



INSTITUTE
OF MICROELECTRONICS
AND OPTOELECTRONICS



ANNUAL REPORT
2010

Edited by Agnieszka Mossakowska-Wyszyńska

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From the Director

This Annual Report summarizes the research activities of the Institute in 2010, as well as the teaching activities in the academic year 2009/2010. 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 two large investment projects of the Innovative Economy Operational Programme. As a result a 9 high-tech laboratories offering high quality scientific services in the field of advanced electronic and photonic technologies will be established in IMiO.

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. 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 2011

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

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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

Director of the Institute

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1.3. Microelectronics and Nanoelectronics Devices Division

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Lidia Łukasiak, Ph.D., D.Sc.	Professor
Robert Mroczyński	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

Jarosław Grabowski, M.Sc.	Ph.D. Student
Marcin Iwanowicz, M.Sc.	Ph.D. Student
Jakub Jasiński, M.Sc.	Ph.D. Student, Assistant
Arkadiusz Malinowski, M.Sc.	Ph.D. Student
Andrzej Mazurak, M.Sc.	Ph.D. Student
Michał Rakowski, M.Sc.	Ph.D. Student
Paweł Sałek, M.Sc.	Ph.D. Student
Anna Sawicka, M.Sc.	Ph.D. Student
Jędrzej Stęszewski, M.Sc.	Ph.D. Student
Dominik Taonus, 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 microelectronics in digital signal processing.

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

Junior academic staff

Tomasz Borejko, M.Sc.	Ph.D. Student
Michał Bryk, M.Sc.	Ph.D. Student

Jacek Grądzki, M.Sc.	Ph.D. Student
Andrzej Grodzicki, M.Sc.	Ph.D. Student
Aleksander Koter, M.Sc.	Ph.D. Student
Krzysztof Marcinek, M.Sc.	Ph.D. Student
Piotr Mierzwiński, M.Sc.	Ph.D. Student
Paweł Narczyk, 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,
- development of CAD tools for integrated circuit design and verification, with special emphasis on analog full custom ASICs design,
- design of digital and mixed VLSI circuits for special applications such as innovative AD converters, data

processing in physical experiments, RF front ends for wireless data transmission etc.,

- modeling and control of leakage currents in nanometer CMOS digital circuits,
- Investigations 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. Ph.D. Student, 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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Michał Borecki, Ph.D.	Assistant Professor
Piotr Firek, Ph.D.	Assistant Professor
Jerzy Kalenik, Ph.D.	Assistant Professor
Ryszard Kisiel, Ph.D.	Assistant Professor

Zdzisław Mączyński, 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

Piotr Caban, M.Sc.	Ph.D. Student
Łukasz Chudzian, M.Sc.	Ph.D. Student
Konrad Kielbasiński, M.Sc.	Ph.D. Student
Krzysztof Kłós, M.Sc.	Ph.D. Student
Piotr Knypś, M.Sc.	Ph.D. Student
Krzysztof Król, M.Sc.	Ph.D. Student
Norbert Kwietniewski, M.Sc.	Ph.D. Student
Mateusz Mroczkowski, M.Sc.	Ph.D. Student
Kamil Pazio, M.Sc.	Ph.D. Student
Andrzej Stefański, M.Sc.	Ph.D. Student

Science research staff

Małgorzata Kalisz, Ph.D.
Mariusz Sochacki, Ph.D.

Assistant Professor

Technical and administrative staff

Ryszard Biaduń.

The research activity of the Division concentrates on optoelectronic and hybrid devices. Fundamental and applied research are carried out. Research groups are organised for defined tasks.

The main research areas are as follows:

- 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 techniques of surface mounted devices on PCB (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.);
- research, design and monitoring of photovoltaic systems, strategy for development of photovoltaic solar energy;
- 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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Jerzy Kęsik, Ph.D. Assistant Professor
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Ryszard Piramidowicz, Ph.D. Assistant Professor
Anna Tyszka-Zawadzka, Ph.D. Assistant Professor
Piotr Warda, Ph.D. Assistant Professor

Junior academic staff

Krzysztof Anders, M.Sc. Ph.D. Student
Zuzanna Boruc, M.Sc. Ph.D. Student
Paweł Gdula, M.Sc. Ph.D. Student
Bartosz Fetliński, M.Sc. Ph.D. Student
Anna Jusza, M.Sc. Ph.D. Student
Marcin Koba, M.Sc. Ph.D. Student
Kamila Leśniewska-Matys, 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

Technical and administrative staff

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

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, 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 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;
- research of light generation in metal vapour gas lasers, measurement of laser parameters, investigation of light generation in hollow cathode lasers, analysis of plasma discharge processes, research of the opto-galvanic effect;
- 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	2009	2010	DIFFERENCE
Academic staff	88	93	+5
Tenured professors	10	10	0
Professors	3	3	0
Docent	1	1	0
Assistant professors	31	34	+3
Senior lecturers	4	4	0
Assistants and Ph.D. students	39	41	+2
Science research staff	3	7	+4
Technical and Administrative staff	20	22	+2
Computers	317	380	+63
Library resources - Books (number of volumes)	3532	3597	+65
Teaching activities	73	69	-4
Basic courses	38	31	-7
Advanced courses	19	16	-3
Special courses	16	22	+6
Research projects	35	43	+8
Granted by the University	6	6	0
Granted by State Institutions	22	28	+6
Granted by International Institutions	7	8	+1
Others projects	0	1	+1
Degrees awarded	61	59	-2
D.Sc. degrees	0	1	+1
Ph.D. degrees	2	4	+2
M.Sc. degrees	38	17	-21
B.Sc. degrees	21	37	+16
Publications	125	151	+26
Sci.-tech. books	9	8	-1
Sci.-tech. papers in journals	41	40	-1
Sci.-tech. papers in conference proceedings	75	103	+28
Patents	4	3	-1
Conferences	29	33	+4
Awards	11	14	+3

2. STAFF

2.1. Senior Academic Staff

- Mikolaj Baszun**, M.Sc. ('69), Ph.D. ('77), Computer engineering, Assistant Professor, full time, Electronic Materials and Microsystem Technology Division, WUT Rector's Award ('06), President's of the Republic of Poland Gold Medal for Long-Term Service ('08). room # 363 GE
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- Bogdan Galwas**, M.Sc.('62), Ph.D. ('69), D.Sc. ('76), Microelectronics, Microwave Electronics, Tenured Professor, full time, Image and Microwave Photonics Division, Head of Image and Microwave Photonics Division ('84-'09), Pro-Rector of WUT ('87-'90), Member of Electronics and Telecommunications Committee of the Polish Academy of Sciences ('88-), Member of Scientific Council of Industrial Institute of Telecommunications ('90-), Chairman of the International Management Committee of the International Travelling Summer Schools ('91-), Director of Ph.D. Studies in Electronics and Telecommunications ('92-), Senior Member of IEEE ('94-), Member of Scientific Council of Institute of Telecommunications ('97-), Member of IACEE ('97-), Member of SEFI ('97-), Rector's Plenipotentiary for New Technologies and Forms of Education ('99-), Director of WUT Center for Distance Learning – OKNO ('00-), Dean of the Faculty of Electronics and Information Technology ('05-'08), WUT Rector's Individual Award for Didactic Achievements ('08). room # 51a GE
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Scientific Publications ('86, '96), Member of Programme Committee of ELTE ('84-), MiEL ('94-), IWSPD ('96-), MIXDES ('97-), IEEE ICCDS ('02-), Chairman of "Diagnostic and Yield" ('88-), Editor-in-chief of "Electron Technology" ('90-'94), WUT Rector's Collective Award for Scientific Achievements ('08).

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2.3. Science Research Staff

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Mariusz Sochacki	Ph.D.	Senior Research Worker	+48 222347851
Katrin Welikow	M.Sc.	Design Engineer	+48 222345047

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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] **Characterization of Microelectronic Structures and Technologies** (Charakteryzacja struktur i technologii mikroelektronicznych), **CSTM**, Bogdan Majkusiak
- [Edu5] **Design of Analog Circuits for VLSI Systems** (Projektowanie układów analogowych dla systemów VLSI), **PUAV** Wiesław Kuźmicz
- [Edu6] **Digital Circuits** (Układy cyfrowe), **UCYF**, Elżbieta Piwowarska
- [Edu7] **Electronic Elements and Circuits** (Elementy i układy elektroniczne), **ELIU**, Andrzej Pfitzner
- [Edu8] **Electronics 1** (Elektronika 1), **ELE1**, Andrzej Jakubowski, Sławomir Szostak
- [Edu9] **Electronics 2** (Elektronika 2), **ELE2**, Zbigniew Pióro
- [Edu10] **Equipment - Programming Synthesis of Digital Systems** (Synteza sprzętowo – programowa systemów cyfrowych), **SSP**, Elżbieta Piwowarska
- [Edu11] **Fields and waves**, (Pola i fale), **POFA**, Jerzy Piotrowski
- [Edu12] **Fundamentals of Circuit and System Technology** (Podstawy technologii układów i systemów), **PTUIS**, Romuald Beck
- [Edu13] **Fundamentals of Lasers** (Lasery - kurs podstawowy), **LKP**, Paweł Szczepański
- [Edu14] **Fundamentals of Microelectronics** (Podstawy mikroelektroniki), **PMK**, Wiesław Kuźmicz
- [Edu15] **Fundamentals of Microprocessor Techniques** (Podstawy techniki mikroprocesorowej), **TMIK**, Lidia Łukasiak
- [Edu16] **Fundamentals of Microwave Engineering** (Podstawy techniki w.cz.), **TWCZ**, Bogdan Galwas
- [Edu17] **Fundamentals of Photonics** (Podstawy fotoniki), **FOT**, Michał Malinowski
- [Edu18] **Fundamentals of Solid State Electronics** (Elektronika ciała stałego), **ELCS**, Jan Szmidt, Witold Pleskacz
- [Edu19] **Hybrid Systems** (Układy hybrydowe), **UKH**, Ryszard Kisiel
- [Edu20] **Integrated Optoelectronics** (Optoelektronika zintegrowana), **OZT**, Michał Malinowski, Agnieszka Mossakowska-Wyszyńska
- [Edu21] **Introduction to Microsystems** (Wstęp do mikrosystemów), **WMS**, Zbigniew Pióro
- [Edu22] **Introduction to Programming** (Podstawy programowania), **PRM**, Michał Borecki
- [Edu23] **Introduction to the UNIX System** (Użytkowanie systemu UNIX), **USUX**, Andrzej Wielgus
- [Edu24] **Introduction to Numerical Methods** (Wstęp do metod numerycznych), **WDMNM**, Jerzy Krupka
- [Edu25] **Object Programming in Java** (Praktyka programowania obiektowego w Javie), **PPOJ**, Adam Wojtasik
- [Edu26] **Object Programming** (Programowanie obiektowe), **PROE**, Adam Wojtasik
- [Edu27] **Operating Systems** (Systemy operacyjne), **SOE**, Andrzej Wielgus
- [Edu28] **Optoelectronic Devices and Systems** (Elementy i systemy optoelektroniczne), **ESO**, Michał Malinowski
- [Edu29] **Physical Fundamentals of Information Processing** (Fizyczne podstawy przetwarzania informacji), **FPPI**, Bogdan Majkusiak
- [Edu30] **Programming microcontrollers in C language** (Programowanie mikrokontrolerów w języku C), **PMIK**, Sławomir Szostak
- [Edu31] **Semiconductor Devices** (Przyrządy półprzewodnikowe), **PP**, Andrzej Jakubowski, Andrzej Pfitzner

3.2. Advanced Courses

- [Edu32] **Advanced Lightwave Telecommunication** (Zaawansowana telekomunikacja optofalowa), **ZTEOP**, Bogdan Galwas
- [Edu33] **Advanced Microelectronic and Optoelectronic Technologies** (Zaawansowane technologie mikroelektroniczne i optoelektronczne), **ZTMO**, Romuald Beck
- [Edu34] **Advanced Physical Fundamentals of Optoelectronics** (Zaawansowane podstawy fizyczne optoelektroniki), **ZPFO**, Paweł Szczepański
- [Edu35] **Digital Image Processing** (Cyfrowe przetwarzanie obrazów), **CPOO**, Piotr Garbat
- [Edu36] **Electronic and Photonic Devices for Telecommunication** (Przyrządy elektroniki i fotoniki dla telekomunikacji), **PEFT**, Bogdan Galwas
- [Edu37] **Fundamentals of Photovoltaics** (Podstawy fotowoltaiki), **PFOT**, Stanisław Pietruszko
- [Edu38] **Integrated and Logic Circuits for Optoelectronics** (Zintegrowane układy optoelektroniczne i optyczne układy logiczne), **ZOUL**, Michał Malinowski
- [Edu39] **Monte Carlo Methods - Fundamentals and Applications** (Metody Monte Carlo - podstawy i zastosowania), **MMC**, Marek Niewiński
- [Edu40] **Nanostructures and Nanosystems** (Nanostruktury i nanosystemy), **NIN**, Jan Szmidt, Aleksander Werbowy
- [Edu41] **Nanotechnologies** (Nanotechnologie), **NAN**, Jan Szmidt
- [Edu42] **Optical Waveguide Lasers and Amplifiers**(Wzmacniacze i lasery światłowodowe), **WLS**, Ryszard Piramidowicz
- [Edu43] **Optoelectronics Techniques of Information Processing** (Optoelektroniczne techniki przetwarzania informacji) ,**OTZI**, Janusz Parka, Jerzy Woźnicki
- [Edu44] **Photovoltaic Systems** (Systemy fotowoltaiczne), **SFOT**, Stanisław Pietruszko
- [Edu45] **Semiconductor Structures for VLSI and ULSI Circuits** (Struktury półprzewodnikowe dla układów VLSI i ULSI), **SPVU**, Andrzej Jakubowski
- [Edu46] **Vision Monitoring Systems** (Systemy monitoringu wizyjnego), **SYMW**, Jerzy Woźnicki
- [Edu47] **VLSI System Design** (Projektowanie systemów scalonych w technice VLSI), **PSSV**, Wiesław Kuźmicz, Zbigniew Jaworski

3.3. Courses in English

- [Edu48] **Electronics 1, EELE1**, Bogdan Majkusiak
- [Edu49] **Laser physics**, Anna Tyszka-Zawadzka, Athens Programme course
- [Edu50] **Physics 3, EPHY3**, Bogdan Majkusiak
- [Edu51] **Fundamentals of Nanoelectronics**, Bogdan Majkusiak, Athens Programme course
- [Edu52] **Quality Management, EQUMA**, Zdzisław Mąceński

3.4. Courses for other Faculties

- [Edu53] **Bases of Automation, Faculty of Management**, (Podstawy automatyzacji, Wydział Zarządzania), **POAUT**, Mikołaj Baszun
- [Edu54] **Electromagnetic Compatibility, Faculty of Management** (Kompatybilność elektromagnetyczna, Wydział Zarządzania), **KOMEL**, Jerzy Piotrowski
- [Edu55] **Electronic Circuits and the Introduction to Microelectronics, Faculty of Management** (Układy elektroniczne i wstęp do mikroelektroniki, Wydział Zarządzania), **UEMIK**, Sławomir Szostak
- [Edu56] **Electronic Devices, Faculty of Management** (Elementy elektroniczne, Wydział Zarządzania), **ELEME**, Andrzej Jakubowski
- [Edu57] **Electronic Equipment Assembly Processes, Faculty of Management**, (Inżynieria montażu urządzeń elektronicznych, Wydział Zarządzania), **IMUEL**, Ryszard Kisiel

