytwarzani kompozytu luminescencyjnego na baize PDMS), zgłoszenie patentowe nr 399409, 04.06.2012

[Pat2] J. Kęsik, W. Kamiński, J. Lipkowski, M. Osiniak, **Power ion gas laser** (Zasilacz jonowego lasera gazowego), Patent UP RP, 30.11.2012

[Pat3] P.Ristola, J.Vilo, J.Piotrowski, **Apparatus for Microwave Heating of a Planar Product Including a Multi-segment Waveguide Element** (Urządzenie do mikrofalowego grzania płaskiego produktu zawierające wieloodcinkowy falowodowy element), United States Patent, Patent No. 8,173,943 B2; Date of Patent: 08.05.2012

[Pat4] P.Ristola, J.Vilo, J.Piotrowski, **Apparatus for Microwave Heating of Planar Products**, (Urządzenie do mikrofalowego grzania płaskich produktów), United States Patent, Patent No. US 8,288,694 B2; Date of Patent 16.10.2012

8. REPORTS

[Rep1] **Design and manufacturing of complete microwave sensor based measurement system intended for electromagnetic properties investigations of grapheme** (Opracowanie systemu z mikrofalową głowicą pomiarową w postaci rezonatora dielektrycznego do badań właściwości elektrycznych grafenu), project leader: Jerzy Krupka

[Rep2] **Development of layout editing software for VESTIC integrated circuits** (Oprogramowanie do projektowania topografii układów scalonych VESTIC) project leader: Wiesław Kuźmicz

[Rep3] **Dual-mode blocks of the integrated circuit GALILEO and GPS signal receiver in nanometer CMOS technology for precise positioning of mobile objects**, (Bloki dwusystemowego, scalonego odbiornika sygnałów nawigacji satelitarnej GALILEO i GPS w technologii nanometrowej CMOS do dokładnego pozycjonowania obiektów przenośnych) project leader: Witold Pleskacz

[Rep4] **Feasibility study of the novel nanometric silicon transistors and modelling of them for computer aided design of integrated circuits,** (Badania właściwości nanometrowych tranzystorów krzemowych o nowej konstrukcji i ich modelowanie dla potrzeb wspomagania projektowania (CAD) układów scalonych), project leader: Andrzej Pfitzner

[Rep5] **Future Internet Engineering,** (Inżynieria Internetu Przyszłości), EU Innovative Economy Programme, POIG.01.01.02-00-045/09, project leader: Paweł Szczepański

[Rep6] **High temperature spectroscopy of rare-earth doped crystals and nanocrystals for luminescence thermometry applications** (Spektroskopia wysokotemperaturowa kryształów i nanokryształów tlenkowych domieszkowanych jonami ziem rzadkich dla zastosowań w termometrii luminescencyjnej), project leader: Michał Malinowski

[Rep7] **Highly sensitive ISFET matrix transistors with functional dielectrics on new generation** (Wysokoczułe matryce tranzystorowych struktur typu ISFET z funkcjonalnymi dielektrykami nowej generacji), project leader: Piotr Firek

[Rep8] **IDESA – 2 „Implementation of widespread IC design skills in advanced deep submicron technologies at European Academia",** (IDESA-2 "Rozpowszechnienie umiejętności projektowania submikronowych układów scalonych w europejskich wyższych uczelniach"), EU structural project, project leader: Wiesław Kuźmicz

[Rep9] **Implementation of HDR methods in video security systems,** (System pozyskiwania obrazów 3D z analizą polaryzacyjną), project leader: Jerzy Woźnicki

[Rep10] **Innovative technologies of multi-functional materials and structures for nanoelectronics, photonics, spintronics and sensors InTechFun,** (Innowacyjne technologie wielofunkcyjnych materiałów i struktur dla nanoelektroniki, fotoniki, spintroniki i technik sensorowych InTechFun), EU structural project, project leaders: Jan Szmidt

[Rep11] **Integrated circuit technology for measurement of psychophysiological parameters under dynamic conditions** (Mikroukładowa technologia pomiaru parametrów psychofizjologicznych w warunkach dynamicznych), project leader: Witold Pleskacz

[Rep12] **Investigation of coherent radiation sources for photonic integreated circuits made in SOI technology** (Badania nad źródłami promieniowania koherentnego dla fotonicznych układów zintegrowanych wykonanych w technologii krzemowej), project leader: Paweł Szczepański

