WARSAW UNIVERSITY OF TECHNOLOGY
Faculty of Electronics and Information Technology

Institute of Microelectronics and Optoelectronics

annual report 2013

WARSAW UNIVERSITY OF TECHNOLOGY
Faculty of Electronics and Information Technology

Institute of Microelectronics and Optoelectronics

annual report 2013

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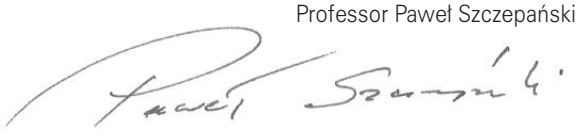
From the Director

This Annual Report summarizes the activities of the Institute of Microelectronics and Optoelectronics (IMiO) in the year 2013, with particular attention given to its research and educational potential. The Institute is a part of the Faculty of Electronics and Information Technology, the biggest faculty of the Warsaw University of Technology. Among six institutes constituting the Faculty, Institute of Microelectronics and Optoelectronics is the one most focused on advanced technologies of modern electronics and photonics.

It should be noted that the Institute has its roots deep in history. Although formally founded in 1970, it evolved from the Chair of Radio Engineering established in 1929 by Professor Janusz Groszkowski, who is often called "the father of Polish electronics". The Institute is linked with the beginnings of the Faculty of Electronics and Information Technology not only by the person of Prof. Groszkowski, who worked in IMiO until end of his career, but also by location – half of the Institute is situated in the Building of Radio Engineering at the Warsaw University of Technology main campus, where the Faculty started its operation in 1951 (as the Faculty of Communications). Currently, the Institute's Technology Centre is located there. It includes laboratories specializing in silicon processing (clean-room), hybrid technologies and assembly techniques, fibre optic and integrated optoelectronics, laser optoelectronics and characterization of new electronic and photonic materials. Recently, the research potential of the Institute has been significantly improved due to investments conducted within the Innovative Economy Operational Programme framework. As the result 11 high-tech laboratories offering high quality scientific services in the field of advanced electronic and photonic technologies have been established in IMiO. Most of these labs had reached their full operational readiness by the end of 2012, two are presently at the final stage of development.
The present research activities of the Institute are concentrated in the area of microelectronics, nanoelectronics and photonics. These include in particular VLSI systems, microelectronic and nanoelectronic semiconductor devices, hybrid circuits (e.g. microwave, optoelectronic), sensors, microsystems, lasers, fiber optics and integrated photonics, electronic imaging and image processing. It is worth to emphasize that research activities of the Institute include modelling, CAD, manufacturing and versatile characterization.
In the field of teaching the Institute meets the challenges posed by the development of modern technology and information society. The didactic offer (at all levels – B.Sc., M.Sc. and Ph.D.) reflects the main fields of the advanced electronics and photonics and, simultaneously, the main research expertise of the Institute. In the last year the Institute continued to improve its contribution for on-campus study program realized together with the Institute of Electronic Systems in the field of Electronics and Computer Engineering. Since 2012 IMiO also provides a Microelectronics, Photonics and Nanotechnology M.Sc. teaching program. The Institute's involvement in distance learning studies of Electronics and Telecommunications is also worth mentioning, especially postgraduate 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 in electronic equipment production. IMiO also inspired and was actively involved in the organization of a series of popular science lectures aiming at encouraging secondary-school students to continue their education at our Faculty.

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 creative development of the Institute.

Professor Paweł Szczepański



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1. GENERAL INFORMATION

1.1. Board of Directors

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1.2. 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 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 EU Framework Programme.

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.

1.3. Microelectronics and Nanoelectronics Devices Division

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

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Andrzej Mazurak, Ph.D.	Assistant Professor
Robert Mroczyński, Ph.D.	Assistant Professor
Zbigniew Pióro, Ph.D.	Assistant Professor
Sławomir Szostak, Ph.D.	Assistant Professor
Jakub Walczak, Ph.D.	Assistant Professor
Agnieszka Zaręba, M.Sc.	Assistant Professor
Jan Gibki, Ph.D.	Senior Lecturer
Antoni Siennicki, Ph.D.	Senior Lecturer

Junior academic staff

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

Technical and administrative staff

Witold Ciemiewski
Kazimierz Dalbiak,
Krzysztof Krogulski

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, SiOxNy);
- 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.

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1.4. VLSI Engineering and Design Automation Division

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.

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

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Jakub Kopański, M.Sc.	Ph.D. Student
Aleksander Koter, M.Sc.	Ph.D. Student
Arkadiusz Łuczyk, M.Sc.	Assistant
Michał Łukaszewicz, M.Sc.	Ph.D. Student
Krzysztof Marcinek, M.Sc.	Science Assistant, Ph.D. Student
Piotr Mierzwiński, M.Sc.	Ph.D. Student
Krzysztof Siwiec, M.Sc.	Science Assistant, Ph.D. Student
Michał Staniewski, M.Sc.	Ph.D. Student

Science research staff

Paweł Narczyk, M.Sc.	Science Assistant

Technical and administrative staff

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

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, analog and mixed signal VLSI circuits for special applications such as innovative AD converters, data processing in physical experiments and medical equipment, RF front ends for wireless data transmission etc.,
- modeling and control of leakage currents in nanometer digital circuits,
- investigations and development of new VESTIC microelectronic technology.

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1.5. Image and Microwave Photonics Division

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.

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

Junior academic staff

Krzysztof Madziar, M.Sc. Assistant

Technical and administrative staff

Jerzy Domański, M.Sc.
Bożena Janus

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.

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1.6. Electronic Materials and Microsystem Technology Division

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

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

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Jakub Grochowski, M.Sc.	Ph.D. Student
Piotr Knyps, M.Sc.	Ph.D. Student
Krzysztof Krogulski, M.Sc.	Ph.D. Student
Krystian Król, M.Sc.	Ph.D. Student
Mateusz Mroczkowski, M.Sc.	Assistant, Ph.D. Student
Michał Myśliwiec, M.Sc.	Ph.D. Student
Andrzej Taube, M.Sc.	Ph.D. Student
Michał Waśkiewicz, M.Sc	Ph.D. Student

Science research staff

Mariusz Sochacki, Ph.D.	Assistant Professor

Technical and administrative staff

Ryszard Biaduń,
Katarzyna Trzaskowska.

The main research areas are as follows:

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

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1.7. Optoelectronics Division

The activity of the Optoelectronics Division is concentrated on education as well as on various areas of optoelectronic research in the field of laser physics, new optical waveguide materials and structures, laser spectroscopy, laser construction and laser applications in medicine and air pollution monitoring.
Photovoltaics laboratory, as a part of the Division, serves as a focal point for conducting and stimulating research and demonstration activities; educating students; organizing technical meetings, workshops, symposia and conferences; disseminating information and addressing environmental issues.

Head of the Division

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Marcin Kaczkan, Ph.D.	Assistant Professor
Jerzy Kęsik, Ph.D.	Assistant Professor
Agnieszka Mossakowska- -Wyszyńska, Ph.D.	Assistant Professor
Anna Tyszka-Zawadzka, Ph.D.	Assistant Professor
Piotr Warda, Ph.D.	Assistant Professor

Junior academic staff

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

Technical and administrative staff

Maciej Juźwik, M.Sc.