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- [Edu58] **Electronic Equipment Design Techniques, Faculty of Management**, (Techniki konstrukcji urządzeń elektronicznych, Wydział Zarządzania), **TKUE**, Ryszard Kisiel
- [Edu59] **Fundamentals of Devices, Circuits and Systems Technology, Faculty of Management**, (Podstawy technologii przyrządów, układów i systemów, Wydział Zarządzania), **POTPU**, Robert Mroczyński
- [Edu60] **Introduction to Measurements, Faculty of Management** (Podstawy miernictwa, Wydział Zarządzania), **POMIE**, Mikołaj Baszun
- [Edu61] **Introduction to Microsystems, Faculty of Management** (Wstęp do mikrosystemów, Wydział Zarządzania), **WMIKS**, Zbigniew Pióro
- [Edu62] **Laboratory of Laser Technology, Faculty of Mechatronics** (Laboratorium Techniki Laserów, Wydział Mechatroniki), Ryszard Piramidowicz
- [Edu63] **Laser Technology, Faculty of Physics** (Technika Laserów, Wydział Fizyki), **TL**, Ryszard Piramidowicz
- [Edu64] **Materials for Electronics and Optoelectronics, Faculty of Management** (Materiały dla elektroniki i optoelektroniki, Wydział Zarządzania), **MATEL**, Zdzisław Mączyński
- [Edu65] **Methods of Electronic Element Diagnostics, Faculty of Management** (Metody diagnostyki elementów elektronicznych, Wydział Zarządzania), **MEDEL**, Jan Gibki
- [Edu66] **Microtechnologies for Miniature Chemical Systems, Faculty of Chemistry** (Mikrotechnologie dla miniaturowanych systemów chemicznych, Wydział Chemiczny), Romuald B. Beck
- [Edu67] **Nanotechnologies, Faculty of Management** (Nanotechnologia, Wydział Zarządzania), **NANOT**, Aleksander Werbowy
- [Edu68] **Photonic Devices, Faculty of Management** (Elementy fotoniczne, Wydział Zarządzania), **ELFOT**, Ryszard Piramidowicz
- [Edu69] **Printed Circuit Board Design, Faculty of Management**, (Projektowanie obwodów drukowanych, Wydział Zarządzania), **PRODRU**, Jerzy Kalenik

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 2009 - March 2010, **sub-projects:**
- [Pro1.1] **Analysis, modeling and investigation of waveguide structures for amplifiers and lasers and characterization of optically active materials**, (Analiza, modelowanie i badanie światłowodowych struktur wzmacniających i laserowych oraz charakteryzacja materiałów optycznie aktywnych), sub-project leader: Michał Malinowski, co-workers: P.Szczepański, R.Piramidowicz
Waveguide, active structures based on rare-earth doped fibers, planar structures, microdisk and photonic bandgap materials offer an attractive technology for micro-size amplifiers and lasers. One of the recent important developments is the successful operation of fiber lasers, which offer the highest efficiencies and the best thermal working conditions among solid-state lasers. Fiber lasers not only could be easily coupled to optical telecommunication fiber components, but also give output powers exceeding kW cw range. In this work we present a general modeling of rare-earth doped fiber and planar lasers, including up-conversion lasers. Approximate analytical results are derived for the threshold and the output intensities. Experimental work is oriented on the investigation of fiber lasers based on Pr, Ho and Nd ZBLAN glass, and epitaxial, planar crystalline RE:YAG/YAG structures.
- [Pro1.2] **Characterization of construction and materials used for microsystems sensors technology**, (Charakteryzacja konstrukcji i materiałów dla mikrosystemowych technik sensorowych), sub-project leader: Jan Szmidt
This work bases on a review, of the published literature and on the authors' own research, of the current state of the art of fiber-optic capillary sensors and related instrumentation as well as their applications, with special emphasis on point-of-care chemical and biochemical sensors.
In the first part of our work we systematize the various types of sensors from the point of view of the principles of their construction and operation. In the second part we look at microsystems sensors technology that uses multi-parametric and multi-functional optical capillary component. Unlike classical fiber-optic sensors which rely on changes in light propagation inside the fiber as affected by outside conditions, optical capillary sensors rely on changes of light transmission in capillaries filled with the analyzed liquid, which opens the possibility of interesting new applications, while raising specific issues relating to the construction, materials and instrumentation of those sensors.
- [Pro1.3] **Effects of silicon gate region modification with fluorine on the properties of MOS devices** (Wpływ modyfikacji powierzchni krzemu w obszarze bramki fluorem na właściwości struktur MOS), sub-project leader: Romuald Beck
The project aims in experimental study of the consequences of exposure of silicon surface to r.f. fluorine containing plasma. The nature of the surface modification is complex and is of both, physical and chemical nature. From the physical point of view, one can expect ultra-shallow fluorine ions implantation, as well as substrate structure damage. From the chemical point of view, one can expect also formation of silicon-fluorine bonds and particles. In this work we will attempt to characterize the effects and find out the possibility to control them by plasma process parameters.
- [Pro1.4] **Liquid crystal cells in GHz range and structural analysis of 3D objects** (Ciekłokrystaliczne przetworniki w zakresie GHz i analiza struktur obiektów 3D), sub-project leader: Janusz Parka
Liquid crystals physical properties in the GHz range are strongly investigated last years. Low loss nematic liquid crystals materials with high dielectric properties and in optical range in tunable GHz phase shifter construction were used. Theoretical problems of wave propagations in such type of phase shifter was discussed. Application properties and possibility of improving parameters of this device and tunability problems in 10 - 30 GHz are considered.
- [Pro1.5] **Research on the physical models applied for device simulation in submicrometer IC technologies**, (Badania modeli fizycznych dla symulacji elementów układów scalonych w technologiach submikrometrowych), sub-project leader: Andrzej Pfitzner, co-workers: J.Gempel, G.Janczyk, Z.Jaworski, S.Jeszka, D. Kasproicz, W.Kuźmicz, E.Piwowska, A.Pfitzner, W.Pleskacz, A.Wielgus, A.Wojtasik
Scaling of semiconductor devices comes to the applicability limit of macroscopic models of the physical phenomena occurring in the active regions of IC devices. Research cover simulation experiments comparing DC characteristics of the chosen nanometric devices, obtained using drift-diffusion, thermodynamic and hydrodynamic models, and exploration of such devices parameter space.

- [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 2010 - March 2011, **sub-projects:**
- [Pro2.1] **Application of ultra-shallow fluorine implantation to increasing MOS structures radiation damage hardness against high energy electrons (1MeV)** (Zastosowanie ultra-plytkiej implantacji fluoru do podniesienia odporności struktur MOS na radiację wysoko energetycznymi (1MeV) elektronami), project leader: Romuald B. Beck
The project aims in experimental study of the consequences of exposure of silicon surface to r.f. fluorine containing plasma. Such process has been proved to allow for ultra-shallow implantation of fluorine, under certain circumstances achieving concentrations of the order of 10^{19}cm^{-3} . It has been found that presence of fluorine in the gate stack region reduces significantly the degradation due to high energy (1MeV) electrons irradiation. The ultimate goal is finding correlations between irradiation effects and concentration and position of the fluorine profile.
- [Pro2.2] **Constructions and materials analysis for microsystems sensing** (Analiza konstrukcji i materiałów dla mikrosystemowych technik sensorowych), project leader: Jan Szmidt
This grant considers research, of the current state of the art of fiber-optic capillary sensors and related instrumentation as well as their applications, with special emphasis on point-of-care chemical and biochemical sensors, systematizing the various types of sensors from the point of view of the principles of their construction and operation. Unlike classical fiber-optic sensors which rely on changes in light propagation inside the fiber as affected by outside conditions, optical capillary sensors rely on changes of light transmission in capillaries filled with the analyzed liquid, which opens the possibility of interesting new applications, while raising specific issues relating to the construction, materials and instrumentation of those sensors. We examine polymer-ceramic composites materials for their dielectric, mechanical, and thermal properties as well as low loss dielectric samples covered with thin metal patterns consisting split-ring resonators SRRs, creating a regular hexagonal lattice. In order to determine the two complex quantities, namely the effective permittivity and the effective permeability of materials samples have been tested using the split post dielectric resonator (SPDR) method.
- [Pro2.3] **Development of CAD tools for multiprocessor and distributed computing environments** (Rozwój oprogramowania CAD pracującego w trybie wieloprocesorowym i rozproszonym), project leader: Wiesław Kuźmicz
The goal of the project is to develop new versions of CAD tools (from the IMiOCAD toolset for integrated circuit design and verification), which would take advantage of the computing power of two computer clusters existing in the VLSI engineering group. The works will include such topics as:
- parallelization of the algorithms,
 - optimal task assignment,
 - synchronization of tasks and processes,
 - synchronization of communication between computers in the cluster,
 - assessment of the efficiency of various synchronization strategies.
- The final outcome expected are versions of the CAD software that will run in the multitasking, multiprocessor and distributed computing environments.
- [Pro2.4] **Experimental study of the use of photonic technology in microwave oscillator circuits and the analysis of 3D structures using liquid crystal polarizing filter** (Wykorzystanie technik fotonicznych w układach oscylatorów mikrofalowych oraz analiza struktur 3D za pomocą filtra ciekłokrystalicznego), project leader: Janusz Parka
The project aims in experimental study of the use of photonic technology in microwave oscillator circuits and the analysis of 3D structures using liquid crystal polarizing filter. Research will be carried out on the use of photonic technology in microwave oscillator circuits. Application properties and possibility of improving parameters of this type device are considered. Development of 3D data acquisition methods for structures with strong polarization and analysis in order to detect defects and identify structure.
- [Pro2.5] **Modeling and investigation of microphotonic structures and characterization of optically active materials** (Modelowanie, opracowanie i badanie mikro-struktur fotonicznych oraz charakteryzacja ośrodków optycznie aktywnych), project leader: Michał Malinowski
The project is focused on; optical modeling tools for passive and active micro-photonic devices such as; planar and fiber waveguides, amplifiers and lasers, 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 and glassy matrix for various phosphors, including white light and up-conversion phosphors, sensors, photovoltaics, lasers and amplifiers.
- [Pro2.6] **Spectral conversion for solar cells using lanthanide ions (Konwersja widma słonecznego w systemach fotowoltaicznych z wykorzystaniem jonów ziem rzadkich)**, project leader: Michał Malinowski
One of the approaches to increase the solar cell efficiency is to change the solar spectrum via spectral up- or down-conversion. In up-conversion two infrared photons that would otherwise be transmitted through the cell are added up to one visible photon, that can be absorbed by the solar cell. Down-conversion is the reverse process when one high energy

photon is cut into two infrared photons, or down-shifted in energy, that still can be absorbed by the solar cell. It has been shown theoretically that for ideal up-and down-conversion materials, a maximum efficiency of about 50% and 40% can be achieved, respectively. The project includes spectroscopic investigations of rare-earth activated nano-crystalline solids embedded in glassy or plastic matrix. Multi-ion and multi-photon processes in selected systems such as Er, Tm, Ho, Dy, Tb and Yb doped YO, YAG and YAM nano-powders have been studied.

- [Pro3] **Building of quadcopter controlled by wireless accelerometer manipulator**, (Budowa pojazdu latającego „quadcopter” sterowanego za pomocą bezprzewodowego manipulatora akcelerometrycznego), project leader: Zbigniew Pióro, March 2010- December 2010

The aim of this project was construction of a flying vehicle powered by four, independent rotors located symmetrically in reference to its gravity centre. Basic parameters of the Quadcopter: breadth – 0,6 to 0,7 meters, weight 1kg, 4 brushless engines of thrust 600g each, powered by 11,1V litho-polymer batteries allowing for 30 minutes flight without a load, equipped with of inert sensors module allowing implementation of autopilot algorithms, possible implementation of accelerometer manipulator equipped with 2,4GHz wireless communication system.

- [Pro4] **Development of software for automation of an current-voltage (I-V) measurements** (Opracowanie programu do automatyzacji pomiarów prądowo-napięciowych (I-V)), project leader: Jan Szmidt, March 2010- December 2010

The aim of this project was full automation of an existing current-voltage (I-V) measurements setup for characterization of microelectronics devices, including MIS capacitors, MIS transistors, Schottky diodes, as well as preparation of a user-friendly software for the setup. The software is capable for controlling of the I-V measurements, data storage, as well as analysis and visualization of the obtained results.

- [Pro5] **Fiber amplifier dedicated to application in optical access systems** (Wzmacniacz światłowodowy do zastosowań w sieciach dostępowych), project leader: Ryszard Piramidowicz, co-workers: Krzysztof Anders, Anna Jusza, Paweł Gdula, Katarzyna Ławniczuk, Katrin Welikow, Piotr Florczyk, Łukasz Sudol, Michał Śpiczko, March 2010 - December 2010

Project was aimed at design, development and characterization of a low-cost, compact erbium doped optical fiber amplifier operating in the C band and dedicated to application in optical access systems. The project's tasks covered detailed analysis of spectroscopic properties of erbium doped preforms and fibers, theoretical modeling of main parameters, design of amplifier components, and, finally, manufacturing and characterization of the EDFA demonstrator. A number of technical problems have been solved, which resulted in development of compact and robust, all-fiber design suitable both for access and CATV systems as well as for student laboratories.

- [Pro6] **Modeling of feasibility of securing energy needs of buildings with use of photovoltaic systems and preparation for certification of their components** (Modelowanie możliwości zaspokojenia potrzeb energetycznych budynków przy pomocy systemów fotowoltaicznych oraz przygotowanie do certyfikacji ich komponentów), project leader: Michał Malinowski, co-workers: Maciej Juźwik, Piotr Knyps, Bartosz Fetiński, Ewa Piórecka, Jakub Wiśniewski, May 2010-December 2010

Within framework of the project some of the measurement equipment necessary to implement certification measurements in accordance with corresponding IEC norms of photovoltaic (PV) modules were acquired. It enabled implementation of measurement utilizing currently owned equipment according to international norms for PV modules certification. Guidance measurements of selected photovoltaic modules taken from buildings of WIS and GR were conducted and aging effects investigated. Results of these measurements served as input for analysis of performance of examined PV systems, especially for long term stability modeling, that also was conducted within the project. Performed analysis involved multiple aspects of PV system operation, however due to research profile of the Faculty of Environmental Engineering it mainly concerned feasibility of fulfilling energy needs of buildings with use of PV systems. Analysis made it possible to verify prepared model of variable in time energy needs in public buildings. This model made it possible to determine the possibility of decreasing peak energy needs during daytime.