[Rep13] **Light sources with cold emitters** (Źródła światła z zimnymi emiterami), project leader: Jan Szmidt

[Rep14] **Long-period grating structures for monitoring of deformation and defects in structural materials** (Struktury długookresowych siatek światłowodowych do monitorowania odkształceń i uszkodzeń materiałów konstrukcyjnych), project leader: Mateusz Śmietana

[Rep15] **Micro and nano-systems in chemistry and biomedical diagnostic - Task 2A: Capillary microfluidic sensors use in fertility diagnostics** (Mikro i nanosystemy w chemii i diagnostyce biomedycznej MNS-DIAG), EU structural project**,** project leader: Jan Szmidt

[Rep16] **Microstructured polymer optical fibers for application in access networks** (Mikrostrukturalne światłowody polimerowe do zastosowań w sieciach dostępowych), project leader: Katrin Welikow

[Rep17] **Modeling and investigation of optically active photonic materials and micro- and nano-structures** (Modelowanie i badanie aktywnych optycznie mikro- i nano-struktur oraz materiałów fotonicznych), project leader: Michał Malinowski

[Rep18] **Modeling and investigation of the double barrier metal-oxide-semicondutor tunnel structures** (Modelowanie i badanie struktur tunelowych typu metal-izolator-półprzewodnik (MIS) z podwójną barierą potencjału), project leader: Bogdan Majkusiak

[Rep19] **Modeling of light generation in photonic crystal lasers based on coupled mode theory** (Modelowanie generacji promieniowania w laserach z ośrodkiem aktywnym w postaci kryształu fotonicznego bazujące na teorii modów sprzężonych), project leader: Marcin Koba

[Rep20] **Nanocoated Optical Fiber Sensors for Biodiagnostics of Liquids,** EU structural project, project leader: Mateusz Śmietana

[Rep21] **New optoelectronics devices for intelligent classification of organic and biologic liquids.** (Nowe przyrządy optoelektroniczne do inteligentnej klasyfikacji cieczy organicznych i biologicznych), project leader: Jan Szmidt

[Rep22] **New processes and technology for assembly and hermetic SiC high temperature packages** (Nowoczesne procesy i technologie na potrzeby montażu i hermetyzacji elektroniki wysokotemperaturowej na bazie SiC), project leader: Ryszard Kisiel

[Rep23] **Optical fiber sensors with nanofilms for examination of bioliquids** (Nanowarstwowe czujniki światłowodowe do biodiagnostyki cieczy), project leader: Mateusz Śmietana

[Rep24] **PARADIGM Photonic advanced research and development for integrated generic manufacturing** (Zaawansowane badania nad rozwojem generycznych technologii fotonicznych układów scalonych), EU structural project, project leader: Paweł Szczepański

[Rep25] **Self-aligned gate MOSFET test structures technology** (Struktury testowe MOSFET w technologii samocentrującej bramki),project leader: Romuald B. Beck

[Rep26] **Solar-pumped fiber laser** (Laser włóknowy zasilany promieniowaniem słonecznym, grant Koła Naukowego Optoelektroniki), project leader: Ryszard Piramidowicz

[Rep27] **Spectral analysis of nano-coated optical fiber sensors working on surface plasmon resonance *(SPR) effect*** (Analiza spektralna czujników światłowodowych z nanopokryciami pracującymi w oparciu o zjawisko powierzchniowego rezonansu plazmonów (SPR)), project leader: Mateusz Śmietana

[Rep28] **Structural camera 3D-HD** (Strukturalna kamera 3D-HD), project leader: Piotr Garbat

[Rep29] **Structures and materials for sensor microsystems technology** (Konstrukcje i materiały dla mikrosystemowych technik sensorowych), project leader: Jan Szmidt

[Rep30] **Technology and characterization of MIS structures with double gate dielectric stacks for non-volatile semiconductor memory (NVSM) applications** (Technologia i charakteryzacja struktur MIS z podwójną warstwą dielektryka bramkowego dla zastosowań w nieulotnych pamięciach półprzewodnikowych (NVSM)), project leader: Robert Paweł Mroczyński

[Rep31] **Technology and characterization of ultrathin silicon layers formed by means of PECVD for nanelectronic applications** (Technologia i charakteryzacja ultracienkich warstw krzemu wytwarzanych metodą PECVD na potrzeby struktur nanoelektronicznych), project leader: Romuald B.Beck