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

The main research activity of the Division comprises:

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

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1.8. Statistical Data

SPECIFICATION	2012	2013	DIFFERENCE
Academic staff	**82**	**79**	**-3**
Tenured professors	10	9	-1
Professors	6	6	0
Docent	1	1	0
Assistant professors	33	30	-3
Senior lecturers	4	4	0
Assistants and Ph.D. students	28	29	+1
Science research staff	**7**	**6**	**-1**
Technical and Administrative staff	**20**	**24**	**+4**
Computers	**273**	**303**	**+30**
Library resources – Books (number of volumes)	**3645**	**3659**	**+14**
Teaching activities	**61**	**72**	**+11**
Basic courses	32	32	0
Advanced courses	19	23	+4
Special courses	10	17	+7
Research projects	**40**	**39**	**-1**
Granted by the University	8	8	0
Granted by State Institutions	24	26	+2
Granted by International Institutions	7	4	-3
Others projects	1	1	0
Degrees awarded	**74**	**54**	**-20**
D.Sc. degrees	0	1	+1
Ph.D. degrees	3	2	-1
M.Sc. degrees	22	17	-5
B.Sc. degrees	49	34	-15
Publications	**136**	**219**	**+83**
Sci.-tech. books	11	16	+5
Sci.-tech. papers in journals	56	77	+21
Sci.-tech. papers in conference proceedings	69	126	+57
Patents	**4**	**7**	**+3**
Conferences	**28**	**24**	**-4**
Awards	**13**	**14**	**+1**

Microelectronics and Nanoelectronics Devices Division

1. STAFF

2.1. Senior Academic Staff

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('90–'96), Rector of Warsaw University of Technology ('96–'02), Member of the Polish Section of SPIE ('89–'90), Member of Committee for Electronics and Telecommunication of the Polish Academy of Sciences ('89–'02), Member of Presidential Board of Polish Committee for Optoelectronics ('90–'93), Fellow of IEE ('95–), Member of the Scientific Council of the Institute of Vacuum Technology ('91–'95), Member of the Advisory Board of the Ministry of Post and Communication ('92–'96), Member of the Advisory Board of the Ministry of National Education: Financing Research at Universities ('93), Governmental Expert designated by the Polish Government ('96, '99), Chairman of the Siemens Award Jury (Poland) ('96–'02), Programme Coordinator ('97–'99) and Member of Programme Council ('95–'97) of the Programme for Reform of Higher Education and Research Organisation realized by Institute of Public Affairs, Member of the Committee on Science of science (Polish Academy of Sciences) ('96–'02), Deputy President (1997–1999), President (1999–2002) and Honorary President (2002–2005) of the Conference of Rectors of Academic Schools in Poland, Chairman of the Committee on Organisation and Legislation of CRASP ('97–'99; '05–'08; '08–'12; '12–14), President of the Conference of Rectors of Polish Universities of Technology ('97–'99), Member of National Consultative Council for Reforms in Education ('98–'01), Chairman of Auditing Committee and Member of the Mutual Aid Society of the French Legion of Honour (Polish Section) ('00–), Deputy Chairman and Member of National Council for European Integration ('99–'01), Member of the Committee on Good Practices in High Education ('05–), Member of Editorial Board of Higher Education in Europe – published by UNESCO ('99–'09), Facilitator of International Follow Up Committee of UNESCO World Conference on Higher Education ('98), Member of Council of European University Association ('00–'02), President of Polish Rectors Foundation ('02–), Director of the Institute of Knowledge Society ('03–), Chairman of the Presidential Team in Charge of Elaboration of the Project of Law on Higher Education ('03–'05), Chairman of the Committee "Poland in United Europe" at Polish Academy of Sciences ('03–'06), Member of the Forecast Committee "Poland 2000 Plus" ('03–'06), Chairman of Multi-branch Commission for Mobility and Science Career acting at Ministry of Science and Higher Education ('06–'08), Member of the Ministerial Team for prepare the Reforms of research and higher education in Poland ('08), Member of the Committee of Ethics in Science (Polish Academy of Sciences) ('08–'12, '12–), Chairman of the Committee of the project "The strategy of development of higher education: 2010–2020" ('09–'10), Member of the Forum of Experts in Ministry of Science and Higher Education ('10–), Member of the team of Central Commission for Degrees and Titles for new academic disciplines ('11–), Commander's Cross: Polonia Restituta ('11), Chairman of the Programme Board the Monthly "Academic Forum" ('03–'12), Member of the Ministerial Team for changes in legal acts about higher education ('12–), WUT Rector's Individual Award for Organizing Achievements (2nd stage) ('12), Chairman of the Patronage Board of Monthly "Academic Forum" ('13–).

Agnieszka Zaręba, M.Sc. ('93), Ph.D. ('05), Microelectronics, Assistant Professor, full time, Microelectronics and Nanoelectronics Devices Division, WUT Rector's Award for Didactic Achievements ('04), WUT Rector's Collective Award for Scientific Achievements ('08).

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2.2. Junior Research Staff

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2.3. Science Research Staff

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Krzysztof Marcinek	M.Sc.	Science Assistant	+48 22 2345364	366 GE
Mateusz Mroczkowski	M.Sc.	Science Assistant	+48 22 2347779	423B GR
Paweł Narczyk	M.Sc.	Science Assistant	+48 22 2345364	371 GE
Krzysztof Siwiec	M.Sc.	Science Assistant	+48 22 2345364	371 GE
Mariusz Sochacki	Ph.D.	Science Assistant Professor	+48 22 2347932	232 GR