4.2. Projects Granted by the Ministry of Education and Science

- [Pro7] **Contact and assembly technologies for high temperature, high power and high frequency applications of SiC devices**, (Technologia kontaktów i montażu dla przyrządów z węgla krzemu do zastosowań wysokotemperaturowych, wysokomocowych i wysokoczęstotliwościowych) Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Kisiel, co-workers: Zbigniew Szczepański, Marek Guziewicz, Norbert Kwietniewski, Ryszard Biaduń, April 2007 - March 2010

The aim of the project is to elaborate the ohmic contact technology for SiC devices as well as assembly technique for electrical and mechanical connection between SiC structure and package. An elaborated package shall be able to work in high temperature (up to 400°C), high power and high frequency application.

- [Pro8] **Deposition and measurements of thin metal and dielectric films intended for nanoelectronics and microwave technique**, (Wytwarzanie i charakteryzacja cienkich warstw metalicznych i dielektrycznych dla potrzeb nanoelektroniki i techniki mikrofalowej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jerzy Krupka, co-workers: Jan Szmidt, Marek Guziewicz, Zdzisław Mąceński, Mikołaj Baszun, Norbert

Kwietniewski, April 2007 - April 2010

New nanotechnologies require not only high resolution photolithographic processes but also deposition of very thin (the order of few nanometers) metal and dielectric films having repeatable and electromagnetic properties. When film thickness becomes very thin their physical properties may be different than the properties of bulk materials or thin films having thickness in the range of microns. In the addition traditional measurements methods may be not adequate for very thin films characterization. The main goal of this project is deposition and characterization of extremely thin metal and dielectric films. Single post and split post dielectric resonator techniques will be used for measurements of the surface resistance of thin metal films deposited on low loss dielectric substrates. Al, Cu, Ag, Au, Fe, Mo, W, Pd, Pt and ITO films will be measured employing those resonators. For comparison DC and low frequency measurement techniques will be also employed.

- [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] **Electrical characterization of dielectric-semiconductor interface in advanced MOS structures**, (Elektryczna charakteryzacja powierzchni granicznej dielektryk-półprzewodnik w zaawansowanych strukturach MOS), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Lidia Łukasiak, October 2008 – March 2010

The aim of this project is to adapt the charge pumping method to advanced MOS structures, i.e. conditions of strong coupling between top and back interfaces and considerable leakage current.

- [Pro11] **Emission properties of the active hybrid eutectic materials** (Właściwości emisyjne aktywnych eutektyków hybrydowych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Marcin Kaczkan, May 2010 – November 2011

The aim of the project is to investigate and analyze spectroscopic properties of optically active micro- and nano-materials. These type of structures are interesting as host materials, in which active ions may have different properties compared to those they have in bulk crystals. In particular, influence of the eutectic structure properties on the rare-earth ions behavior will be investigated. Emission properties of the Pr^{3+} and Er^{3+} active ions in $\text{SrTiO}_3\text{-TiO}_2$ oxide-oxide eutectic will be examined with the help of high-resolution laser spectroscopy. Additionally, the spectroscopic analysis for the bulk crystals with the same structures as constituents of eutectic will be perform. This analysis will enable determination of the influence of eutectic structure on the electron relaxation processes in the excited active ions.

Results of the project will enhance the knowledge about processes occurring in solid-state active media which have never been investigated in this manner.

- [Pro12] **Feasibility study of the novel nanometric silicon transistors and modelling of them for computer aided design of integrated circuits**, (Badania właściwości nanometrycznych 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.

- [Pro13] **Ferroelectric smectic LC materials in holographic recordings**, (Ciekłokrystaliczne smektyczne materiały o właściwościach ferroelektrycznych do zapisów holograficznych), Military University of Technology, Faculty of Advanced Technologies and Chemistry, project leader: Janusz Parka, co-worker: Marek Sutkowski, October 2008 – October 2010

The goal of the project is to achieve holographic recordings in thin smectic ferroelectric liquid crystal layers. The optical recording of the gratings is performed with use of low-power coherent laser beams (with different wavelengths). Bistable SSFLC (Surface Stabilised Ferroelectric Liquid Crystal) effect should be used to allow possibility of re-writable properties of the recordings.

- [Pro14] **Growth of the AlGaIn/GaN/SiC-based semiconductor heterostructures by vapour phase epitaxy for the HEMTs applications**, (Wytwarzanie heterostruktur półprzewodnikowych AlGaIn/GaN/SiC metodą epitaksji z fazy gazowej na potrzeby konstrukcji tranzystorów z dwuwymiarowym gazem elektronowym (HEMT)), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, April 2010 – February 2011
The growth conditions of GaN-on-SiC MetalOrganic Vapour Phase Epitaxy has been determined as well as AlN wetting layer growth conditions. Effect of growth pressure on coalescence thickness and crystal quality of GaN deposited on 4H-SiC has been investigated. HEMTs (AlGaIn/AlN/GaN-based) heterostructure has been grown and characterized. The sample HEMTs epistuctures are under processing of the devices.
- [Pro15] **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 Y₂O₃ crystals. Also, the temperature dependence of the up-conversion emissions will be studied over a wide temperature range.
- [Pro16] **Investigation of coherent radiation sources for photonic integrated 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: R.B.Beck, B.Majkusiak, M.Malinowski, R.Piramidowicz, A.Tyszka-Zawadzka, A.Mossakowska-Wyszyńska, J.Walczak, P.Warda, K.Leśniewska-Matys, M.Koba, 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.
- [Pro17] **Light generation in planar waveguide lasers based on two dimensional photonic crystals** (Generacja promieniowania w falowodowych laserach planarnych wykonanych na bazie dwu-wymiarowych kryształów fotonicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Szczepański, co-worker: Kamila Leśniewska-Matys, March 2009 – March 2011
The aim of the project is semi-analytical supermodes analysis of the structure comprising N-coupled planar waveguides manufactured on the base of two dimensional photonic crystal active material. Next, it is possible to create a model of nonlinear operation of such a phased array laser with Fabry-Perot cavity. The analysis is based on energy theorem approach which allows investigation of the influences of real structure parameters i.e. photonic crystal and waveguides geometry for output power level. In particular, the effect of radius of an air column, period of photonic crystal lattice in the horizontal direction (triangular and square symmetry), distance between waveguides, number of waveguides, thickness and length of active structure on output power level and maximal power efficiency is analyzed.
- [Pro18] **Modeling and characterization of multigate MOS SOI structures** (Modelowanie i charakteryzacja wielobramkowych struktur MOS SOI), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: A. Jakubowski, co-workers: B. Majkusiak, L. Łukasiak, R.B. Beck, J. Gibki, S. Szostak, J. Walczak, A. Zaręba, G. Głuszko, D. Tomaszewski, October 2007 – October 2010
The aim of the project is analysis of electrical characteristics of multi-gate MOS structures and development of methods of characterization, as well as modeling of selected physical phenomena present in multigate MOS devices and their parameters and electrical characteristics.
- [Pro19] **Modeling and characterization of semiconductor devices fabricated on silicon carbide cubic (3C-SiC) and hexagonal (4H-SiC) polytype substrates**, (Modelowanie i charakteryzacja przyrządów półprzewodnikowych wytworzonych na kubicznej (3C-SiC) oraz heksagonalnej (4H-SiC) odmianie węgla krzemu), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Andrzej Jakubowski, October 2008 – February 2010

The aim of the project is to develop a set of accurate models of the fundamental parameters and devices (VDMOSFET, MOSFET, MESFET, MIS capacitor, gate diode) fabricated on 3C-SiC and 4H-SiC.

The models are verified by means of characterization of test structures manufactured by a foreign research partner - Acreo AB, Sweden.

Charge pumping is a novel method used for characterization of silicon carbide. Two-level and three-level charge pumping methods are adapted to studying the interface traps of the 3C-SiC and 4H-SiC VDMOSFETs.

- [Pro20] **Modeling and investigation of the double barrier metal-oxide-semiconductor 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: R.B. Beck, A. Jakubowski, L. Łukasiak, J. Walczak, R. Mroczynski, A. Zaręba, S. Szostak, A. Mazurak, J. Grabowski, G. 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.

- [Pro21] **Modeling of silicon structures with low-dimensional electron gas**, (Modelowanie struktur krzemowych z niskowymiarowym gazem elektronowym), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: J. Walczak, co-workers: B. Majkusiak, R.B. Beck, A. Mazurak, May 2007 – May 2010

The project relates to modeling Si and also SiGe structures with 2DEG (two dimensional electron gas – quantum plane) and 1DEG (quantum wire). The main goal is the development and implementation of physical models of complex structures comprising a plurality of ultrathin semiconductor and dielectric layers, along with the analysis of obtained electrical characteristics of the modeled devices.

- [Pro22] **Nanostructural carbonaceous films for cold emitters** NANOCAFE – MNT-ERA NET, (Zimne emitery elektronów oparte o nanostrukturalne warstwy węglowe MNT-ERA NET), leading institution: Tele- and Radioresearch Institute, task executor: Warsaw University of Technology, Institute of Microelectronics, project leader: Elżbieta Czerwicz, task leader: Jan Szmiedt, co-workers: Jerzy Kalenik, Piotr Firek, Mateusz Mroczkowski, Ryszard Biadań, Krystyna Szyłko, Krystian Król, March 2009 – February 2011

The goal of the project is preparation of a new type of cold cathode based on nanocomposite material that is nanostructural carbonaceous film and design of prototype device based on the cathode.

This film consists of composite nanostructural material built of carbon nanotubes, carbonaceous and metal nanocrystals. The film based cold electron sources will be designed as a new type of cold electron emitters. Practical goal of this project design a prototype of a new cold cathode that shall be used in bright displays of new type.

- [Pro23] **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 Szmiedt, 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.

- [Pro24] **Next generation teleinformatics service and nets – technology, application and market aspects. Development of technology and algorithms for telemedicine services using of Internet and cell telephone nets**, (Usługi i sieci teleinformatyczne następnej generacji – aspekty techniczne, aplikacyjne i rynkowe. Rozwój technik i algorytmów telemedycyny z wykorzystaniem Internetu oraz sieci telefonii komórkowej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Mikołaj Baszun, January 2008 – December 2010

The aim of the project is development of technology and algorithms for services with using of Internet and cell telephone nets for telemedicine applications. The project obeys the following tasks:

- Working out of new algorithms for classifications and/or categorizations of the physician tasks aspected from a remote outdoor patient, for application in serwer expert systems.
- Design of serwer services using secure and authenticated remote wireless communication of the physicians with the patients, based on uncertain data.

- Design and realizing of practical models of intelligent electronic modules for monitoric of the diagnostic data of an outdoor human being, without his engagement.
- Design of a specialized server databases for telemedicine applications, with communication history and secure access tools.
- Design data of new algorithms for clasifications and/or categorizations of a physician tasks aspected from a remote outdoor patient.
- Software implementation of server services using secure and authenticated remote wireless communication of physicians with patients.
- Practical models of intelligent electronic modules for monitoric of the diagnostic data of an outdoor human being.
- Software implementation of secure server databases for telemedicine applications.

[Pro25] **Optoelectronic mikrosystem to make research of samples about nano-liters volumes with using the optical capillaries**, (Mikrosystem optoelektroniczny do badania próbek o nanolitrowych objętościach z wykorzystaniem kapilar optycznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidi, co-worker: Paweł Wrzosek, October 2007 – October 2010

The main aim the project is to study the new, original method to make research of liquid samples about 10 – 9 liters volume, it means possibility of the analysis physics-chemical drop.

Final measurable work effect will be laboratory computer system to analysis chosen liquid parameters together with software to visualization of measuring results.

[Pro26] **Process of spontaneous emission in photonic crystals**, (Proces emisji spontanicznej w kryształach fotonicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Szczepański, co-worker: Adam Rudziński, October 2008 – February 2011

The aim of this project is to develop an analytical model describing the process of spontaneous emission in structure of one-dimensional photonic crystal, that would account for parameters and defects of the structure, as well as spatial distribution of the active medium. The model will be based on quantum theory of interaction of light and matter, and the effective resonator model, used for the description of the photonic crystal's structure. Constructed model will allow to analyze many aspects of the phenomenon, but it could be also used as a tool for designers of modern optoelectronic devices, like distributed-feedback laser resonators, high efficiency light-emitting diodes or dielectric coatings.

[Pro27] **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.

[Pro28] **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 photolithography 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.

[Pro29] **The model of radiation generation in photonic crystal laser analysis**, (Model generacji promieniowania w laserach posiadających ośrodek aktywny w postaci kryształu fotonicznego), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Szczepański, co-worker: Marcin Koba, March 2010 – May 2011

This work introduces the model of light generation in two-dimensional photonic crystal laser. Although this work is limited to two-dimensional structures it remains general and conclusions apply to one- and three-dimensional cases. An approximate model of two-dimensional photonic crystal laser generation at threshold and above threshold has been show. This analysis is based on coupled mode theory and semiclassical theory. Additionally an energy theorem was used to obtain above threshold characteristics. Presented model takes into account nonlinear dispersion of active medium, gain saturation and mode competition effects. The outcome of calculations is valid for square and triangular lattice photonic crystals. On the basis of presented approximate model an output characteristics of laser operation has been shown. They describe output power in terms of a coupling coefficients and allow to define regions of coupling strength corresponding to

maximum power efficiency. Moreover the stability conditions and the characteristics for stable two mode operation has been shown.

- [Pro30] **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.

- [Pro31] **Thin barium titanate layers for microelectronics demand – technology, characterization and applications**, (Warstwy tytanianu baru na potrzeby mikroelektroniki- technologia, charakteryzacja i próby aplikacji), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmids, co-worker: Piotr Firek, October 2008 – March 2010

The main goal of the project is development of the fabrication method of high-k and high-resistive BaTiO₃ thin films and investigation of its properties from the viewpoint of electronics applications.

Development of the fabrication technology (BaTiO₃ deposition, selective etching) will allow for producing of the test structures, like MIM, MIS capacitors, field-effect transistors (FETs) and ion sensitive field-effect transistors (ISFETs) with discussed layers as a gate insulator.

- [Pro32] **Tunable liquid crystal devices working on THz and GHz range**, (Przestrjalne ciekłokrystaliczne przetworniki na zakres THz i GHz.), 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.

- [Pro33] **Unipolar devices and transistors for high-temperature electronics**, (Przyrządy unipolarne i struktury tranzystorowe na potrzeby elektroniki wysokotemperaturowej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmids, co-worker: Mariusz Sochacki. May 2007 – April 2010

Schottky diodes and field effect transistors (MOSFET and JFET) for high-temperature electronics have been designed, developed, measured and characterized. The abovementioned structures have been tested within temperature range from 20°C up to 400°C.

- [Pro34] **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 new 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 International Institutions

- [Pro35] **Center of Nanophotonics** (Centrum nanofotoniki), EU structural project, project leader: Paweł Szczepański, co-worker: Ryszard Piramidowicz, 2009 – 2011

Project POIG. POIG.02.02.00-00-004/08 „Center of Nanophotonics” is realized in the scope of priority 2.2 of Operational Programme Innovative Economy by a consortium led by Institute of Electron Technology. Project is focused on development of a distributed competence center, having highest-level expertise and technical competences in the field

of nanophotonic materials and devices. Institute of Microelectronics and Optoelectronics is one of the main consortium's partners and is responsible for developing laboratory of infra-red spectroscopy oriented towards versatile optical characterization of nano-photonic materials.