[Rep32] **Technology of new generation of hydrogen and hydrogen compounds sensor for over normative conditions applications POIG "DETEH,"** (Opracowanie technologii nowej generacji czujnika wodoru i jego związków do zastosowań w warunkach ponadnormatywnych), EU structural project, project leader: Jan Szmidt

[Rep33] **TFT thin-film structures based on a new generation of amorphous semiconductors** (Struktury cienkowarstwowe typu TFT oparte o półprzewodniki amorficzne nowej generacji), project leader: Robert Mroczyński

[Rep34] **The conditions of short-wavelength emission excitation in optically active low-phonon glasses and composite materials pumped with pressure-tuned laser diodes** (Warunki wzbudzania emisji krótkofalowej w aktywnych optycznie szkłach niskofonowych i materiałach kompozytowych pompowanych przestrajalnymi ciśnieniowo diodami laserowymi), project leader: Ryszard Piramidowicz

[Rep35] **The influence of subsurface doping of silicon carbide (4H-SiC) by ion implantation on electrophysical properties of MOS structures fabricated by thermal oxidation** (Wpływ przypowierzchniowego domieszkowania węglika krzemu 4H-SiC techniką implantacji jonów na właściwości elekrofizyczne struktur MOS otrzymywanych w wyniku utleniania termicznego), project leader: Jan Szmidt

[Rep36] **The new optoelectronics method of intelligent classification of liquid bio-fuels properties with optical capillary use** (Nowa metoda optoelektroniczna inteligentnej klasyfikacji właściwości użytkowych biopaliw ciekłych z wykorzystaniem kapilar optycznych), project leader: Michał Borecki

[Rep37] **The on-board computer for supersonic missiles** (System komputera pokładowego do rakiety naddźwiękowej, grant Koła Naukowego Mikrosystemów ONYKS), project leader: Zbigniew Pióro

[Rep38] **The study of optical properties of erbium doped materials for short wavelength upconversion lasers** (Badania właściwości optycznych ośrodków aktywnych domieszkowanych jonami erbu do zastosowań w układach laserów z konwersja wzbudzenia na zakres krótkofalowy), project leader: Krzysztof Anders

[Rep39] **The use of photonic techniques in microwave filters applications and investigations of 3D imaging systems** (Wykorzystanie technik fotonicznych w układach filtrów mikrofalowych oraz badanie parametrów systemów obrazowania 3D), project leader: Janusz Parka

[Rep40] **Tunable liquid crystal devices working on THz and GHz range,** (Przestrajalne ciekłokrystaliczne przetworniki na zakres THz i GHz.), project leader: Janusz Parka

[Rep41] **Universal laser source for medical applications,** (Uniwersalne źródło promieniowania laserowego do zastosowań medycznych), project leader: Wojciech Kamiński

[Rep42] **Upgrade of vocational skills in field of application of ecological and effective energy solutions in Poland. Photovoltaic systems**, (Wspieranie kwalifikacji zawodowych w zakresie stosowania ekologicznych i efektywnych rozwiązań elektro-energetycznych w Polsce. Systemy fotowoltaiczne), project leader: Maciej Juźwik

[Rep43] **VESTIC: a new manufacturing technology for integrated circuits** (VESTIC: nowy sposób wytwarzania układów scalonych), project leader: Wiesław Kuźmicz

9. CONFERENCES, SEMINARS AND MEETINGS

9.1. Conferences

[Con1] **7th Microwave Materials and their Applications MMA 2012**, Taipei, Taiwan, June 3- 6
participant: J.Krupka

[Con2] **13th International Conference on Plasma Surface Engineering**, Garmisch-Partenkirchen, Germany, September 10-14
participants: P.Firek, J.Szmidt

[Con3] **19th International Conference Mixed Design of Integrated Circuits and Systems MIXDES 2012**, Warsaw, Poland, May 24-26
participants: W.A. Pleskacz, A.Grodzicki, K.Madziar, B.Galwas, J.Krupka,

[Con4] **22nd SPIE International Conference on Optical Fiber Sensors OFS2012**, Beijing, China, October 15–19
participant: M.Śmietana

[Con5] **24th Symposium IS&T/SPIE on Electronic Imaging 2012, Three-Dimensional Image Processing (3DIP) and Applications**, Burlingame, California, USA, January 22-26
participant: P.Garbat

[Con6] **26th European Conference on Solid-State Transducers, EUROSENSOR 2012**, Cracow, Poland, September 9-12
participants: M.Śmietana, J.Szmidt