2.4. Technical and Administrative Staff

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Kazimierz Dalbiak		Senior Foreman	+48 22 2347534	335 GR
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Karolina Fruba	B.Sc.	Secretary	+48 22 2347777	239 GR
Jerzy Gempel	M.Sc.	Senior R&D Engineer	+48 22 2347819	352 GE
Bożena Janus		Senior Technical Clerk	+48 22 2347939	51 GE
Stanisław Jeszka	M.Sc.	Senior R&D Engineer	+48 22 2347207	352 GE
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Anna Olszyna		Administrative Specialist	+48 22 2347771	242 GR
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Bogdan Sowa	M.A.	Financial Specialist	+48 22 2346059	237 GR
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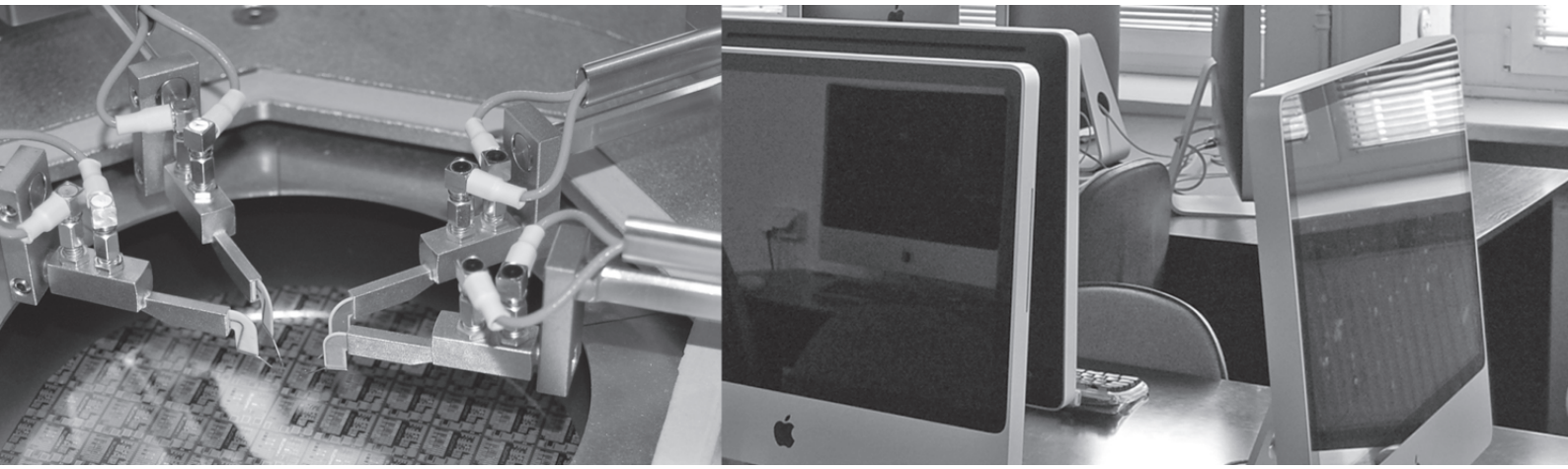


VLSI Engineering
and Design Automation Division

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** (Projektowanie obwodów drukowanych), **PADS**, Ryszard Kisiel, Jerzy Kalenik

[Edu4] **Digital Circuits** (Układy cyfrowe), **UCYF**, Elżbieta Piwowarska

[Edu5] **Electronic Elements and Circuits** (Elementy i układy elektroniczne), **ELIU**, Andrzej Pfitzner

[Edu6] **Electronics 1** (Elektronika 1), **ELE1**, Andrzej Jakubowski, Sławomir Szostak

[Edu7] **Electronics 2** (Elektronika 2), **ELE2**, Zbigniew Pióro

[Edu8] **Equipment-Programming Synthesis of Digital Systems** (Synteza sprzętowo-programowa systemów cyfrowych), **SSP**, Elżbieta Piwowarska

[Edu9] **Fields and waves**, (Pola i fale), **POFA**, Jerzy Piotrowski

[Edu10] **Fundamentals of Circuit and System Technology** (Podstawy technologii układów i systemów), **PTUIS**, Romuald Beck

[Edu11] **Fundamentals of Lasers** (Lasery – kurs podstawowy), **LKP**, Paweł Szczepański

[Edu12] **Fundamentals of Microelectronics** (Podstawy mikroelektroniki), **PMK**, Wiesław Kuźmicz

[Edu13] **Fundamentals of Microprocessor Techniques** (Podstawy techniki mikroprocesorowej), **TMIK**, Lidia Łukasiak

[Edu14] **Fundamentals of Microwave Engineering** (Podstawy techniki w.cz.), **TWCZ**, Bogdan Galwas

[Edu15] **Fundamentals of Photonics** (Podstawy fotoniki), **FOT**, Michał Malinowski

[Edu16] **Fundamentals of Solid State Electronics** (Elektronika ciała stałego), **ELCS**, Jan Szmidt, Witold Pleskacz

[Edu17] **Hybrid Systems** (Układy hybrydowe), **UKH**, Ryszard Kisiel

[Edu18] **Introduction to Microsystems** (Wstęp do mikrosystemów), **WMS**, Zbigniew Pióro

[Edu19] **Introduction to Numerical Methods** (Wstęp do metod numerycznych), **WDMNM**, Jerzy Krupka

[Edu20] **Introduction to Programming** (Podstawy programowania), **PRM**, Michał Borecki

[Edu21] **Introduction to the UNIX System** (Użytkowanie systemu UNIX), **USUX**, Andrzej Wielgus

[Edu22] **Ligthwave Telecommunication** (Telekomunikacja optofalowa), **TEOP**, Bogdan Galwas

[Edu23] **Meeting 1 – Fundamentals of Information Technology** (Zjazd 1 – Podstawy technologii informacyjnej), **ZJ1Z**, Krzysztof Madziar

[Edu24] **Meeting 4 – Advanced Course Laboratory** (Zjazd 4 – Zaawansowane laboratorium kierunkowe), **ZJ4Z**, Agnieszka Szymańska

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

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

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

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

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

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

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

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

3.2. Advanced Courses

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

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

[Edu35] **Advanced Semiconductor Structures** (Zaawansowane struktury półprzewodnikowe), **ZSP**, Andrzej Jakubowski, Lidia Łukasiak

[Edu36] **Analog Integrated Circuit Design for VLSI Systems** (Projektowanie bloków analogowych dla systemów VLSI), **PSSA**, Wiesław Kuźmicz

[Edu37] **Characterization of Materials for Microelectronics** (Charakteryzacja materiałów dla mikroelektroniki), **CHA**, Jan Szmidt

[Edu38] **Computational Methods in Microelectronics and Photonics** (Metody obliczeniowe w mikroelektronice i fotonice), **MOBI**, Andrzej Pfitzner

[Edu39] **Digital Image Processing** (Cyfrowe przetwarzanie obrazów), **CPOO**, Piotr Garbat

[Edu40] **Electronic and Photonic Devices for Telecommunication** (Przyrządy elektroniki i fotoniki dla telekomunikacji), **PEFT**, Bogdan Galwas

[Edu41] **Fiber-Optic Communication** (Komunikacja światłowodowa), **KOS**, Ryszard Piramidowicz

[Edu42] **Fundamentals of Nanoelectronics and Nanophotonics** (Podstawy nanoelektroniki i nanofotoniki), **NANO**, Bogdan Majkusiak, Paweł Szczepański

[Edu43] **Fundamentals of Photovoltaics** (Podstawy fotowoltaiki), **PFOT**, Stanisław Pietruszko

[Edu44] **Integrated and Logic Circuits for Optoelectronics** (Zintegrowane układy optoelektroniczne i optyczne układy logiczne), **ZOUL**, Michał Malinowski

[Edu45] **Introduction to Digital VLSI System Design** (Projektowanie scalonych systemów cyfrowych), **PSSC**, Elżbieta Piwowarska

[Edu46] **Laboratory of Fundamentals of Nanoelectronics and Nanophotonics** (Pracownia podstaw nanoelektroniki i nanofotoniki), **PNAN**, Bogdan Majkusiak, Paweł Szczepański

[Edu47] **Lasers** (Lasery), **LAS**, Paweł Szczepański

[Edu48] **Microsystems Engineering** (Inżynieria mikrosystemów), **MIK**, Ryszard Kisiel