- [Pro36] **Establishing of innovative, complementary laboratories dedicated to advanced research in micro-, nano- and optoelectronics**, (Utworzenie grupy innowacyjnych komplementarnych laboratoriów badawczych w obszarze mikro-, nano- i optoelektroniki), EU structural project, project leader: Paweł Szczepański, co-worker: Ryszard Piramidowicz, 2009 – 2011

Project POIG.02.01.00-14-138/08 „Establishing of innovative, complementary laboratories dedicated to advanced research in micro-, nano- and optoelectronics” is realized in the scope of priority 2.1 of Operational Programme Innovative Economy by Institute of Microelectronics and Optoelectronics and Institute of Electronic Systems.

The main aim of the Project is the development of a cluster of complementary laboratories, equipped with state-of-the-art research apparatus, offering high quality scientific services in the field of advanced electronic and photonic technologies. Investments of total value of 7 million EUR will complete R&D base of the laboratories, which shall result in establishment of a laboratory octagon, having at its disposal appropriate scientific expertise, as well as laboratory and prototyping base. State-of-the-art scientific infrastructure, being the primary result of the Project, shall enable more intense participation of IMiO and ISE research teams both in European projects, and large domestic projects involving industrial partners. It shall further allow enhancement of training actions necessary for education of market-demanded, high-quality specialists and professional improvement of employees of various industrial partners.

- [Pro37] **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.

- [Pro38] **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.

- [Pro39] **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 Szmidi, 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 AlGaIn/GaN transistors on silicon substrate.
3. Design, fabrication, development and characterization of multi-parameter classifier of liquid bio-fuels quality.

- [Pro40] **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 Szmidi, 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.

- [Pro41] **Silicon-based nanostructures and naodevices for long-term nanoelectronics applications - NANOSIL, Network of Excellence within IST 7FP of UE**, (Przyrządy nano- oraz nanostruktury krzemowe dla zastosowań w nanoelektornice przyszłości), Sieć doskonałości w ramach 7-tego Programu Ramowego UE, project leader: Romuald Beck, co-workers: B.Majkusiak, L.Łukasiak, K.Dalbiak, W.Ciemiewski, R.Mroczyński, D.Tomaszewski, J. Gibki, J.Grabowski, G. Głuszko, A. Jakubowski, J. Jasiński, A. Mazurak, S. Szostak, J. Stęszewski, J. Walczak, January 2008 – December 2010

NANOSIL project is devoted to wide range of issues concerning silicon – based nanodevices. The main types of activities in which the Division actively participates within this project are:

- manufacturing of CMOS device based on classical approach, as well as on SOI, multigate or strained (SiGe) platforms, with particular attention to problems of mobility gain, leakage reduction, ... etc.;
- devices based on graphene on silicon;
- characterization of the manufactured test devices and diagnostics of problems that should be solved either by technology or device design modifications;
- modelling of all types of structures under investigation in this project.

- [Pro42] **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.

4.4. Other Projects

- [Pro43] **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 Knypys, 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. D.Sc. Degrees

- [DSc1] Ryszard Kisiel, **Solder Joints in Electronic Assembly With the Application of Ecological Materials** (Połączenia lutowane w montażu elektronicznym z zastosowaniem materiałów ekologicznych), 5 May 2010

5.2. Ph.D. Degrees

- [PhD1] Piotr Firek, **Barium titanate layers for microelectronics - technology, characterization and applications**, Warstwy tytanianu baru na potrzeby mikroelektroniki- technologia, charakteryzacja i próby aplikacji, supervisor: Jan Szmidt, 30 March 2010
- [PhD2] Ryszard Gronau, **Carbon layers for electron cold emission**, Warstwy węglowe na potrzeby zimnej emisji elektronów (technologia charakteryzacja), supervisor: Jan Szmidt, 11 May 2010
- [PhD3] Mariusz Klimczak, **Short-wavelength emission in neodymium and holmium doped fluorozirconate fibers**, supervisor: Michał Malinowski, 20 April 2010
- [PhD4] Adam Rudziński, **Process of spontaneous emission in photonic crystals**, Proces emisji spontanicznej w kryształach fonicznych, supervisor: Paweł Szczepański, 15 June 2010

5.3. M.Sc. Degrees

- [MSc1] Rafał Andrzejewski, **Specyfification of planar weveguides by using m-line spectroscopy**, Charakteryzacja falowodów planarnych za pomocą spektroskopii m-line, advisor: Ryszard Piramidowicz, good
- [MSc2] Paweł Hernik, **Synchronous demodulation system for fiber optic measuring sensors**, Układu demodulacji synchronicznej w światłowodowych czujnikach pomiarowych, advisor: Michał Borecki, very good
- [MSc3] Maciej Karpiuk, **DRC module to Integrated Circuits Graphic Topography Editor**, Moduł DRC do graficznego edytora topografii układów scalonych, advisor: Grzegorz Janczyk, very good
- [MSc4] Michał Korniluk, **Recognizing of chosen images contents in uses to monitoring systems of guarded grounds**, Rozpoznawanie wybranych treści obrazowych w zastosowaniu do monitoringu terenów strzeżonych, advisor: Mikołaj Baszun, good
- [MSc5] Paweł Leszcz, **Sensors and measurement techniques in energy-efficient wireless networks**, Czujniki i metody pomiarowe w energooszczędnych sieciach bezprzewodowych, advisor: Zbigniew Pióro, good
- [MSc6] Adam Mazurek, **Editor of circuit diagrams for virtual prototyping of integrated circuits**, Edytor schematów elektrycznych na potrzeby wirtualnego prototypowania układów scalonych, advisor: Wiesław Kuźmicz, very good
- [MSc7] Piotr Mierzwiński, **Realization of 12-bit C/A converter in 0,35um CMOS technology**, Realizacja 12-bitowego przetwornika C/A w technologii CMOS 0,35um, advisor: Zbigniew Jaworski, good
- [MSc8] Wojciech Nasiłowski, **Virtual laboratory: Analysis of optical chromatic dispersion parameters in optical link**, Laboratorium wirtualne: "Badanie parametrów dyspersji chromatycznej łącza optycznego," advisor: Piotr Witoński, excellent
- [MSc9] Łukasz Pytlarczyk, **Implementation of methods to create a digital model of the object by using polarization images**, Implementacja metody tworzenia cyfrowego modelu obiektu z użyciem obrazów polaryzacyjnych, advisor: Marek Sutkowski, very good
- [MSc10] Krzysztof Siwiec, **A 1,5 GHz phase-locked loop in UMC CMOS 90 nm technology**, Implementacja układu pętli fazowej na częstotliwości 1,5 GHz w technologii UMC CMOS 90nm, advisor: Witold Pleskacz, excellent
- [MSc11] Maciej Smyk, **Low-power sequential standard cells for UMC CMOS 90 nm technology**, Niskomocowe sekwencyjne komórki standardowe dla technologii UMC CMOS 90nm, advisor: Witold Pleskacz, very good
- [MSc12] Michał Staniewski, **Modeling of a junction field-effect transistor in the subthreshold range of operation**, Modelowanie tranzystora polowego złączowego w zakresie pracy podprogowej, advisor: Andrzej Pfitzner, very good
- [MSc13] Michał Strzyga, **Modeling of a junction field-effect transistor in over-threshold region**, Modelowanie tranzystora polowego złączowego w zakresie dominacji prądu unoszenia, advisor: Andrzej Pfitzner, excellent

- [MSc14] Tomasz Ścisło, **Implementation of algorithms for critical areas extraction for opens using skill programming language**, Implementacja algorytmów ekstrakcji obszarów krytycznych na rozwarcia w języku SKILL, advisor: Andrzej Wielgus, very good
- [MSc15] Dominik Tanous, **PSoC arrhythmia diagnose system**, Układ PSoC do diagnostyki zaburzeń rytmu serca, advisor: Elżbieta Piwowarska, very good
- [MSc16] Katrin Welikow, **Microstructured fibers for FTTH systems**, Światłowody mikrostrukturalne do zastosowań w systemach FTTH, advisor: Ryszard Piramidowicz, excellent
- [MSc17] Robert Wójcik, **The analysis of PSL applications in formal verification of digital systems**, Analiza zastosowań języka PSL w weryfikacji formalnej systemów cyfrowych, advisor: Elżbieta Piwowarska, good

5.4. B.Sc. Degrees

- [BSc1] Tomasz Adamowicz, **3D video in interactive user interfaces**, Wideo 3D w interaktywnych interfejsach użytkownika, advisor: Piotr Garbat, good
- [BSc2] Adam Andrzejewski, **Implementation of programmable AB class power amplifier in UMC CMOS 90 nm technology**, Implementacja programowalnego wzmacniacza mocy klasy AB w technologii UMC CMOS 90nm, advisor: Witold Pleskacz, very good
- [BSc3] Rafał Borkowski, **Complex permittivity measurements of aqueous saline solutions at microwave frequencies**, Pomiar zespolonej przenikalności elektrycznej wodnych roztworów NaCl w paśmie częstotliwości mikrofalowych, advisor: Jerzy Krupka, good
- [BSc4] Michał Brzeziński, **Implementation of digital-to-analog converter in UMC CMOS 90 nm technology**, Implementacja przetwornika cyfrowo-analogowego w technologii UMC CMOS 90 nm, advisor: Witold Pleskacz, good
- [BSc5] Tymoteusz Ciuk, **Fabrication of ultrathin layers of amorphous silicon by PECVD**, Wytwarzanie ultracienkich warstw krzemu amorficznego metodą PECVD, advisor: Romuald Beck, very good
- [BSc6] Daniel Duchna, **SPARC V8 instructions translator to MOVE architecture**, Translator listy rozkazów procesora SPARC V8 na architekturę MOVE, advisor: Arkadiusz Łuczyk, good
- [BSc7] Michał Czesak, **Programming of MSP430 processor in biomedical applications - user interface**, Oprogramowanie procesora MSP430 dla zastosowań biomedycznych - interfejs użytkownika, advisor: Witold Pleskacz, very good
- [BSc8] Piotr Florczyk, **Fiber laser with loop resonator**, Laser włóknowy z rezonatorem pętlowym, advisor: Ryszard Piramidowicz, good
- [BSc9] Witold Granicki, **Analysis of the influence of a sun-tracking system on photovoltaic module's energy yield**, Badanie wpływu zastosowania systemu nadążnego na uzysk energetyczny modułu fotowoltaicznego, advisor: Stanisław Pietruszko, very good
- [BSc10] Ewa Janas, **Microprocessor controller for fractional-N PLL synthesis**, Sterownik mikroprocesorowy do ułamkowej syntezy PLL, advisor: Jerzy Skulski, very good
- [BSc11] Artur Jaroszek, **Precise current-to-voltage converter for an analog-digital converter**, Projekt precyzyjnego konwertera prąd-napięcie dla potrzeb przetwornika A/C, advisor: Elżbieta Piwowarska, good
- [BSc12] Tomasz Kudliński, **Synthesis of computer generated hologram patterns in CUDA environment**, Generacja cyfrowych wzorców hologramów z wykorzystaniem środowiska CUDA, advisor: Piotr Garbat, very good
- [BSc13] Michał Kulik, **Implementation of single - chip microcontroller 6811 in CMOS C35 technology**, Implementacja mikrokontrolera jednocukłowego 6811 w technologii CMOS C35, advisor: Zbigniew Jaworski, good
- [BSc14] Tomasz Lechowicz, **Simulation of electrical characteristics of organic semiconductor structures**, Symulacja charakterystyk elektrycznych organicznych struktur półprzewodnikowych, advisor: Lidia Łukasiak, very good
- [BSc15] Michał Luśnia, **Performance analysis of the photovoltaic systems based on modules fabricated in different technologies**, Analiza pracy systemów fotowoltaicznych z modułami wykonanymi w różnych technologiach, advisor: Stanisław Pietruszko, good
- [BSc16] Michał Murgrabia, **Implementation of cryptography structure using VHDL language for UMC90 technology**, Implementacja bloku kryptograficznego w języku VHDL dla technologii UMC90, advisor: Arkadiusz Łuczyk, very good
- [BSc17] Marcin Myczka, **Implementation of single - chip microcontroller 8051 in CMOS C35 technology**, Implementacja mikrokontrolera jednocukłowego 8051 w technologii CMOS C35, advisor: Zbigniew Jaworski, very good
- [BSc18] Piotr Nietrzebka, **Comparing photovoltaic modules made in different technologies**, Porównanie modułów fotowoltaicznych wykonanych różnymi technologiemi, advisor: Stanisław Pietruszko, fairly good

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- [BSc19] Tomasz Pińkowski, **Laboratory exercise for use with the reconfigurable PSoC circuit**, Opracowanie ćwiczenia laboratoryjnego z wykorzystaniem układu rekonfigurowalnego PSoC, advisor: Elżbieta Piwowska, very good
- [BSc20] Magdalena Pleban, **Quality of 3D structure assessment in stereo vision systems**, Ocena jakości układów 3D w systemach stereowizyjnych, advisor: Piotr Garbat, good
- [BSc21] Igor Podobiński, **Project and parameters analysis of contactless resistivity measurement of dielectric materials probe**, Projekt i analiza parametrów głowicy pomiarowej do bezkontaktowego pomiaru rezystywności dielektryków, advisor: Sławomir Szostak, good
- [BSc22] Jakub Pruk, **Implementation of selected sequential standard cells for UMC CMOS 90 nm technology in accordance with DFM rules**, Implementacja wybranych sekwencyjnych komórek standardowych dla technologii UMC CMOS 90 nm z uwzględnieniem reguł DFM, advisor: Arkadiusz Łuczyk, good
- [BSc23] Karol Pszczółkowski, **Communication modeling with the bus at the transaction level**, Modelowanie komunikacji z magistralą na poziomie transakcji, advisor: Elżbieta Piwowska, good
- [BSc24] Tomasz Rokosz, **Design of digital voltmeter for use in laboratory**, Opracowanie i oprogramowanie sterowanego mikroprocesorem woltomierza do zastosowań laboratoryjnych, advisor: Jan Gibki, very good
- [BSc25] Emil Roslanowski, **Design of integrated battery voltage detector**, Projekt scalonego detektora stanu naładowania baterii, advisor: Witold Pleskacz, good
- [BSc26] Marek Sanaluta, **Universal inertial module unit**, Uniwersalny moduł inercyjny, advisor: Zbigniew Pióro, good
- [BSc27] Jakub Sarna, **Graphical user interface (GUI) for the visualization and analysis of the two-dimensional photonic crystal band gap**, Opracowanie środowiska graficznego (GUI) do wizualizacji i analizy przerwy fotonicznej dwuwymiarowego kryształu fotonicznego, advisor: Agnieszka Mossakowska-Wyszyńska, fairly good
- [BSc28] Paweł Stadnik, **Scenic fixtures web database in WWW technology**, Internetowa baza urządzeń scenicznych w technologiach WWW, advisor: Elżbieta Piwowska, good
- [BSc29] Ewelina Szpakowska, **Microwave oscillator in transmission mode**, Generator mikrofalowy w układzie transmisyjnym, advisor: Jerzy Skulski, good
- [BSc30] Andrzej Taube, **Optimization of construction and modelling of silicon carbide RESURF LJJFET transistor**, Opracowanie konstrukcji i modelowanie tranzystora RESURF LJJFET w węglu krzemu, advisor: Jan Szmidt, excellent
- [BSc31] Michał Tyszko, **Implementation of specialized digital gates for low power circuits in UMC CMOS 90nm technology**, Implementacja cyfrowych bramek specjalizowanych dla układów niskomocowych w technologii UMC CMOS 90 nm, advisor: Arkadiusz Łuczyk, good
- [BSc32] Maciej Walasik, **Supercapacitors and ultracapacitors - theory, construction solutions and application systems**, Superkondensatory i ultrakondensatory - teoria, rozwiązania konstrukcyjne i układy aplikacyjne, advisor: Zdzisław Mączyński, fairly good
- [BSc33] Michał Waśkiewicz, **Deposition and characterization of MIS capacitors with AIN gate on SiC substrates**, Wytwarzanie i charakteryzacja kondensatorów MIS z bramką AIN na podłożach SiC, advisor: Jan Szmidt, excellent
- [BSc34] Piotr Wnuk, **A robot detecting gasses - communication and steering**, Sterowanie i komunikacja z robotem detekującym gazy, advisor: Zbigniew Pióro, good
- [BSc35] Krzysztof Woźny, **Design of stage lighting controller**, Projekt sterownika oświetlenia scenicznego, advisor: Sławomir Szostak, fairly good
- [BSc36] Michał Wszeborowski, **IC temperature sensor design**, Projekt scalonego czujnika temperatury, advisor: Witold Pleskacz, very good
- [BSc37] Cezary Zawadzki, **Server database for the needs of the telemedical market**, Serwerowa baza danych na potrzeby telemedycyny, advisor: Mikołaj Bazun, good