[Con7] **BIT's 2nd Annual World Congress of Nano Sciences and Technologies**, Qingdao, China, October 25-28
participants: P.Szczepański, M.Koba

[Con8] **Conferences SPIE: Photonics Europe 2012**, Brussels, Belgium, April 16-19
participants: A.Tyszka-Zawadzka, P.Szczepański, P.Gdula, K.Welikow, R.Piramidowicz, K.Andres, W.Kamiński, A.Jusza

[Con9] **Congress Advanced Photonics and Conference Speciality Optical Fibers & Applications,** Colorado Springs, USA, June 17-21
participants: P.Szczepański, M.Koba

[Con10] **ICFCCT 2012 – International Conference on Future Communication and Computer Technology**, Beijing, China, May 19-20
participant: M.Baszun

[Con11] **IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems DDECS 2012**, Tallin, Estonia, April 18-20
participants: A.Pfitzner, W.A.Pleskacz, J.Grądzki

[Con12] **II Photonics Society of Poland Symposium (c/o OPTON 2012)**, Katowice, Poland, May 15-16
participant: A.Mossakowska-Wyszyńska

[Con13] **International Conference IEEE Sensors 2012**, Taipei, Taiwan, October 28-31
participant: M.Śmietana

[Con14] **International Conference on Solid-state and Integrated Circuit – ICSIC 2012**, Singapore, China, October 29-November 1
participants: D.Kasprowicz, A.Pfitzner

[Con15] **International Microwave Syposium IMS 2012**, Montreal, Canada, June 17-22
participant: J.Krupka

[Con16] **Konferencja ITC Young 2012**, Gdańsk, Poland, May 26-27
participants: B.Majkusiak, D.Taunous

[Con17] **Krajowe Sympozjum Telekomunikacji i Teleinformatyki**, Warsaw, Poland, September 12-14
participants: P.Szczepański, R.Piramidowicz, K.Welikow, S.Stopiński

[Con18] **X Sympozjum Techniki Laserowej**, Świnoujście, Poland, September 24-28
participants: W.Kamiński, P.Warda, S.Jonak, A.Jusza, K.Welikow, K.Anders, R.Piramidowicz, P.Szczepański, A.Tyszka-Zawadzka, A.Mossakowska-Wyszyńska, P.Witoński, K.Ławniczuk

[Con19] **XI Krajowa Konferencja Elektroniki KKE 2012**, Darłowo, Poland, June 11-14
participants: M.Borecki, J.Kalenik, P.Szczepański, R.Piramidowicz, K.Welikow, K.Ławniczuk, A.Taube, A.Jakubowski, L.Łukasiak, M.Sochacki, J.Szmidt, A.Krysiński, M.Śmietana, R.Mroczyński, K.Król

[Con20] **XII Konferencja Uniwersytet Wirtualny Model, Narzędzie, Praktyka**, Warsaw, Poland, June 13-15
participant: K.Madziar

[Con21] **XXI Europhysics Conference On Atomic And Molecular Physics Of Ionized Gases ESCAMPIG,** Viana Castelo, Portugal, July 10-14
participant: W.Kamiński

9.2. Schools, Seminars and Meetings

[Con22] **15th International Workshop on Computational Electronics IWCE 2012**, Madison, USA, May 22-25
participants: A.Mazurak, B.Majkusiak

[Con23] **17th Workshop on Dielectric in Microelectronics WoDiM 2012**, Dresden, Germany June 25-27
participants: B.Majkusiak, J.Jasiński

[Con24] **22nd International Traveling Summer School on Microwaves and Lightwaves**, Třešť Castle, Czech Republic, July 7-13
participant: B.Galwas

[Con25] **35th International Spring Seminar on Electronics Technology ISSE 2012**, Bad Ausse, Austria, May 9-13
participants: R.Kisiel, P.Firek, M.Guziewicz ,J.Grochowski, M.Mysliwiec

[Con26] **Institute Seminar - Students Association of Microelectronics and Nanoelectronics: Wspomnienia z Ann Arbor - życie i praca z perspektywy uniwersyteckiego miasteczka**, May 24
participants: R.Piramidowicz, P.Szczepański, J.Szmidt, M.Śmietana, A.Jusza, K.Welikow, K.Anders, P.Witoński, K.Ławniczuk, M.Borecki, J.Kalenik, A.Taube, A.Jakubowski, L.Łukasiak, M.Sochacki, R.Mroczyński, K.Król