[Edu49] **Monte Carlo Methods – Fundamentals and Applications** (Metody Monte Carlo – podstawy i zastosowania), **MMC**, Marek Niewiński

[Edu50] **Nanotechnologies** (Nanotechnologie), **NAN**, Jan Szmidt

[Edu51] **Optical Waveguide Lasers and Amplifiers** (Wzmacniacze i lasery światłowodowe), **WLS**, Ryszard Piramidowicz

[Edu52] **Photovoltaic Systems** (Systemy fotowoltaiczne), **SFOT**, Stanisław Pietruszko

[Edu53] **Semiconductor Photonic Devices** (Fotoniczne przyrządy półprzewodnikowe), **FPP**, Paweł Szczepański

[Edu54] **Vision Monitoring Systems** (Systemy monitoringu wizyjnego), **SYMW**, Jerzy Woźnicki

[Edu55] **VLSI System Design** (Projektowanie systemów scalonych w technice VLSI), **PSSV**, Wiesław Kuźmicz, Zbigniew Jaworski

3.3. Courses in English

[Edu56] **Electronics 1**, **EELE1**, Bogdan Majkusiak

[Edu57] **Physics 3**, **EPHY3**, Bogdan Majkusiak

3.4. Courses for other Faculties

[Edu58] **Ecologic Aspects of the Production of Electronic Materials and Devices, Faculty of Management** (Ekologiczne aspekty produkcji materiałów I urządzeń elektronicznych, Wydział Zarządzania), **EKASP**, Ryszard Kisiel

[Edu59] **Electronic Circuits and the Introduction to Microelectronics, Faculty of Management** (Układy elektroniczne i wstęp do mikroelektroniki, Wydział Zarządzania), **UEMIK**, Sławomir Szostak

[Edu60] **Electronic Devices, Faculty of Management** (Elementy elektroniczne, Wydział Zarządzania), **ELEME**, Lidia Łukasiak

[Edu61] **Electronics 1, Faculty of Mechatronics** (Elektronika 1, Wydział Mechatroniki), **ELE1**, Andrzej Jakubowski, Sławomir Szostak

[Edu62] **Electronics 2, Faculty of Mechatronics** (Elektronika 2, Wydział Mechatroniki), **ELE2**, Zbigniew Pióro

[Edu63] **Energy Conditioning and Storage Laboratory, Faculty of Physics** (Laboratorium przetwarzania i magazynowania energii, Wydział Fizyki, **LPME**, Michał Malinowski

[Edu64] **Information Techniques and Systems, Faculty of Transport** (Technologie i systemy informatyczne, Wydział Transportu), **TISI**, Jarosław Dawidczyk

[Edu65] **Introduction to Measurements, Faculty of Management** (Podstawy miernictwa, Wydział Zarządzania), **POMIE**, Mikołaj Baszun

[Edu66] **Introduction to Microsystems, Faculty of Management** (Wstęp do mikrosystemów, Wydział Zarządzania), **WMIKS**, Zbigniew Pióro

[Edu67] **Laser Technology, Faculty of Physics** (Technika Laserów, Wydział Fizyki), **TL**, Ryszard Piramidowicz

[Edu68] **Materials for Electronics and Optoelectronics, Faculty of Management** (Materiały dla elektroniki i optoelektroniki, Wydział Zarządzania), **MATEL**, Mikołaj Baszun

[Edu69] **Nanotechnologies, Faculty of Management** (Nanotechnologia, Wydział Zarządzania), **NANOT**, Aleksander Werbowy

[Edu70] **Photonic Devices, Faculty of Management** (Elementy fotoniczne, Wydział Zarządzania), **ELFOT**, Ryszard Piramidowicz

[Edu71] **Specific testing and certification of products, Faculty of Management** (Specyficzne badania i certyfikacja wyrobów, Wydział Zarządzania), **SPECY**, Piotr Kamiński

[Edu72] **Yield and Reliability in Electronics, Faculty of Management** (Uzysk i niezawodność w elektronice, Wydział Zarządzania), **UZNIE**, Bogdan Butkiewicz

Image and Microwave
Photonics Division

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 2012–May 2013, **sub-projects**:

[Pro1.1] **Analysis of bridging faults tolerance of digital circuits implementing fuzzy operations** (Badanie odporności na zwarcia cyfrowych bloków realizujących operacje rozmyte), project leader: Andrzej Pfitzner.

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

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

[Pro1.2] **Investigation and modeling of photonic structures and characterization of optically active materials** (Badania i modelowanie struktur fotonicznych oraz charakteryzacja ośrodków optycznie aktywnych), project leader: Michał Malinowski.

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

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

[Pro1.3] **Preparation and characterization of MOSFETs structures made in self-aligned technology** (Wytwarzanie i charakteryzacja struktur MOSFET wykonanych w technologii samocentrującej), project leader: Romuald B. Beck.

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

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

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

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

[Pro1.5] **The acquisition and signal processing to analyze the shape of the 3D objects in the THz and optical fiber Bragg gratings** (Pozyskiwanie i przetwarzanie sygnałów do analizy kształtu obiektów 3D w zakresie THz oraz światłowodowych siatek Bragga), project leader: Janusz Parka

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

[Pro2.1] **Constructions, technology and materials for microsystem sensors techniques** (Konstrukcje, technologie i materiały dla mikrosystemowych technik sensorowych), project leader: Jan Szmidt

Statute grant of ZTMiME "Constructions, technology and materials for microsystem sensors techniques" consists of two tasks. First task is „Electronic materials characterization in controlled environment with microwave methods". Second task is „Microsystem construction development for use in biomedical diagnostic."

In the area of first task, we have investigated resistivity changes introduced on the high-resistivity p-type silicon wafer by the irradiation with deuteron beam with an energy of 4.4 GeV performed in the NUCLOTRON superconducting accelerator. Two contactless techniques were used for the measurements of resistivity changes: namely the microwave split post dielectric resonator (SPDR) technique and capacitance measurements in the frequency domain. The first technique allows resistivity measurements in the plane of the wafer, while the second one in the direction perpendicular to the wafer. The resistivity map obtained with the SPDR technique enabled us to obtain a permanent fingerprint of the accelerator beam intensity profile. It has been shown that after the irradiation, the material resistivity increased to ˜$3.9 \times 105\ \Omega$ cm in the wafer region exposed to the maximum beam intensity. Complementary studies of the properties and concentrations of radiation deep-level defects were performed by the high-resolution photo-induced current transient spectroscopy (HRPITS). These studies have shown that the irradiation of the high resistivity silicon with 4.4-GeV deuterons results in the formation of several types of deep-level defects responsible for the charge compensation.

In the area of second task we develop new type of large area photodiode. We describe the construction, fabrication and properties of large-area ultra violet detector that is transparent in the visible range. The device was made on n-type 4H SiC substrate with a double epitaxial layer in which aluminum was implanted to form a p-n junction close to the surface, and a SiO_2 layer was formed for passivation, without a guard ring. The design of the top and bottom electrodes of 4mm diameter UV sensitive area allows not less than 20% visible range transmission. This transmission was measured across sensitive area of examined devices and was only 5% lower than that of the substrate before implantation and electrodes deposition. We show the implementation of developed photodiode in ultra violet range radiation, which has important applications in sensing techniques, in particular for biochemical sensing of mixture parameters. At the first step of sensing examinations of fatty acids composition characterization we perform investigation of their parameters in capillary microsystem.