6. PUBLICATIONS

6.1. Scientific and Technical Papers published in Journals Included in the ISI¹ Database

Number	Journal	Authors	Title	Volume	Pages
[Pub1]	Acta Physica Polonica A	M.Borecki, M.L.Korwin-Pawłowski, M.Bebłowska, M.Szmidt, K.Urbańska, J.Kalenik, Ł.Chudzian, Z.Szczepański, K.Kopczyński, A.Jakubowski, J.Szmidt	Capillary Microfluidic Sensor for Determining the Most Fertile Period in Cows	Vol. 118 No 6	1093 - 1099
[Pub2]	Applied Physics Letters	J.Krupka, W.Strupiński	Measurements of the sheet resistance and conductivity of thin epitaxial graphene and SiC films	96	082101-1 – 082101-3
[Pub3]	Central European Journal of Physics	A.Rudziński, P.Szczepański	Calculation of atomic spontaneous emission rate in 1D finite photonic crystal with defects	Vol. 8 No 5	746 - 759
[Pub4]	Diamond & Related Materials	M.Śmietana, W.J.Bock, J.Szmidt, J.Grabarczyk	Substrate effect on the optical properties and thickness of diamond-like carbon films deposited by the RF PACVD method	19	1461 - 1465
[Pub5]	IEEE Journal of Quantum Electronics	M.Koba, P.Szczepański	Approximate Analysis of nonlinear operation of square lattice photonic crystal laser	Vol. 46, No 6	1003 - 1008
[Pub6]	IEEE Journal of Quantum Electronics	T.Kossek, P.Szczepański	Nonlinear operation of a planar circular-grating DBR laser	Vol. 6	742 - 751
[Pub7]	IEEE Transactions on Microwave Theory and Techniques	J.Krupka, W.Gwarek, N.Kwietniewski, J.G.Hartnett	Measurements of planar metal-dielectric structures using split-post dielectric resonators	Vol. 58 No 12	3511 - 3518
[Pub8]	International Journal of Applied Ceramic Technology	G.Sumesh, A.S.Prabhakaran, S.T.Mailladil, J.Krupka, U.Sreekumar, J.P.Sreekumar	Dielectric, mechanical and thermal properties of low-permittivity polymer-ceramic composites for microelectronic applications	7 [4]	461 - 474
[Pub9]	Journal of Applied Physics	D.Mouneyrac, J.G.Hartnett, J.M de Floch, D.Cros, J.Krupka	Detrapping and retrapping of free carriers in nominally pure single crystal GaP, GaAs, and 4H-SiC semiconductors under light illumination at cryogenic temperatures	108	104107-1 – 104107-6
[Pub10]	Journal of Applied Physics	J.Krupka, W.Gwarek, J.G.Hartnett	Experimental studies of planar metamaterials with a tunable cylindrical TE _{01n} mode cavity	Vol. 107, No 12	124101-1 - 124101- 8
[Pub11]	Materials Science Forum	M.Guziewicz, R.Kisiel, K.Gołaszewska, M.Wzorek, A.Stonert, A.Piotrowska, J.Szmidt	Characteristics of Gold Wire Bonds with Ti- and Ni-based Contact Metallization to n-SiC for High Temperature Applications	645-648	745 - 748
[Pub12]	Measurement Science and Technology	M.Śmietana, W.J.Bock, J.Chen, P.Mikulic	Highly sensitive pressure sensor based on long-period gratings written in a boron co-doped optical fiber	21	1 - 5
[Pub13]	Measurement Science and Technology	M.Śmietana, W.J.Bock, P.Mikulic	Comparative study of long-period gratings written in a boron co-doped fiber by an electric arc and UV irradiation	21	1 - 8
[Pub14]	Optics Communications	L.Y.Shao, A.Laronche, M Śmietana, P.Mikulic, W.J.Bock, J.Albert	Highly sensitive bend sensor with hybrid long-period and tilted fiber Bragg grating	283	2690 - 2694

¹ Institute for Scientific Information (Philadelphia, USA)

[Pub15]	Sensors	M.Borecki, M.L.Korwin-Pawłowski, M.Bebłowska, J.Szmidt, A.Jakubowski	Optoelectronic Capillary Sensors in Microfluidic and Point-of-Care Instrumentation	10	3771 - 3797
[Pub16]	Sensors	M.Śmietana, W.J.Bock, P.Mikulic, J.Chen	Pressure sensing in high-refractive-index liquids using long-period gratings nanocoated with silicon nitride	10	11301 - 11310

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

Number	Journal	Authors	Title	Volume	Pages
[Pub17]	Ceramic Transactions	M.Śmietana, W.Bock, J.Szmidt, G.R.Picrell	Nanocoating enhanced optical fiber sensors	Vol. 222	275 - 286
[Pub18]	Elektronika	M.Duk, T.Zyska, A.Kociubiński, M.Borecki	Optoelektroniczny interfejs nowej generacji dla światłowodowych czujników mikrocieczowych	Vol. 51 No 6	102 - 104
[Pub19]	Forum akademickie	A.Pfützner	Dyskusja wokół projektów strategii szkolnictwa wyższego do roku 2020: Trzeba wyważyć cele i działania	5	29 - 35
[Pub20]	Forum akademickie	J.Woźnicki	Dzieło środowiska i dlatego nowy system	5	26 - 28
[Pub21]	International Journal of Social and Humanistic Computing	B.Czejdo, M.Baszun	Remote patient monitoring system and a medical social network	Vol. 1, No 3	273 - 281
[Pub22]	Journal of Telecommunications and Information Technology	L.Łukasiak, A.Jakubowski	History of Semiconductors	1/2010	3 - 9
[Pub23]	Journal of Telecommunications and Information Technology	M.Kalisz, G.Głuszko, R.B.Beck	The Effect of High Temperature Annealing on Fluorine Distribution Profile and Electro-Physical Properties of Thin Gate Oxide Fluorinated by Silicon Dioxide RIE in CF ₄ Plasma	1/2010	25 - 28
[Pub24]	Journal of Telecommunications and Information Technology	M.Kalisz, G.Głuszko, R.B.Beck	Novel Method of Improving Electrical Properties of Thin PECVD Oxide Films by Fluorination of Silicon Surface Region by RIE in RF CF ₄ Plasma	1/2010	20 - 24
[Pub25]	Journal of Telecommunications and Information Technology	S.Pietruszko, M.Kostana	Metastability problems in amorphous silicon	1	76 - 79
[Pub26]	Journal of Telecommunications and Information Technology	T.Bieniek, G.Janczyk, P.Janus, J.Szynka, P.Grabiec, A.Kociubiński, M.Ekwińska, D.Tomaszewski, A.Malinowski	Multi-Domain Modeling and Simulations of the Heterogeneous Systems	1/2010	34 - 39
[Pub27]	Logistyka	B.Czejdo, M.Baszun	Knowledge processing based on information logistics models	No 2	89 - 96
[Pub28]	Logistyka	M.Baszun, B.Czejdo	Iterative design of proximity sensor array for blind patient vehicle	No 6	161 - 171
[Pub29]	Nauka	J.Woźnicki	Strategia rozwoju szkolnictwa wyższego: 2010-2020. Przedstawienie projektu środowiskowego.	1/2010	97 - 115
[Pub30]	Pauza Akademia - Tygodnik Polskiej Akademii Umiejętności	J.Woźnicki	Zasada konwergencji sektorów publicznego iniepublicznego w szkolnictwie wyższym	80	2
[Pub31]	Photonics Letter of Poland	A.Rudziński, P.Szczepański	Analysis of spontaneous emission in a 1D photonic crystal with effective resonator model	Vol. 2 No 2	79 - 81
[Pub32]	Photonics Letter of Poland	K.Ławniczuk, R.Piramidowicz, P.Szczepański, M.Smit, X.Leijtens	Design study of integrated photonic transmitters for application in Fiber-to-the Home networks	Vol. 2 No 2	61 - 63

[Pub33]	Proc. of SPIE: Laser Physics and Applications	K.Zhelyazkova, T.Eftimov, M.Śmietana, W.J.Bock	A differential detection scheme of spectral shifts in long-period fiber gratings	Vol. 7747	77470S-1 – 77470S-9
[Pub34]	Proc. of SPIE: Optical Fibre Sensors	M.Śmietana, W.J.Bock, J.Chen, P.Mikulic	Extraordinary pressure sensitivity of long-period gratings written in boron co-doped optical fiber	Vol. 7503	75033D-1 – 75033D-4
[Pub35]	Proc. of SPIE: Photonics North 2010	D.Brabant, M.Śmietana, W.J.Bock, D.Niyonkuru	Analytical and comparative study of LPGs manufactured using electric-arc and UV micromachining methods	Vol. 7750	775024-1 – 775024-11
[Pub36]	Proceedings of SPIE: Optical Modelling and Design	M.Koba, P.Szczepański	Aproximate analysis of nonlinear operation of triangular lattice photonic crystal laser	Vol. 7717	771717-1 – 771717-8
[Pub37]	Proceedings of SPIE: Photonics Application in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2010	K.Ławniczuk, R.Piramidowicz, P.Szczepański, M.K.Smit, X.J.M.Leijts	Design of integrated photonic transmitter for application in Fiber-to-theHome systems	Vol. 7745	77450P-1 – 77450P7
[Pub38]	Proceedings of SPIE: Photonics Application in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2010	P.Florczyk, K.Anders, P.Gdula, A.Jusza, R.Piramidowicz	Fiber laser with loop reflector	Vol. 7745	77450H-1 – 77450H-7
[Pub39]	Proceedings of SPIE: Photonics Applications in Astronomy, Communications, Research and High Energy Physics Experiments	K.Janeczek, A. Młodziak, G.Kozioł, M.Jakubowska, P.Bajurko	Screen printed UHF antennas on flexible substrates	vol. 7745	1 - 7
[Pub40]	Zeszyty Naukowe Wydziału ETI Politechniki Gdańskiej	M.Duk, A.Kociubiński, T.Zyska, M.Borecki	Moduły elektroniczne do integracji mikrocieczowego czujnika kapilarnego	Vol. 19 No 8	397 - 400

6.3. Scientific and Technical Papers Published in Conference Proceedings

Number	Conference	Authors	Title	City, Country	Pages
[Pub41]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	A.Malinowski, L.Łukasiak, A.Jakubowski, D.Tomaszewski et. al.	3D TCAD simulation study of the influence of line-width roughness on FinFET performance for the 22-nm technology node, MN-16	Wrocław, Poland	1 - 4
[Pub42]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	A.Mazurak, B.Majkusiak	Modeling the Charge Trapping Effect in High-K Gate Stacks on the Tunnel Current, MN-17	Wrocław, Poland	1 - 4
[Pub43]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	A.Sawicka, B.Majkusiak, T.Numata, S.Uno, G.Milnikov, N.Mori	Modelling the Ballistic and Tunnel Source-Drain Current in Silicon Nanowire MOSFETs, MN-22	Wrocław, Poland	1 - 4
[Pub44]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	B.Majkusiak	Characterization of MOS Structures with Ultrathin Insulator Layer by Means of a Theoretical Model, MN-15	Wrocław, Poland	1 - 4

[Pub45]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	B.Majkusiak, R.B.Beck, A.Mazurak, J.Grabowski	Investigation of Double Barrier MOS Tunnel Diodes with PECVD Silicon Quantum Well	Wrocław, Poland	1 - 4
[Pub46]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	E.Dumiszewska, W.Strupiński, M.Wesołowski, P.Knyps	III-V solar cells grown by MOVPE, FO-3	Wrocław, Poland	
[Pub47]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	J.Grabowski, A.Mazurak, T.Płociński, K.J.Kurzydłowski, B.Majkusiak, R.B.Beck	PECVD ultrathin amorphous silicon layer for novel structures, MN-4	Wrocław, Poland	26
[Pub48]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	J.Jasiński, G.Głuszko, L.Lukasiak, A.Jakubowski, H.Gottlob, M.Lopes, J.Schubert	Influence of annealing temperature on MOSCAPs with LaLuO gate oxide, MN-10	Wrocław, Poland	1 - 4
[Pub49]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	J.Jasiński, M.Iwanowicz, L.Lukasiak, A.Jakubowski	Electrical characterization of MOSFETs with HfSiON gate oxide, MN-9	Wrocław, Poland	1 - 4
[Pub50]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	J.Kalenik, E.Kowalska, M.Kozłowski, K.Król, M.Mroczkowski, E.Czerwosz	Temperature changes in C-Pd nanocrystalline films, ME-3	Wrocław, Poland	1 - 4
[Pub51]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	J.Walczak, B.Majkusiak	Modelling the gate-tunnel current in the ultrathin double-gate SOI MOSFETs, MN-27	Wrocław, Poland	49
[Pub52]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	J.Walczak, B.Majkusiak	Modelling the Source-Drain Current in Ultrathin Double-Gate SOI MOSFET, MN-28	Wrocław, Poland	1 - 4
[Pub53]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	K.Krogulski, L.Lukasiak, A.Jakubowski	Model of SiGe MOS transistor with graded Ge content along the channel, MN-13	Wrocław, Poland	1 - 4
[Pub54]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Borecki, M.L.Korwin-Pawłowski, M.Bebłowska, J.Szmidt	Bio-fuel classification method using intelligent fiber optic capillary structures	Wrocław, Poland	
[Pub55]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Iwanowicz, J.Jasiński, G.Głuszko, L.Lukasiak, A.Jakubowski, H.Gottlob	Studies of the quality of GdSiO-Si interface, MN-7	Wrocław, Poland	1 - 4
[Pub56]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Iwanowicz, L.Lukasiak, A.Jakubowski	Vector for pulse characterization of MOS devices, MN-8	Wrocław, Poland	1 - 4
[Pub57]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Kalisz, R.Mroczyński, R. B.Beck	Improvement of immunity on MeV electron radiation of MOS structures by means of ultra-shallow fluorine implantation, MN-12	Wrocław, Poland	1 - 5
[Pub58]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Malinowski, B.Fetliński, M.Jużwik, P.Knyps, P.Zabierski, M.Sibiński	Materials and technologies for modern photovoltaics	Wrocław, Poland	1 - 5
[Pub59]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Mroczkowski, M.Cież, J.Kalenik	Studies of rejuvenation of electroluminescent thick structures, IC-30	Wrocław, Poland	1 - 4
[Pub60]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Sochacki, J.Szmidt	Perspectives for developing silicon carbide technology in Poland	Wrocław, Poland	
[Pub61]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	M.Łączala, R.Paszkwicz, B.Paszkwicz, T.Pisarkiewicz, J.Szmidt, M.Sochacki	New materials and technologies in microelectronics	Wrocław, Poland	1 - 2
[Pub62]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	P.Firek, J.Szmidt	MISFET structures with barium titanate dielectric layers for memory cells applications, MN-2	Wrocław, Poland	1 - 4