[Con27] **Institute Seminar - Students Association of Optoelectronics: Fotoniczne układy scalone**, February 29, March 29
participants: R.Piramidowicz, P.Szczepański, J.Szmidt, M.Śmietana, A.Jusza, K.Welikow, K.Anders, P.Witoński, K.Ławniczuk, M.Borecki, J.Kalenik, A.Taube, A.Jakubowski, L.Łukasiak, M.Sochacki, R.Mroczyński, K.Król

[Con28] **International Topical Meeting on Microwave Photonic**, Noordwijk, The Netherlands, September 11-14
participant: K.Ławniczuk

10. AWARDS

[Award1] Romuald Beck, Bogdan Majkusiak, **WUT Rector's Collective Award for Scientific Achievements (2nd stage)** (Nagroda Zespołowa II stopnia JM Rektora PW za osiągnięcia naukowe)

[Award2] Witold Ciemiewski, Kazimierz Dalbiak, **President's of the Republic of Poland Gold Medal for Long-Term Service** (Medal Złoty za Długoletnią Służbę nadany przez Prezydenta Rzeczypospolitej Polskiej)

[Award3] Michał Malinowski, Ryszard Piramidowicz, Marcin Kaczkan, Krzysztof Anders, Anna Jusza, **WUT Rector's Collective Award for Scientific Achievements (1st stage)** (Nagroda Zespołowa I stopnia JM Rektora PW za osiągnięcia naukowe)

[Award4] Andrzej Mazurak, **WUT Rector's Individual Award for Scientific Achievements (3rd stage)** (Nagroda Indywidualna III stopnia JM Rektora PW za osiągnięcia naukowe)

[Award5] Robert Mroczyński, **Winner of the competition "Knowledge with passion. We promote young scientists." organized by Innovation Transfer of Knowledge in Science Portal and Bolesław Markowski Higher School of Commerce in Kielce** (Portal Innowacyjnego Transferu Wiedzy w Nauce wraz z Wyższą Szkołą Handlową im. Bolesława Markowskiego w Kielcach, laureat konkursu „Wiedza z pasją. Promujemy młodych naukowców")

[Award6] Stanisław Pietruszko, **Clear Energy Magazine Award - Promoter of Renewable Energy** (miesięcznik „Czysta Energia" przyznał tytuł Promotora Energetyki Odnawialnej w 2012 r.)

[Award7] Witold Pleskacz, **WUT Rector's Individual Award for Scientific Achievements (2nd stage)** (Nagroda Indywidualna II stopnia JM Rektora PW za osiągnięcia naukowe)

[Award8] Antoni Siennicki, **Medal of National Education Commission** (Medal Komisji Edukacji Narodowej)

[Award9] Jan Szmidt, **WUT Rector's Individual Award for Organizing Achievements (2nd stage)** (Nagroda Indywidualna II stopnia JM Rektora PW za osiągnięcia organizacyjne)

[Award10] Mateusz Śmietana, **Diploma of Minister of Science and Higher Education for project „Waveguide pressure sensor"** (Dyplom Ministra Nauki i Szkolnictwa Wyższego za projekt „Światłowodowy czujnik ciśnienia"*)*

[Award11] Mateusz Śmietana, **Diploma International Warsaw Invention Show IWIS 2012 – Silver Medal for the Invention Optical Fiber Sensor using Bacteriophages for Bacteria Detection**

[Award12] Andrzej Taube, Mariusz Sochacki, Jan Szmidt, **First Award in prof. Mieczysław Pożaryski Competition, Association of Polish Electrical Engineers SEP, for best article "The design and modeling of vertical transistors in silicon carbide DIMOSEFT"** (Stowarzyszenie Elektryków Polskich przyznało I Nagrodę w Konkursie im. prof. Mieczysław Pożaryskiego na najlepsze artykuły opublikowane w czasopismach SEP za artykuł „*Konstrukcja i modelowanie tranzystorów wertykalnych DIMOSEFT w węgliku krzemu*" zamieszczony w „Elektronika – konstrukcje, technologie, zastosowania", Warszawa 10 października 2012)

[Award13] Jerzy Woźnicki, **WUT Rector's Individual Award for Organizing Achievements (2nd stage)** (Nagroda Indywidualna II stopnia JM Rektora PW za osiągnięcia organizacyjne)