[Pro2.2] **Integrated radio frequency voltage controlled oscillator design automation methods for submicrometer CMOS technologies** (Metody automatyzacji projektowania scalonych układów generatorów przestrajanych napięciem na częstotliwości radiowe realizowanych w submikrometrowych technologiach CMOS), project leader: Andrzej Pfitzner

The work will include research and development of integrated radio frequency voltage controlled oscillator design automation methods for submicrometer CMOS technologies. Design automation of analog circuits, such as voltage controlled oscillators, is a relevant and complex research task. A lot has been done in the area of digital circuit design automation, which resulted in substantial design time reduction. Development of design automation methods in analog circuit domain will allow reducing design time also in this area.

Design automation methods will be implemented as algorithms, which will be used to develop a design automation tool. The tool, based on input specification given by a designer, will automatically create electrical schematic and will find all parameters of semiconductor devices used in the circuit. The tool will be integrated with commercial software from Cadence, used for integrated circuit design, and will be implemented as Matlab functions.

[Pro2.3] **Modeling, elaboration and investigation of micro- and nano-photonic structures and characterization of new optically active materials** (Modelowanie, opracowanie i badanie mikro- i nano- struktur fotonicznych oraz charakteryzacja nowych ośrodków optycznie aktywnych), project leader: Michał Malinowski

The interest in increasing signal speed, lowering optical losses and reducing power requirements led to the integration and miniaturization of the photonic components and systems for optical communication. The project is focused on spectroscopic investigation and optical modeling of passive and active micro-photonic devices such as; planar and fiber waveguides, amplifiers and lasers, development of optical modeling tools for nonlinear optical high-finesse (ring, DFB/DBR, photonic crystal) resonators, power optimization and quantum noise analysis of amplifiers and lasers, laser action studies in new solid-state lasers, including waveguide and photonic crystal structures.

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

[Pro2.4] **Modification of properties of MOS test structures with high-K gate dielectric layer** (Modyfikacja właściwości struktur testowych MOS z dielektrykami bramkowymi w postaci warstw o wysokiej wartości przenikalności elektrycznej (high-k)), project leader: Robert Mroczyński

The main objective of this work is to examine the possibility of modifying of electro-physical properties of MOS structures with high-k permittivity dielectrics. The modification will be based on medium and high temperature annealing in a controlled atmosphere on the fabricated dielectric films and MOS structures. Research and analysis of the thermal stability is of the utmost importance for MOS structures based on high-k layers for modern semiconductor devices.

The development of such technology will result in the ability to perform new research tasks, prepare specialized Technological Laboratory of Microelectronic and Nanoelectronic Devices Divison (ZPMiN) for the fabrication of MOS structures/MOSFET in self-aligned technology, as well as preparation a services offer for internal and external partners.

[Pro2.5] **The study of nonlinear phenomena in a Mach-Zender modulator for microwave photonics systems and optimization of 3D imaging in the THz range realized in the reflectance system** (Badanie zjawisk nieliniowych w modulatorze Macha-Zendera w układach fotoniki mikrofalowej oraz optymalizacja zobrazowań 3D w zakresie THz realizowana w układzie odbiciowym), project leader: Janusz Parka

The aim of proposed project is to investigate non-linear behaviour of Mach-Zehnder (MZ) modulators. Such effects, caused by MZ modulator's non-linear transfer characteristics can be used for optical-microwave mixing, frequency multiplication etc. An analytical non-linear model of MZ Modulator with experimental verification of its non-linear behaviour will be presented.

[Pro3] **High power fiber laser – an usable model** (Laser włóknowy dużej mocy – model użytkowy, grant Koła Naukowego Optoelektroniki), project leader: Ryszard Piramidowicz

The main aim of this project was to design, construct and investigate the parameters of high power fiber laser with all-fiber geometry. The assumed parameters: single mode, optical power not less than 10 W and efficiency not less than 30%. The investigation of basic spectroscopic parameters of ytterbium doped SiO_2 fibers allowed to formulate an analytical model for lasing properties of designed system.

Three different designs of fiber laser have been designed and lasing experiments have been performed. In the most sophisticated setup, using a fiber Bragg grating as a resonator, 10 W of output power has been obtained (at a wavelength of 1060,8 nm, and a threshold power of 4 W). The efficiency of the system was determined on approx. 44%, which is the result at least satisfactory, taking into account the simplicity of the designed system. Demonstrator was developed in the open version, allowing for easy scaling of the parameters and prepared for implementation by industrial partners of IMiO.

[Pro4] **IR-to-visible upconversion erbium fiber laser** (Erbowy laser światłowodowy z konwersją wzbudzenia na zakres widzialny), project leader: Krzysztof Anders

The project is focused on on obtaining a short wavelength generation (UV-VIS) in erbium doped fiber laser excited by commercially available laser diodes. In particular, is planned to develop design of a hybrid "all fiber" resonator in ring configuration and with Bragg gratings, the development of low-loss connections technology between quartz and multicomponent glass fibers, lasing experiments with Er^{3+}:ZBLAN (from FiberLabs) and Er^{3+}:TZN fibers (produced in collaboration with the Institute of Electronic Materials Technology).

[Pro5] **Multi-channel WDM transceiver in an InP-based generic integration technology** (Wielokanałowy nadajnik i odbiornik WDM wykonany w generycznej technologii fosforku indu), project leader: Stanisław Stopiński

The project is focused towards development of a multi-channel, wavelength division multiplexed (WDM) transceiver for application in optical access systems. The device combines the advantages of the indium phosphide (InP) based technology, such as low power consumption, multichannel operation and integration of transmitter and receiver functionality in a single chip, which makes this device suitable for application in modern access networks. The integrated transceiver will be designed and realized in a generic technology approach, i.e. utilizing a limited set of building blocks (deeply and shallowly etched waveguides, semiconductor optical amplifiers, electro-optic phase modulators and PIN diodes) and a standardized technology process. Manufacturing of the chips will be performed by means of participation in a multi-project wafer run of an indium phosphide foundry. The fabricated samples will be characterized and investigated with respect to achieving the design performance.