[Pub63]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	P.Sałek, L.Łukasiak	New threshold voltage definition based on approximate potential distribution for undoped symmetrical DGMOSFET, MN-21	Wrocław, Poland	1 - 3
[Pub64]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	S.Szostak, I.Podobiński, J.Krupka	Charge amplifier for contactless capacitive method for characterization of semi-insulating substrates	Wrocław, Poland	
[Pub65]	10 th Conference „Electron Technology” ELTE’2010, 22 – 25 September	T. Bieniek, G.Janczyk, S.Kliciński, P.Janus, P.Grabiec, J.Szynka	Methodology and tools for customer-oriented product engineering of micro and nano devices	Wrocław, Poland	1 - 4
[Pub66]	10 th International Workshop of Advanced Plasma Processing and Diagnostics, 8 – 10 January	A.Malinowski, L.Łukasiak, A.Jakubowski, M.Sekine, M.Hori, D.Tomaszewski	Simulation of 3D gate fabrication by plasma etching for environment-friendly processing	Nagasaki, Japan	29
[Pub67]	11 th Scientific Conference Optoelectronic and Electronic Sensors COE, 20 – 23 June	M.Duk, T.Zyska, A.Kociubiński, M.Borecki	Optoelektroniczny interfejs nowej generacji dla światłowodowych czujników mikrocieczowych	Nałęczów, Poland	1 - 8
[Pub68]	13 th IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems, 14– 16 April	J.Grażdzi, T.Borejko, W.Pleskacz	A Comparison of Low Voltage LNA Architectures Designed for Multistandard GNSS in Two 90nm CMOS Technologies	Vienna, Austria	213 - 216
[Pub69]	16 th Workshop on Dielectrics in Microelectronics, 28 – 30 June	A.Mazurak, J.Walczak, B.Majkusiak	Modelling of tunneling through a three-layer gate stack with/without a quantum well	Bratislava, Slovakia	32
[Pub70]	17 th Int. Conference “Mixed Design of Integrated Circuits and Systems,” MIXDES 2010, 24 – 26 June	M.Bryk, A.Wielgus	Digital Implementation of a Programmable Type-2 Fuzzy Logic Controller	Wrocław, Poland	255 - 258
[Pub71]	18 th Int. Conference on Microwaves, Radar and Wireless Communications, MIKON-2010, 14 –16 June	K.Derzakowski, J.Krupka	Measurements of the Complex Permeability of Yttrium Iron Garnet Substrates Near Ferromagnetic Resonance	Vilnius, Lithuania	94 - 96
[Pub72]	1 st Ukrainian-French Seminar “Semiconductor-on-Insulator Materials, Devices and Circuits: Physics, Technology and Diagnostics” & 6 th Int. SemOI Workshop “Nanoscaled Semiconductor-on-Insulator Materials, Sensors and Devices,” 26 – 30 April	B.Majkusiak, A.Mazurak	Some Issues of Modeling the Double Barrier Metal-Oxide-Semiconductor Tunnel Structure	Kyiv, Ukraine	77 - 78
[Pub73]	2 nd International Symposium on Advanced Plasma Science and its Applications for Nitrides and Nanomaterials, ISPlasma2010, 7 – 10 March	A.Malinowski, M.Hori, M.Sekine, T.Suzuki, H.Yamamoto, H.Kondo, K.Ishikawa, A.Jakubowski, L.Łukasiak, D.Tomaszewski	Modeling of Radical Transformation under ‘PAPE’ Structures and Method of Estimation for Surface Loss Probabilities of Radicals	Nagoya, Japan	126
[Pub74]	2 nd Polish-Korean Workshop on Information and Communication Technologies, 30 September	B.Fetliński, M.Jużwik, M.Malinowski	Photovoltaic activities at FEIT	Warsaw, Poland	
[Pub75]	2 nd Polish-Korean Workshop on Information and Communication Technologies, 30 September	L.Łukasiak, R.B.Beck	Characterization and technology of Modern MOS Devices	Warsaw, Poland	

[Pub76]	33 rd Int. Spring Seminar on Electronics Technology, ISSE'2010, 12– 16 May	A.Werbowy	Nanotechnology Consumer Products	Warsaw, Poland	16
[Pub77]	33 rd Int. Spring Seminar on Electronics Technology, ISSE'2010, 12– 16 May	R.Kisiel, M.Guziewicz, Z.Szczepański, K.Król	An overview of materials and bonding techniques for inne connections in SiC high power and high temperature devices	Warsaw, Poland	33 - 34
[Pub78]	34 th International Microelectronics and Packaging IMAPS-CPMT Poland Conference, 22 – 25 September	A.W.Stadler, Z.Zawiślak, A.Kolek, K.Kiełbasiński, M.Jakubowska	Further improvement of Pb/Cd-free CaRuO ₃ thick-film resistors	Wrocław, Poland	1 - 6
[Pub79]	34 th International Microelectronics and Packaging IMAPS-CPMT Poland Conference, 22 – 25 September	J.Kalenik, K.Kiełbasiński, K.Król	Temperature controller for diaposable lab-on-chip microsystem	Wrocław, Poland	1 - 3
[Pub80]	34 th International Microelectronics and Packaging IMAPS-CPMT Poland Conference, 22 – 25 September	K.Kiełbasiński, M.Jakubowska, A.Młóżniak	Lead free material system for chip resistors	Wrocław, Poland	1
[Pub81]	34 th International Microelectronics and Packaging IMAPS-CPMT Poland Conference, 22 – 25 September	R.Kisiel, M.Guziewicz, K.Gołaszewska, M.Sochacki	Mechanism of carriers transport in Ni/n-SiC, Ti/n-SiC and AlTi/p-SiC ohmic contacts	Wrocław, Poland	1 - 4
[Pub82]	34 th International Microelectronics and Packaging IMAPS-CPMT Poland Conference, 22 – 25 September	Z.Szczepański, R.Kisiel	Packaging technologies for SiC power devices	Wrocław, Poland	1 - 4
[Pub83]	3 rd International Conference on Plasma-Nanotechnology & Science, IC-PLANTS 2010, 11 – 12 March	A.Malinowski, M.Hori, M.Sekine, H.Kondo, L.Lukasiak, A.Jakubowski, D.Tomaszewski	Investigation of Influence of Single Carbon Nano Wall Structure on Field Effect Transistor Electrical Parameters and Characteristics	Nagoya, Japan	6 - 7
[Pub84]	57 th Spring Meeting of Japanease Society of Applied Physics, 17 – 20 March	A.Malinowski, M.Hori, M.Sekine, L.Lukasiak, A.Jakubowski, D.Tomaszewski	Introduction to modeling of a transport mechanizm in single carbon wall field effect transistor based on Landauer-Buttiker formalizm	Kanagawa, Japan	17 - 18
[Pub85]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	E.Czerwosz, E.Kowalska, M.Kozłowski, P.Firek, J.Szmidt	Nanoporous film containing Pd nanograins growth on silicon covered with DLC layer	Zakopane, Poland	179 - 180
[Pub86]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	E.Czerwosz, M.Kozłowski, J.Rymarczyk, H.Wronka, P.Firek, J.Szmidt	The influence of thermal annealing on the topography and structure of carbon nanocomposite films containing palladium nanograins	Zakopane, Poland	183 - 184

[Pub87]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	J.Kalenik, J.Szmidt, K.Kielbasiński	Electrical properties of Pd crystals containing carbon fils at elevated temperatures	Zakopane, Poland	176 - 177
[Pub88]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	J.Stęszewski, M.Bakowski, G.Gluszko, L.Lukasiak, A.Schöner, A.Jakubowski	Characterization of 3C-SiC VDMOSFETs using charge pumping method	Zakopane, Poland	88 - 89
[Pub89]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	K.Król, J.Szmidt, M.Sochacki, M.Kalisz	Oxidation of silicon carbide: process charcterization and kinetic modeling	Zakopane, Poland	75 - 76
[Pub90]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	M.Kalisz, R.Mroczyński, R.B.Beck	Effect od the fluorine implantation on electrical characteristics of MIS structures with PECVD silicon oxynitride layers	Zakopane, Poland	96 - 97
[Pub91]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	M.Sochacki, N.Kwietniewski, M.Kalisz, R.Mroczyński, J.Szmidt	Electrical properties of MOS interface by thermal Annealing of PECVD oxynitrides	Zakopane, Poland	69
[Pub92]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	M.Waškiewicz, P.Firek, K.Zdunek, J.Szmidt, R.Chouñ, K.Nowakowska-Langier	Influence of annealing on electronic properties of thin AlN films deposited by magnetron sputtering method on silicon substrates	Zakopane, Poland	98
[Pub93]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	N.Kwietniewski, M.Kalisz, R.Mroczyński, J.Jasiński, M.Sochacki, J.Szmidt	Characterization of 4H-SiC RESURF MOSFET transistors	Zakopane, Poland	91

[Pub94]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	P.Caban, W.Strupiński, M.Wójcik, J.Gaca, J.Szmidt, D.Caliskan, O.Kelekci, E.Ozbay	Growth of GaN on SiC low pressure MOVPE for HEMTs applications	Zakopane, Poland	90
[Pub95]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	P.Firek, J.Szmidt, M.Kozłowski	DLC Layers for sensor application deposited on different substrates	Zakopane, Poland	178
[Pub96]	5 th Wide Bangap Materials – progress in synthesis and applicatons and 7 th Diamond & Related Films jointly with 2 nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials, 28 June – 2 July	W.Strupiński, R.Jakiela, P.Caban, M.Wesołowski	P-type doping optimisation of epitaxial 4H-SiC layers	Zakopane, Poland	73
[Pub97]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	A.Blew, D.Nguyen, J.Krupka, J.Mazierska	Microwave and RF methods of contact-less mapping of the sheet resistance and the complex permittivity of conductive materials	Warsaw, Poland	102 - 103
[Pub98]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	B.J.Jankiewicz, J.Parka, R.Dąbrowski	Properties of liquid crystalline materials for applications in phase shifters operating at GHz frequency range	Warsaw, Poland	146 - 147
[Pub99]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	H.Wang, F.Xiang, L.Shui, J.Krupka	Dielectric measurement at microwave frequencies in high temperature range employing TE _{01δ} resonator technique	Warsaw, Poland	124
[Pub100]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	J.G.Hartnett, J.Krupka, N.Kwietniewski	Dielectric and magnetic properties of metamaterials at microwave frequencies pyrochlores	Warsaw, Poland	38 - 39
[Pub101]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	J.Kowrdziej, J.Parka, J.Krupka	Negative-zero-positive metamaterials with liquid crystals at microwave frequencies	Warsaw, Poland	138 - 139
[Pub102]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	J.Parka, J.Krupka, K.Czupryński	Liquid crystal anisotropy properties in GHz wave range and possibility of their application	Warsaw, Poland	127 - 128
[Pub103]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	M.Jakubowska, A.Młożniak, J.Krupka	Dielectric and magnetic properties of PMMA/Al thick films at microwave frequencies	Warsaw, Poland	122 - 123

[Pub104]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	M.Valant, G.S.Babu, A.K.Axelsson, T.Kolodiaznyyi, J.Krupka	New generation of functional pyrochlores – magnetic semiconductor pyrochlores	Warsaw, Poland	34 - 35
[Pub105]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	P.Los, A.Łukomska, S.Kowalska, R.Jezińska, P.Zaprzański, J.Krupka	Polymers composite metamaterials with nanocopper fillers	Warsaw, Poland	144
[Pub106]	6 th Int. Conference on Microwave Materials and their Applications, MMA'2010, 1 – 3 September	Z.Buczko, J.Krupka, W.Okuroski, A.Przywóski, J.Jakubiak	Microwave properties of electrolytic metal coatings	Warsaw, Poland	136
[Pub107]	6 th International Conference on Rare Earth Development and Application, 2 – 6 August	S.Mahlik, M.Malinowski, M.Gruber	High pressure and time resolved luminescence spectra of Gd ₃ Ga ₅ O ₁₂ :Pr ³⁺	Beijing, China	
[Pub108]	6 th Workshop of the Thematic Network on Silicon-On-Insulator Technology, Devices and Circuits, EUROSOI 2010, 25 – 27 January	A.Mazurak, B.Majkusiak, J.Grabowski, R.B.Beck	Examination of physical structure of experimental double barrier MOS tunnel diode by comparison with theoretical Models	Grenoble, France	85 - 86
[Pub109]	8 th European Workshop on Microelectronics Education, 10– 12 May	W.Kuźmich, B.de Mey	Old IDESA and New IDESA-2: European Training Programs for Implementation of DSM CMOS ASICs	Darmstadt, Germany	74 - 77
[Pub110]	Conference Capture, Transmission and Display of 3D Video, 3DTV-CON 2010, 7 – 9 June	P.Garbat, M.Sutkowski	3D Shape measurement system based on structure light and polarization analysis	Tampere, Finland	1 - 4
[Pub111]	E-learning wyzwaniem dla nowoczesnej edukacji	B.Galwas, P.Kopciał	E-learning w edukacji	Warsaw, Poland	1 - 8
[Pub112]	European Materials Research Society Spring Meeting (E-MRS), 6 – 11 June	M.Malinowski	Concentration effects on Pr ³⁺ luminescence in LaAlO ₃ crystals	Strasbourg, France	
[Pub113]	European Optical Society – Topical Meeting on Diffractive Optics, 14 – 18 February	M.Koba, P.Szczepański	Analysis of Spatial hole burning effect in square lattice photonic crystal laser	Koli, Finland	
[Pub114]	Excited States of Transition Elements, ESTE-2010 and Workshop on Luminescence, 11 – 15 September	K.Anders, A.Jusza, R.Piramidowicz, M.Malinowski, R.Stępień	Up-conversion processes in erbium doped TZN glasses under IR excitation	Wrocław, Poland	
[Pub115]	Excited States of Transition Elements, ESTE-2010 and Workshop on Luminescence, 11 – 15 September	M.Kaczkan, D.A.Pawlak, S.Turczyński, M.Malinowski	Emission properties of (SrTiO ₃ – TiO ₂):Pr ³⁺ eutectic with self-organized fractal microstructure	Wrocław, Poland	
[Pub116]	Excited States of Transition Elements, ESTE-2010 and Workshop on Luminescence, 11 – 15 September	M.Malinowski	Multi-photon and multi-ion processes in praseodymium activated materials	Wrocław, Poland	
[Pub117]	Excited States of Transition Elements, ESTE-2010 and Workshop on Luminescence, 11 – 15 September	S.Mahlik, M.Malinowski, M.Gruber	High pressure and time resolved luminescence spectra of Gd ₃ Ga ₅ O ₁₂ :Pr ³⁺	Wrocław, Poland	