[Pro6] **New generation of non-volatile resistive memory based on transition metals oxides** (Rezystywne nieulotne pamięci nowej generacji oparte na tlenkach metali przejściowych, grant Koła Naukowego), project leader: Mateusz Śmietana

Traditional methods of storage and recording of information based on magnetic and electrical effects soon encounter physical limits of storage density. Therefore, searching for new construction and physical phenomena which may in the future be used in the new generation of non-volatile memory is required. One of the more frequently studied and future structures are memory cells based on resistive switching phenomena (ReRAM, RRAM – Resistive Random Access Memory). Compared to conventional technology of memory cells (eg SONOS – Silicon-Oxide-Nitride-Oxide-Silicon, Flash) ReRAM memory are mainly characterized by a low voltage power supply (up to 5 V), low switching time (less than 10 ns) and high stability, long-time storage of information (over 10 years) without the need to refresh and low power consumption. These advantages make ReRAM memory attractive from the research point of view. The main objective of the project was to develop the technology and electrical characterization techniques of ReRAM memory structures based on transition metal oxide layers. Hafnium oxide (HfO_x) and titanium oxide (TiO_x) thin films were deposited by means of magnetron sputtering. In order to characterize fabricated layers optical and microscopy techniques were used. Thickness and optical constants were determined by spectroscopic ellipsometry and surface morphology was examined by atomic force microscopy. After the initial characterization of dielectric layers, MIM (metal-insulator-metal) test structures was fabricated. Ni/HfO_x/Ni MIM structures, which may serve as a ReRAM memory was successfully prepared. One of the most interesting obtained results, was observation of two different types of memory-cell operation, depending on the concentration of oxygen during deposition of hafnium oxide.

[Pro7] **Oscilloscope with logic analyzer** (Oscyloskop z analizatorem stanów logicznych, grant Koła Naukowego), project leader: Jakub Jasiński

This project aims to build a complete measuring system with the capabilities of an oscilloscope. The device has been divided into several modules, so that it can be adapted to different tasks. The device consists of a measuring module and a visualization module. The first is responsible for the measurement of various physical values, and the second allows them to visualize the collected data. Additionally, the device is optimized for usability in virtual measurement systems.

[Pro8] **TFT thin film structures with IGZO layers for transparent and flexible electronics** (Struktury cienkowarstwowe typu TFT z warstwami IGZO dla elektroniki transparentnej i elastycznej), project leader: Robert Mroczyński

The project concerns the development of Indium-Gallium-Zinc Oxide (IGZO) layers technology by using r.f. reactive magnetron sputtering method. Those experiments will be the first carried out at IMiO associated with the fabrication of a new generation amorphous semiconductors for transparent and flexible electronics. After the development of IGZO layers technology (on the basis of structural, as well as optical characterization) the most favorable films (from the point of view of the application in TFTs) will be deposited by using shadow-masks in order to the fabrication of test devices. As the gate dielectric materials in TFT structures high-k layers will be used. In the final phase of the project there will be carried out electrical characterization of fabricated in the course of this project test structures.

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

[Pro9] **Design and manufacturing of complete microwave sensor based measurement system intended for electromagnetic properties investigations of graphene** (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] **Investigation of coherent radiation sources for photonic integreated circuits made in SOI technology** (Badania nad źródłami promieniowania koherentnego dla fotonicznych układów zintegrowanych wykonanych w technologii krzemowej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Szczepański, co-workers: Romuald B.Beck, Bogdan Majkusiak, Michał Malinowski, Ryszard Piramidowicz, Anna Tyszka-Zawadzka, Agnieszka Mossakowska-Wyszyńska, Jakub Walczak, Piotr Warda, Kamila Leśniewska-Matys, Marcin Koba, Robert Mroczyński, October 2010–October 2013

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

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

The second case relates to nano-electronic and photonic (NEF) silicon structures in which the generation of photons can be caused by the current flow through the pn junction. The structure of metal-SiO_2-well quantum-SiO_2-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.

[Pro11] **Long-period grating structures for monitoring of deformation and defects in structural materials** (Struktury długookresowych siatek światłowodowych do monitorowania odkształceń i uszkodzeń materiałów konstrukcyjnych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Mateusz Śmietana, April 2012–March 2014

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

[Pro12] **Modeling and investigation of the double barrier metal-oxide-semicondutor tunnel structures** (Modelowanie i badanie struktur tunelowych typu metal-izolator-półprzewodnik (MIS) z podwójną barierą potencjału), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Bogdan Majkusiak, co-workers: Romuald B. Beck, Andrzej Jakubowski, Lidia Łukasiak, Jakub Walczak, Robert Mroczyński, Agnieszka Zaręba, Sławomir Szostak, Andrzej Mazurak, Jarosław Grabowski, Grzegorz Głuszko, March 2010–March 2013

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

[Pro13] **Modeling of light generation in photonic crystal lasers based on coupled mode theory** (Modelowanie generacji promieniowania w laserach z ośrodkiem aktywnym w postaci kryształu fotonicznego bazujące na teorii modów sprzężonych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Marcin Koba, April 2012–April 2014

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

[Pro14] **New optoelectronics devices for intelligent classification of organic and biologic liquids**. (Nowe przyrządy optoelektroniczne do inteligentnej klasyfikacji cieczy organicznych i biologicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, November 2010–October 2013

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

4.3. Projects Granted by National Centre for Research and Development

[Pro15] **Dual-mode blocks of the integrated circuit GALILEO and GPS signal receiver in nanometer CMOS technology for precise positioning of mobile objects** (Bloki dwusystemowego, scalonego odbiornika sygnałów nawigacji satelitarnej GALILEO i GPS w technologii nanometrowej CMOS do dokładnego pozycjonowania obiektów przenośnych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Witold Pleskacz, co-workers: Tomasz Borejko, Andrzej Berent, Jacek Grądzki, Aleksander Koter, Wiesław Kuźmicz, Arkadiusz Łuczyk, Krzysztof Marcinek, Krzysztof Siwiec, March 2011–February 2014

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

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

[Pro16] **Innovative graphen-titanium engine valve with improved functional properties** (Innowacyjne grafenowo-tytanowe zawory silnikowe o podwyższonych właściwościach użytkowych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, April 2013–February 2016

The subject matter of the project covering development, based on a comprehensive interdisciplinary research, of a new material in the form of lightweight titanium alloys coated with graphene, with improved mechanical, physical and chemical properties for potential applications in the automotive industry will be an important contribution to research in the field of surface engineering and environmental protection. Developing a comprehensive characterization of performed graphene coatings, graphene/titanium alloy systems will form the basis for the phenomenological description of the phenomena occurring at the influence of certain loads. The performance tests of the finished product, in the form of graphene-titanium engine valves shall allow to estimate the changes that have occurred in the structure of Ti alloy and graphene coating, as a result of service loads of the developed final product. Thanks to this it will be possible to estimate the extent to which the graphene coatings covering the surface of the engine valves affect their functional parameters. As a result of the project implementation the primary utilitarian effect of the project will be the production of graphene-titanium engine valves, retaining stability even under extreme operating conditions, the experimental determination of their properties and analytical-numerical models of the valve behavior.

[Pro17] **Integrated circuit technology for measurement of psychophysiological parameters under dynamic conditions** (Mikroukładowa technologia pomiaru parametrów psychofizjologicznych w warunkach dynamicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Witold Pleskacz, October 2012–September 2015

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

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

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

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

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

[Pro18] **Integretaion of thermoeletrically cooled infrared photodetectors with wideband electonics** (Integracja detektorów podczerwieni chłodzonych termoelektrycznie lub pracujących w temperaturze otoczenia z szerokopasmowym układem odbiorczym), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Kisiel, October 2013–November 2015

The project is aimed at development of a technology for integration of middle and long wavelength photodetectors with wideband electronics in miniature packages and creating a series of high-performance detection modules for a wide range of applications in modern optoelectronic systems. For building such modules, new detector chips will be designed and realized, and appropriate packages for them as well as IC amplifiers selected. Designing the modules will be based on electrical measurements of the detector chips, amplifiers and their interconnects, and aided with electromagnetic and circuit simulations. Several types of optimized detection modules will be realised and characterized to demonstrate maturity of the newly developed technology to the industrial implementation and the advance in the functionality and reliability performances of the modules achieved in comparison to existing counterparts.

[Pro19] **Light sources with cold emitters** (Źródła światła z zimnymi emiterami), Tele & Radio Research Institute, Institute of Physics of The Polish Academy of Sciences, Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, co-worker: Piotr Firek, Jerzy Kalenik, November 2012–October 2015

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

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

[Pro20] **Logistics and monitoring technologies and ways to protect the environment before starting work, during drilling, hydraulic fracturing processes and during the operation, including monitoring of groundwater, air, noise, soil, greenhouse gases and other** (Logistyka i technologie monitoringu oraz sposoby ochrony środowiska przed rozpoczęciem prac, w trakcie wiercenia, w procesach szczelinowania hydraulicznego oraz na etapie eksploatacji, w tym monitoring wód podziemnych, powietrza, hałasu, gleby, emisji gazów i innych), Warsaw University of Technology,

project leader: Jarosław Arabas, Task 3: Multiparametric sensor of liquid surface monitoring as possible methane source (Analiza czujników metanu w kierunku aplikacji do monitorowania powierzchni zbiornika cieczy), sub-project leader: Michał Borecki, October 2013–September 2016

The objective of the project is construction of low cost sensor that can continuously monitor surface of the flowback water pit as a methane source. For this purpose we plan to implement two innovations. The first is the study of multiparametric methane sensor that consist of modified NDIR and SnO_2 heads equipped with additional aerosol, humidity and temperature sensing units. The second is the study of integration technology multiparametric sensor in supernatant construction which is connected with development of local data processing methods.

[Pro21] **Optical fiber sensors with nanofilms for examination of bioliquids** (Nanowarstwowe czujniki światłowodowe do biodiagnostyki cieczy), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Mateusz Śmietana, October 2011–September 2014

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

[Pro22] **Soldier psychological profile management system including development and use of HEALTH-CHIPS technology** (System zarządzania profilami psychologicznymi żołnierzy z opracowaniem i wykorzystaniem technologii HEALTH-CHIPS), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Witold Pleskacz, May 2013–May 2016

The main goal of the project is to elaborate psychological profiles management system. In technological aspect project aims to develop unique in the world wearable integrated circuit, which will allow continuous monitoring and immediate analysis of physiological parameters of human body (including heart activity, respiration rate, oxygen saturation of blood, skin resistance, skin temperature and air pressure). "Health-Chips" (HeC) technology will be a part of experimental research leading to development of universal profiles of soldiers, taking into account their psychophysiological characteristics and level of training. HeC technology will consist of a few functional elements: dedicated integrated circuit BioChip (BCp), logical structure of psychological profiles and intelligent analytical software implemented in BCp, psychological profiles management system.

Realization of the main goal requires development of new technology in the area of sensors, data acquisition and processing techniques, proper modeling and inference to find soldier psychological profile.

[Pro23] **Ultrafast Photodetector based on Graphene (PhotoGraph)** (Ultraszybkie fotodetektory grafenowe), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Szczepański, March 2013–December 2015

Graphene has shown to possess physical properties that make it suitable for light detecting with unique characteristics. The main objective of this project is to take advantage of these properties for developing graphene-based infrared photodetectors (GPDs) characterized by exceptional features. The main goal is to obatin very high speed, exceeding that available in uncooled devices based on narrow gap semiconductors.

We propose the GPD that will work in the middle and long wavelength (from 3 to 14 μm) infrared range. The device will operate at ambient temperature or at temperatures 300 to 180 K, achievable with low cost Peltier coolers. Importantly,

the GPD will be characterized by usable signal to noise ratio level and response speed much faster compared to the existing IR devices operating at the same spectral range and temperature range.

We expect to achieve useful performance with careful design of active element and use of various solutions previously used in the LWIR IR photodetectors operating at near room temperatures. By doing so, we expect that the graphene based infrared devices will be a subject of practical implementation and commercial fabrication for advanced optoelectronic applications.

[Pro24] **VESTIC: a new manufacturing technology for integrated circuits** (VESTIC: nowy sposób wytwarzania układów scalonych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Wiesław Kuźmicz, December 2012–November 2015

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

4.4. Projects Granted by the National Science Centre

[Pro25] **Development of an accurate model of traps in metal/insulator/4H-SiC structures by Thermally Stimulated Current (TSC) measurement** (Konstrukcja precyzyjnego modelu pułapek w strukturach metal/dielektryk/4H-SiC przy wykorzystaniu pomiaru prądu wzbudzanego termicznie (TSC)), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, April 2013–February 2016

The aim of the research is the use of the method of characterization using the temperature change of the sample to determine the energy structure of electrically active traps in SiO2/SiC interface and cross-section of the trap, resulting in a realistic possibility of linking the results of electrical measurements of the traps with the reasons for their formation. A new setup will be designed and implemented to measure Thermally Stimulated Current (TSC) of MIS test capacitors. It was hypothesized that the application of room temperature techniques without the use of light in the spectrum strongly connected with the absorption edge of the semiconductor material, such as the commonly used Terman method based on the measurement of high-frequency capacitance-voltage characteristics (HF C-V) gives too low energy resolution of traps position in the bandgap, and the sensitivity of the method at room temperature is often too small for the characterization of samples with the best performance (low density of traps).

[Pro26] **Electrical characterization of the advanced MIS structures in the range of low and very low frequencies** (Elektryczna charakteryzacja zaawansowanych struktur MIS w zakresie niskich i bardzo niskich częstotliwości), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jakub Jasiński, July 2013–January 2016

Search for new dielectric layers is one of the important development trends of contemporary microelectronics. These layers are applied in almost all types of modern semiconductor devices (gate dielectrics of MIS capacitors and transistors, non-volatile memory cells). Simultaneously the development of microelectronic industry is always accompanied by scaling. Reduction of device dimensions leads to the intensification of carrier tunneling through ever thinner dielectric layers.

In the case of ncMOS structures tunneling a is a process which leads to charge/discharge nanocrystallites, while in multi-layer high-k dielectrics with a thin buffer layer the tunneling current may charge/discharge traps located at the interface between dielectric layers and built-in high-k layer.

The nature of the charge/discharge processes mentioned above and the accompanying mechanisms of carrier transport in the ultra thin dielectric layers seems to be revealed in the range of low and very low frequencies, due to the fact that time constants of these processes can be high in certain situations. The Authors of this application, however, did not find the results of such characterization of mentioned structures in the literature. The characterization presented in the literature is usually limited to static I(V) characteristics or C(V) and G(V) curves at frequencies equal or higher than 500 Hz.