[Pub118]	International Conference Ion Implantation and Other Applications of Ions and Electrons, ION'2010, 14 – 17 June	M.Sochacki, N.Kwietniewski, J.Szmidt, P.Kowalczyk	Reactive ion etching (RIE) of 4H-SiC in fluorinated plasma for device fabrication	Kazimierz Dolny, Poland	47
[Pub119]	International Conference the Advancement of Materials&Nanotechnology, ICAMN'2010, 29 November – 1 December	J.Krupka, W.Strupiński	Electrical properties of graphene films grown on semi-insulating SiC substrates	Kuala Lumpur, Malaysia	83
[Pub120]	JARA-FIT nanoelectronics days 2010, 4 – 7 October	B.Majkusiak, R.B.Beck, A.Mazurak, J.Grabowski	Double barrier MOS tunnel diodes with PECVD silicon layers	Aachen, Germany	86
[Pub121]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	A.Drożdźiel, M.Kilik, S.Prucnal, K. Pyszniak, M.Rawski, M.Turek, A.Kubiak, Z.Lisik, N.Kwietniewski, M.Sochacki, J.Szmidt, J.Żuk	Otrzymywanie domieszkowanych obszarów SiC metodą implantacji jonów oraz ich wykorzystanie do formowania złącz p-i-n	Darłowo, Poland	361 - 363
[Pub122]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	J.Żuk, A.Drożdźiel, K.Pyszniak, S.Prucnal, M.Turek, M.Sochacki, J.Szmidt, Z.Lisik, A.Kubiak	Domieszkowanie węgla krzemu metodą implantacji jonowej	Darłowo, Poland	180 - 198
[Pub123]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	K.Król, M.Sochacki, J.Szmidt	Modelowanie kinetyki utleniania termicznego węgla krzemu	Darłowo, Poland	367 - 369
[Pub124]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	M.Guziewicz, K.Gołaszewska, R.Kisiel, M.Sochacki	Wytworzenie i cechy kontaktu omowego TiAl do P-SiC 4H	Darłowo, Poland	367 - 368
[Pub125]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	M.Sochacki, M.Kalisz, P.Firek, K.Król, K.Pazio, J.Jasiński, J.Żuk, A.Piotrowska, J.Szmidt	Przyrządy unipolarne i struktury tranzystorowe na potrzeby elektroniki wysokotemperaturowej	Darłowo, Poland	252 - 276
[Pub126]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	N.Kwietniewski, M.Kalisz, R.Mroczyński, G.Głuszko, J.Jasiński, M.Sochacki, J.Szmidt	Tranzystory RESURF MOSFET na podłożu 4H-SiC	Darłowo, Poland	372 – 374
[Pub127]	Krajowa Konferencja Elektroniki KKE'2010, 30 May – 2 June	R.Kisiel, Z.Szczepański, R.Biaduń, N.Kwietniewski, A.Piotrowska, M.Guziewicz, E.Kamińska, M.Borysewicz, K.Gołaszewska	Technologia kontaktów i montażu dla przyrządów z węgla krzemu do zastosowań wysokotemperaturowych, wysokomocowych i wysokoczęstotliwościowych	Darłowo, Poland	199 - 218
[Pub128]	Proceedings of 13th International Conference on Silicon Carbide and related Materials	K.Racka-Dzietko, E.Tymicki, K.Grasza, M.Raczkiewicz, R.Jakiela, M.Kozubal, E.Jurkiewicz-Wagner, A.Brzozowski, R.Diduszko, M.Piersa, K.Kościewicz, M.Pawłowski, J.Krupka	Characterization of vanadium doped 4h-and 6H-SiC grown by PVT method using the open seed backside	Nürnberg, Germany	21 - 24
[Pub129]	Proceedings of the 15 th Annual Symposium of the IEEE Photonics Benelux Chapter, 18 – 19 November	K.Ławniczuk, R.Piramidowicz, P.Szczepański, M.K.Smit and X.J.M.Leijtens	Design of integrated photonic transmitter in a multi-project wafer	Delft, The Netherlands	205 - 208
[Pub130]	Thrid World Summit on the Knowledge Society, 22 – 24 September	B.Czejdo, M.Baszun	Information logistic for incomplete knowledge processing	Corfu, Greece	295 - 302

[Pub131]	VI Sympozjum Naukowe Techniki Przetwarzania Obrazu, 18 – 20 November	M.Sutkowski, A.Szymańska	Analiza wpływu stopnia kompresji plików graficznych (JPEG) na jakość obrazu 3D w odniesieniu do przepustowości sieci światłowodowych	Serock, Poland	1 - 6
[Pub132]	VI Sympozjum Naukowe Techniki Przetwarzania Obrazu, 18 – 20 November	M.Sutkowski, D.Drewulski	Implementacja metody automatycznego tworzenia obrazów o podwyższonej dynamice (HDR) dla potrzeb systemów bezpieczeństwa	Serock, Poland	1 - 9
[Pub133]	VI Sympozjum Naukowe Techniki Przetwarzania Obrazu, 18 – 20 November	M.Sutkowski, P.Garbat, Ł.Pytlarczy	Implementacja metody tworzenia cyfrowego modelu obiektu z użyciem obrazów polaryzacyjnych	Serock, Poland	1 - 8
[Pub134]	VI Sympozjum Naukowe Techniki Przetwarzania Obrazu, 18 – 20 November	P.Garbat, M.Pleban	Wyświetlanie obrazów 3D w kontekście czynników warunkujących komfort widzenia	Serock, Poland	1 - 5
[Pub135]	VI Sympozjum Naukowe Techniki Przetwarzania Obrazu, 18 – 20 November	T.Grudniewski, M.Sutkowski, J.Parka, W.Piecek, E.Nowinowski-Kruszelnicki	Domieszkowane barwnikami Ferroelektryczne materiały SmC* w aplikacjach holograficznych	Serock, Poland	1 - 6
[Pub136]	Warsaw Seminar "Advances in Web education, 25 February	B.Galwas	Edukacja w przyszłości i przyszłość edukacji	Warsaw, Poland	1 - 9
[Pub137]	X Conference Virtual University - model, tools, practice, 16 – 18 June	B.Galwas	Informatyka i Internet w modelu edukacji uniwersyteckiej XXI wieku	Warsaw, Poland	1 - 8
[Pub138]	X Conference Virtual University - model, tools, practice, 16 – 18 June	M.Pajer, B.Galwas	Otwarty system czasopism i jego zastosowania w środowisku edukacji elektronicznej	Warsaw, Poland	1 - 5
[Pub139]	X Conference Virtual University - model, tools, practice, 16 – 18 June	T.Gomułowska, B.Galwas	Charakterystyka procesu tworzenia globalnych zasobów Open Access	Warsaw, Poland	1 - 6
[Pub140]	X Conference Virtual University - model, tools, practice, 16 – 18 June	T.Popis, B.Galwas, E.Piwowska	System teleinformatyczny INSPEKTION jako przykład narzędzia egzaminowania przez Internet	Warsaw, Poland	1 - 7
[Pub141]	X Conference Virtual University - model, tools, practice, 16 – 18 June	B.Galwas	Informatyka i Internet w modelu Edukacji Uniwersyteckiej XXI wieku	Warsaw, Poland	1 - 10
[Pub142]	XX International Travelling Summer School on Microwaves and Lightwaves, 3 – 9 July	B.Galwas	RF Photonic Technology	Metz, France	1 - 7
[Pub143]	XX International Travelling Summer School on Microwaves and Lightwaves, 3 – 9 July	P.Szczepański	Photonic crystals	Metz, France	1 - 35

6.4. Scientific and Technical Books

Number	Authors	Publisher	Title, volume, pages
[Pub144]	M.Borecki	Oficina Wydawnicza Politechniki Warszawskiej	Modelowanie i konstrukcja wieloparametrycznych natężeniowych czujników światłowodowych, vol. 173, pp. 1 - 198
[Pub145]	A.Domański, Z.Jankiewicz, T.Woliński, W.Woliński, S.Kłosowicz, T.Pustelny, R.Romaniuk	Oficina Wydawnicza Politechniki Warszawskiej	Analiza stanu i kierunku rozwoju krajowych ośrodków naukowych i firm produkcyjnych w dziedzinie optoelektroniki i fotoniki, in „Analiza stanu i kierunku rozwoju elektroniki i telekomunikacji,” pp.183 - 224

[Pub146]	B.Galwas	Wydawnictwa Polskiej Akademii Nauk	Szczególna rola technologii w przejściu do ery Internetu, in „Rola nauki w myśleniu o przyszłości,” pp141 - 155
[Pub147]	J.Kleer, A.Wierzbicki, B.Galwas, L.Kuźnicki	Komitet Prognoz Polska 200 Plus przy Prezydium PAN	Wyzwania przyszłości - szanse i zagrożenia, p. 469
[Pub148]	B.Majkusiak, P.Palestri, A.Schenk, A.S. Spinelli, C.M.Compagnoni, M.Luisier	John Wiley & Sons, Inc.	Modeling and simulation approaches for gate current computation, in “Nanoscale CMOS Innovative Materials, Modeling and Characterization”, pp. 213-257
[Pub149]	R.Romaniuk, R.Piramidowicz	Oficina Wydawnicza Politechniki Warszawskiej	Fotonika i technologie terahercowe. Rozwój Wydziałowego Centrum Badawczego FOTEH, p.125
[Pub150]	J.Szmidt, A.Werbowy, M.Jakubowski, R.Kisiel, Z.Lisik, T.Pisarkiewicz, M.Łączala, M.Godlewski, T.Gotszalk, A.Jeleński, R.Paszkiwicz, R.Piramidowicz	Oficina Wydawnicza Politechniki Warszawskiej	Stan obecny i perspektywy rozwoju technologii materiałów elektronicznych w Polsce, in „Analiza stanu i kierunki rozwoju elektroniki i telekomunikacji,” pp.225 - 253
[Pub151]	J.Woźnicki	Fundacja na rzecz Nauki Polskiej – Fundacji Dyskusje o Nauce	Projekt środowiskowy rozwoju szkolnictwa wyższego na lata 2010 – 2020 in „Sporne kwestie strategii rozwoju nauki i szkolnictwa wyższego,” pp. 15 - 24

7. PATENTS

- [Pat1] J.Kalenik, K.Kielbasiński, **Method of heated object temperature measurement** (Sposób pomiaru temperatury obiektu podgrzewanego), Zgłoszenie patentowe nr Z-392429, złożone w Urzędzie Patentowym RP 17.09.2010
- [Pat2] P.Ristola, J.Vilo, J.Piotrowski, **Apparatus for Microwave Heating of Planar Products**, (Urządzenie do mikrofalowego grzania płaskich produktów), United States Patent Application Publication No.: US 2010/0059510 A1, Pub. Date: 11.03.2010
- [Pat3] P.Ristola, J.Vilo, J.Piotrowski, **Waveguide Element**, (Falowodowy element), United States Patent Application Publication No.: US 2010/0060391 A1, Pub. Date: 11.03.2010

8. REPORTS

- [Rep1] **Analysis, modeling and investigation of waveguide structures for amplifiers and lasers and characterization of optically active materials**, (Analiza, modelowanie i badanie światłowodowych struktur wzmacniających i laserowych oraz charakteryzacja materiałów optycznie aktywnych), sub-project leader: Michał Malinowski
- [Rep2] **Center of Nanophotonics** (Centrum nanofotoniki), EU structural project, project leader: Paweł Szczepański
- [Rep3] **Characterization of construction and materials used for microsystems sensors technology** (Charakteryzacja konstrukcji i materiałów dla mikrosystemowych technik sensorowych), sub-project leader: Jan Szmidt
- [Rep4] **Contact and assembly technologies for high temperature, high power and high frequency applications of SiC devices**, (Technologia kontaktów i montażu dla przyrządów z węgla krzemu do zastosowań wysokotemperaturowych, wysokomocowych i wysokoczęstotliwościowych), project leader: Ryszard Kisiel
- [Rep5] **Deposition and measurements of thin metal and dielectric films intended for nanoelectronics and microwave technique**, (Wytwarzanie i charakteryzacja cienkich warstw metalicznych i dielektrycznych dla potrzeb nanoelektroniki i techniki mikrofalowej), project leader: Jerzy Krupka
- [Rep6] **Effects of silicon gate region modification with fluorine on the properties of MOS devices** (Wpływ modyfikacji powierzchni krzemu w obszarze bramki fluorem na właściwości struktur MOS), sub-project leader: Romuald Beck
- [Rep7] **Electrical characterization of dielectric-semiconductor interface in advanced MOS structures**, (Elektryczna charakteryzacja powierzchni granicznej dielektryk-półprzewodnik w zaawansowanych strukturach MOS), project leader: Lidia Łukasiak
- [Rep8] **Establishing of innovative, complementary laboratories dedicated to advanced research in micro-, nano- and optoelectronics**, (Utworzenie grupy innowacyjnych komplementarnych laboratoriów badawczych w obszarze mikro-, nano- i optoelektroniki), EU structural project, project leader: Paweł Szczepański
- [Rep9] **Ferroelectric smectic LC materials in holographic recordings**, (Ciekłokrystaliczne smektyczne materiały o właściwościach ferroelektrycznych do zapisów holograficznych), project leader: Janusz Parka
- [Rep10] **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
- [Rep11] **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
- [Rep12] **Light generation in planar waveguide lasers based on two dimensional photonic crystals** (Generacja promieniowania w falowodowych laserach planarnych wykonanych na bazie dwu-wymiarowych kryształów fonicznych), project leader: Paweł Szczepański
- [Rep13] **Liquid crystal cells in GHz range and structural analysis of 3D objects** (Ciekłokrystaliczne przetworniki w zakresie GHz i analiza struktur obiektów 3D), sub-project leader: Janusz Parka
- [Rep14] **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
- [Rep15] **Modeling and characterization of multigate MOS SOI structures** (Modelowanie i charakteryzacja wielobramkowych struktur MOS SOI), project leader: Andrzej Jakubowski

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- [Rep16] **Modeling and characterization of semiconductor devices fabricated on silicon carbide cubic (3C-SiC) and hexagonal (4H-SiC) polytype substrates**, (Modelowanie i charakteryzacja przyrządów półprzewodnikowych wytworzonych na kubicznej (3C-SiC) oraz heksagonalnej (4H-SiC) odmianie węgla krzemu), project leader: Andrzej Jakubowski
- [Rep17] **Modeling of silicon structures with low-dimensional electron gas**, (Modelowanie struktur krzemowych z niskowymiarowym gazem elektronowym), project leader: Jakub Walczak
- [Rep18] **Next generation teleinformatics service and nets – technology, application and market aspects. Development of technology and algorithms for telemedicine services using of Internet and cell telephone nets**, (Usługi i sieci teleinformatyczne następnej generacji – aspekty techniczne, aplikacyjne i rynkowe. Rozwój technik i algorytmów telemedycyny z wykorzystaniem Internetu oraz sieci telefonii komórkowej), project leader: Mikołaj Baszun
- [Rep19] **Optoelectronic mikrosystem to make research of samples about nano-liters volumes with using the optical capillaries**, (Mikrosystem optoelektroniczny do badania próbek o nanolitrowych objętościach z wykorzystaniem kapilar optycznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt
- [Rep20] **Process of spontaneous emission in photonic crystals**, (Proces emisji spontanicznej w kryształach fotonicznych), project leader: Paweł Szczepański
- [Rep21] **Research on the physical models applied for device simulation in submicrometer IC technologies**, (Badania modeli fizycznych dla symulacji elementów układów scalonych w technologiach submikrometrowych), sub-project leader: Andrzej Pfitzner
- [Rep22] **Silicon-based nanostructures and naodevices for long-term nanoelectronics applications - NANOSIL, Network of Excellence within IST 7FP of UE**, (Przyrządy nano- oraz nanostruktury krzemowe dla zastosowań w nanoelektornice przyszłości), EU structural project, project leader: Romuald Beck
- [Rep23] **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
- [Rep24] **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
- [Rep25] **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
- [Rep26] **Thin barium titanate layers for microelectronics demand – technology, characterization and applications**, (Warstwy tytanianu baru na potrzeby mikroelektroniki- technologia,charakteryzacja i próby aplikacji), project leader: Jan Szmidt
- [Rep27] **Unipolar devices and transistors for high-temperature electronics**, (Przyrządy unipolarne I struktury tranzystorowe na potrzeby elektroniki wysokotemperaturowej), project leader: Jan Szmidt
- [Rep28] **Universal laser source for medical applications**, (Uniwersalne źródło promieniowania laserowego do zastosowań medycznych), project leader: Wojciech Kamiński

9. CONFERENCES, SEMINARS AND MEETINGS

9.1. Conferences

- [Con1] **10th Conference „Electron Technology” ELTE’2010**, Wrocław, Poland, September 22 – 25
 participants: M.Bebłowska, R.B.Beck, T.Bieniek, M.Borecki, B.Fetliński, P.Firek, J.Grabowski, G.Głuszko, M.Iwanowicz, A.Jakubowski, J.Jasiński, M.Jużwik, J.Kalenik, M.Kalisz, P.Knyps, M.Kozłowski, K.Krogulski, J.Krupka, K.Król, L.Łukasiak, B.Majkusiak, A.Malinowski, M.Malinowski, A.Mazurak, M.Mroczkowski, R.Mroczyński, M.Sochacki, W.Strupiński, J.Szmidt, S.Szostak, D.Tomaszewski, J.Walczak, M.Wesołowski
- [Con2] **11th Scientific Conference Optoelectronic and Electronic Sensors COE**, Nałęczów, Poland, June 20 – 23
 participants: M.Duk, T.Zyska, A.Kociubiński, M.Borecki
- [Con3] **13th IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems**, Vienna, Austria, April 14– 16
 participants: J.Grażdki, T.Borejko, W.Pleskacz
- [Con4] **17th Int. Conference “Mixed Design of Integrated Circuits and Systems,” MIXDES 2010**, Wrocław, Poland, June 24 – 26
 participant: A.Wielgus
- [Con5] **18th Int. Conference on Microwaves, Radar and Wireless Communications, MIKON-2010**, Vilnius, Lithuania, June 14 –16
 participant: J.Krupka
- [Con6] **2nd International Symposium on Advanced Plasma Science and its Applications for Nitrides and Nanomaterials, ISPlasma2010**, Nagoya, Japan, March 7 – 10
 participants: A.Malinowski, A.Jakubowski, L.Łukasiak, D.Tomaszewski
- [Con7] **34th International Microelectronics and Packaging IMAPS-CPMT Poland Conference**, Wrocław, Poland, September 22 – 25
 participants: M.Jakubowska, J.Kalenik, K.Kiełbasiński, R.Kisiel, K.Król, M.Sochacki, Z.Szczepański
- [Con8] **3rd International Conference on Plasma-Nanotechnology & Science, IC-PLANTS 2010**, Nagoya, Japan, March 11 – 12
 participants: A.Malinowski, L.Łukasiak, A.Jakubowski, D.Tomaszewski
- [Con9] **5th Wide Bangap Materials – progress in synthesis and applicatons and 7th Diamond & Related Films jointly with 2nd Int. Workshop on Science and Applications of Nanoscale Diamond Materials**, Zakopane, Poland, June 28 – July 2
 participants: R.B.Beck, P.Firek, G.Głuszko, A.Jakubowski, J.Jasiński, J.Kalenik, M.Kalisz, K.Kiełbasiński, M.Kozłowski, K.Król, N.Kwietniewski, L.Łukasiak, R.Mroczyński, M.Sochacki, J.Stęszewski, W.Strupiński, J.Szmidt
- [Con10] **6th Int. Conference on Microwave Materials and their Applications, MMA’2010**, Warsaw, Poland, September 1 – 3
 participants: M.Jakubowska, J.Krupka, N.Kwietniewski, J.Parka
- [Con11] **6th International Conference on Rare Earth Developpment and Application**, Beijing, China, August 2 – 6
 participant: M.Malinowski
- [Con12] **Conference Capture, Transmission and Display of 3D Video, 3DTV-CON 2010**, Tampere, Finland, June 7 – 9
 participants: P.Garbat, M.Sutkowski
- [Con13] **Excited States of Transition Elements, ESTE-2010 and Workshop on Lumienscence**, Wrocław, Poland, September 11 – 15
 participants: K.Anders, A.Jusza, R.Piramidowicz, M.Malinowski, M.Kaczkan,
- [Con14] **International Conference Ion Implantation and Other Applications of Ions and Electrons, ION’2010**, Kazimierz Dolny, Poland, June 14 –17
 participants: M.Sochacki, N.Kwietniewski, J.Szmidt
- [Con15] **International Conference the Advancement of Materials&Nanotechnology, ICAMN’2010**, Kuala Lumpur, Malaysia, November 29 – December 1
 participant: J.Krupka
- [Con16] **Krajowa Konferencja Elektroniki KKE’2010**, Darłowo, Poland, May 30 – June 2
 participants: P.Firek, G.Głuszko, J.Jasiński, M.Kalisz, R.Kisiel, K.Król, N.Kwietniewski, R.Mroczyński, M.Sochacki, J.Szmidt, Z.Szczepański

- [Con17] **VI Sympozjum Naukowe Techniki Przetwarzania Obrazu**, Serock, Poland, November 18 – 20
participants: P.Garbat, T.Grudniewski, J.Parka, M.Sutkowski, A.Szymańska
- [Con18] **X Conference Virtual University - model, tools, practice**, Warsaw, Poland, June 16 – 18
participant: B.Galwas, E.Piwowska

9.2. Schools, Seminars and Meetings

- [Con19] **10th International Workshop of Advanced Plasma Processing and Diagnostics**, Nagasaki, Japan, January 8 – 10
participants: A.Jakubowski, L.Łukasiak, A.Malinowski, D.Tomaszewski
- [Con20] **16th Workshop on Dielectrics in Microelectronics**, Bratislava, Slovakia, June 28 – 30
participants: A.Mazurak, J.Walczak, B.Majkusiak
- [Con21] **1st Ukrainian-French Seminar “Semiconductor-on-Insulator Materials, Devices and Circuits: Physics, Technology and Diagnostics” & 6th Int. SemOI Workshop “Nanoscaled Semiconductor-on-Insulator Materials, Sensors and Devices,”** Kyiv, Ukraine, April 26 – 30
participants: B.Majkusiak, A.Mazurak
- [Con22] **2nd Polish-Korean Workshop on Information and Communication Technologies**, Warsaw, Poland, September 30
participants: B.Fetliński, M.Jużwik, M.Malinowski, L.Łukasiak, R.B.Beck
- [Con23] **33rd Int. Spring Seminar on Electronics Technology, ISSE’2010**, Warsaw, Poland, May 12– 16
participants: A.Werbowy, R.Kisiel, Z.Szczepański, K.Król
- [Con24] **57th Spring Meeting of Japanese Society of Applied Physics**, Kanagawa, Japan, March 17 – 20
participants: A.Malinowski, L.Łukasiak, A.Jakubowski, D.Tomaszewski
- [Con25] **6th Workshop of the Thematic Network on Silicon-On-Insulator Technology, Devices and Circuits, EUROSOI 2010**, Grenoble, France, January 25 – 27
participants: A.Mazurak, B.Majkusiak, J.Grabowski, R.B.Beck
- [Con26] **8th European Workshop on Microelectronics Education**, Darmstadt, Germany, May 10– 12
participant: W.Kuźmich
- [Con27] **E-learning wyzwaniem dla nowoczesnej edukacji**, Warsaw, Poland
participant: B.Galwas
- [Con28] **European Materials Research Society Spring Meeting (E-MRS)**, Strasburg, France, June 6 – 11
participant: M.Malinowski
- [Con29] **European Optical Society – Topical Meeting on Diffractive Optics**, Koli, Finland, February 14 – 18
participants: M.Koba, P.Szczepański
- [Con30] **JARA-FIT nanoelectronics days 2010**, Aachen, Germany, October 4 – 7
participants: B.Majkusiak, R.B.Beck, A.Mazurak, J.Grabowski
- [Con31] **Third World Summit on the Knowledge Society**, Corfu, Greece, September 22 – 24
participants: B.Czejdo, M.Baszun
- [Con32] **Warsaw Seminar "Advances in Web education**, Warsaw, Poland, February 25
participant: B.Galwas
- [Con33] **XX International Travelling Summer School on Microwaves and Lightwaves**, Metz, France, July 3 – 9
participants: B.Galwas, P.Szczepański

10. AWARDS

- [Award1] Bogdan Galwas, **Ministry of Science and Higher Education Individual Award for Outstanding Lifetime Achievement of an Academic Teacher**, (Indywidualna Nagroda Ministra Nauki i Szkolnictwa Wyższego za całokształt dorobku wybitnego nauczyciela akademickiego)
- [Award2] Andrzej Jakubowski, Sławomir Szostak, Witold Pleskacz, **WUT Rector's Collective Award for Educational Achievements (first degree)**, (Nagroda Zespołowa I stopnia JM Rektora PW za osiągnięcia w dziedzinie edukacji)
- [Award3] Jerzy Krupka, et. al., **WUT Rector's Collective Award for Educational Achievements (team award, second degree)**, (Nagroda Zespołowa II stopnia JM Rektora PW za osiągnięcia dydaktyczne)
- [Award4] Katarzyna Ławniczak, **The prize in the competition "particularly valuable cooperation offers and presentations" in 4th Forum Science & Technology Days POLAND – EAST for "Integrated photonic devices for research institutes, small and medium-sized enterprises and large companies"** (Nagroda w konkursie „na szczególnie cenne oferty współpracy i prezentacje” na IV Forum Dni Nauki i Technologii Polska-Wschód za „Zintegrowane urządzenia fotoniczne dla instytutów badawczych, małych i średnich przedsiębiorstw oraz dużych firm”)
- [Award5] Józef Maciak, **Medal of National Education Commission** (Medal Komisji Edukacji Narodowej)
- [Award6] Michał Malinowski, Ryszard Piramidowicz, Marcin Kaczkan, Mariusz Klimczak, **WUT Rector's Collective Award for Scientific Achievements, (first degree)**, (Nagroda Zespołowa I stopnia JM Rektora PW za osiągnięcia naukowe)
- [Award7] Witold Pleskacz et. al., **1st Prize in EURO PRACTICE Design Contest - UMC 90 nm Technology**, (1. nagroda w konkursie EURO PRACTICE na najlepszy projekt układu scalonego w technologii UMC 90 nm)
- [Award8] Jan Szmidt, **Award Merit for Technical University of Lodz**, (Odznaka: Zasłużony dla Politechniki Łódzkiej)
- [Award9] Jan Szmidt, **Gold Medal of The Polish Business Club for "research and teaching achievements, particularly for fundamental studies of materials for nanoteleinformatics,"** (Medal Złoty Kapituły Akademii Polskiego Sukcesu: za wybitne osiągnięcia naukowe i dydaktyczne, w szczególności za fundamentalne badania materiałów na potrzeby nanoteleinformatyki)
- [Award10] Jan Szmidt, **Special Award "For the special involvement and significant support to the development of the Science & Technology Days Poland-East Forum idea". 4th Forum Science & Technology Days POLAND – EAST**, (Nagroda Specjalna za szczególne zaangażowanie i wkład w rozwój przedsięwzięcia - IV Forum Dni Nauki i Technologii Polska-Wschód)
- [Award11] Jan Szmidt, **Special Award ITMED 2010 "For the special involvement and significant support to the development of the ITMED Forum idea" 4th International Forum Innovative Technologies for Medicine**, (Nagroda Specjalna ITMED 2010 za "Specjalne zaangażowanie i istotne wsparcie w organizacji Forum ITMED")
- [Award12] Jan Szmidt, Michał Borecki, Piotra Firek, Maria Bebłowska, Maciej Szmidt, Tomasz Niemiec, Kaja Urbańska, **WUT Rector's Collective Award for Scientific Achievements, (first degree)**, (Nagroda Zespołowa I stopnia JM Rektora PW za osiągnięcia naukowe)
- [Award13] Mateusz Śmietana, et. al., **Diploma International Warsaw Invention Show The Agepi Award by Republic of Molgova State Agency on Intellectual Property**, (Dyplom Warszawskiej Wystawy Innowacji)
- [Award14] Mateusz Śmietana, et. al., **Gold Medal Diploma IV International Warsaw Invention Show IWIS 2010 by Association of Polish Inventors and Rationalizers**, (Złoty Medal IV Międzynarodowej Warszawskiej Wystawy Innowacji przyznany przez Stowarzyszenie Polskich Wynalazców i Racjonalizatorów)