Deeper understanding of the phenomena accompanying the current flow through the dielectric layers mentioned above may require characterization in a wider frequency range, beginning from a few hundredths Hz. This will enable development of a more comprehensive small-signal model of the investigated layers than that presented in the literature. The model will most probably contain elements denoting phenomena that may only be observed at low-frequency measurements. This will also enable extraction of electrophysical parameters of the structure that could not be extracted so far.

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

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

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

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

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

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

[Pro30] **Oxide nanostructures for electronics, optoelectronics and photovoltaics** (Nanostruktury tlenkowe do zastosowań w elektronice, optoelektronice i fotowoltaice), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, June 2013–June 2018

Aim of this project is explanation and description of complex electro-optical properties of a group of wide band gap oxide materials (Al_2O_3, HfO_2, ZrO_2, ZnO). Despite the fact that these materials are presently key elements of modern electronic (gate oxides, transparent electronics, memories), optoelectronic (transparent contacts) and photovoltaic (transparent contacts) devices, influence of growth conditions on their electrical and optical properties is still not clear.

By selecting growth conditions we can deposit both dielectric (isolating) and semiconducting layers, in the case of ZnO even with a metallic conductivity. Doped in a controlled way, grown at specific conditions, thin layers of ZnO should enable us construction of transparent contacts to wide band gap semiconductors (SiC, GaN). To achieve goals of the project we should answer several questions on the origin of shallow donors in ZnO, in particular role of hydrogen in these films (our present investigations question the fact that hydrogen is dominant shallow donor in our films), on the role played by vacancies in conductive and dielectric films, on the method of recrystallization blocking of gate oxides, on the mechanisms of compensations in ZnO layers grown in the ALD processes with ammonia water. We will investigate why gate oxides (mainly HfO_2) have excellent isolating properties, when deposited as amorphous ones, but loose these properties after recrystallization. Thus, the ways to block their recrystallizations are crucial and need detail investigations. The working hypothesis is that small deviations from oxides stoichiometry importantly affect electro-physical material parameters of selected oxides.

[Pro31] **Technology and characterization of ultrathin silicon layers formed by means of PECVD for nanelectronic applications** (Technologia i charakteryzacja ultracienkich warstw krzemu wytwarzanych metodą PECVD na potrzeby struktur nanoelektronicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Romuald B.Beck, August 2012–August 2015

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

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

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

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

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

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

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

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

[Pro32] **The conditions of short-wavelength emission excitation in optically active low-phonon glasses and composite materials pumped with pressure-tuned laser diodes** (Warunki wzbudzania emisji krótkofalowej w aktywnych optycznie szkłach niskofonowych i materiałach kompozytowych pompowanych przestrajalnymi ciśnieniowo diodami laserowymi), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Piramidowicz, co-workers: Michał Malinowski, Krzysztof Anders, Anna Jusza, August 2012–February 2015

Short-wavelength radiation, typically understood as near-UV, violet up to blue-green, is important to many aspects of life, society, and technology. As such it has been addressed often in science and technology in the past several decades. Noncoherent short-wavelength radiation, starting at about 100 nm is present in sunlight, although due to absorption in upper atmosphere, very little reaches Earth's surface. The so-called black lights, or Wood light (filtered broadband radiation of e.g. $SrB_4O_7:Eu^{2+}$) and mercury vapour fluorescent UV lamps are typically used for germicidal purposes. Gas-discharge lamps and flash lamps emitting incoherent, broadband radiation due to arc discharge in noble gas plasma, are used e.g. in special lighting, pumping of solid state lasers (including laser at the National Ignition Facility in the USA) or for stimulating or characterizing various biological processes. Better efficiency, longer lifetimes, faster on-off times, dimming capability, less heat generation, together with comparatively lower price, make wide band gap semiconductor light emitting diodes (LEDs) take over from lamp sources, specifically in areas like lighting (and exciting filtering phosphors), bio-imaging or biostimulating processes in medicine and life sciences.

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

[Pro33] **The effect of phosphorus on the electro-physical properties of dielectric layers produced by 4H-SiC thermal oxidation** (Wpływ fosforu na właściwości elektro-fizyczne warstw dielektryków wytwarzanych metodą termicznego 4H-Sic), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Krystian Król, March 2013–March 2016

The goal of the project is conducting research on possibility of influencing electrical parameters of metal-oxide--semiconductor structure on silicon carbide (SiC) by introducing additional elements to interface region of this structure. The main hypothesis of planed research is that electrical properties of thermal oxides obtained on silicon carbide can be improved (especially by decreasing interface density of states Dit) by introducing phosphorus to transition region of MOS structure using shallow ion implantation. This technology can be beneficial for understanding oxidation process of silicon carbide. By performing chemical, and electrical research of prepared samples an effect of phosphorus incorporation will be described. As a result an explanation of mechanisms responsible for observed phenomenon will be proposed. A secondary goal of this project is developing optimal technological steps with respect to electrical properties of MOS structure using thermal dielectric on SiC with special consideration of interface density of states.

[Pro34] **The influence of subsurface doping of silicon carbide (4H-SiC) by ion implantation on electrophysical properties of MOS structures fabricated by thermal oxidation** (Wpływ przypowierzchniowego domieszkowania węglika krzemu 4H-SiC techniką implantacji jonów na właściwości elekrofizyczne struktur MOS otrzymywanych w wyniku utleniania termicznego), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, co-workers: Jerzy Żuk, Jacek Szuber, Bogusława Adamowicz, Mariusz Sochacki, Włodzimierz Strupiński, Małgorzata Kalisz, Piotr Firek, Aleksander Werbowy, Alina Domanowska, Piotr Kościelniak, Norbert Kwietniewski, Krystian Król, April 2011–April 2014

The main objective of the project is primarily to understand the processes taking place in the SiO_2/SiC interface in the presence of nitrogen and an explaination of the reasons of the lower density of surface states including gate dielectric technology development towards commercialization of MOSFET transistors. The role of carbon in surafce states creation and the role of nitrogen in reduction of the surface states density including the nature of chemical bonds in the interface will be investigated by profiling X-ray Photoelectron Spectroscopy (XPS) and profiling Auger Electron Microscopy (SAM). The second stream of research is an extraction of electrical parameters of MOS structures and the determination of the relationship between electrical parameters and the fabrication technology. The parameters of thermal oxidation will be proposed to implement the process into simulation software. The electrical simulation will take into account the technology details if the correlation is obtained through the experimental work.

4.5. Projects Granted by International Institutions

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

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

Expected results:

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

[Pro36] **Nanocoated Optical Fiber Sensors for Biodiagnostics of Liquids**, EU structural project, project leader: Mateusz Śmietana, November 2011–October 2013

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

[Pro37] **PARADIGM Photonic advanced research and development for integrated generic manufacturing** (Zaawansowane badania nad rozwojem generycznych technologii fotonicznych układów scalonych), EU structural project, project leader: Paweł Szczepański, co-workers: Ryszard Piramidowicz, Stanisław Stopiński, Krzysztof Anders, Anna Jusza, September 2011–May 2015

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

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

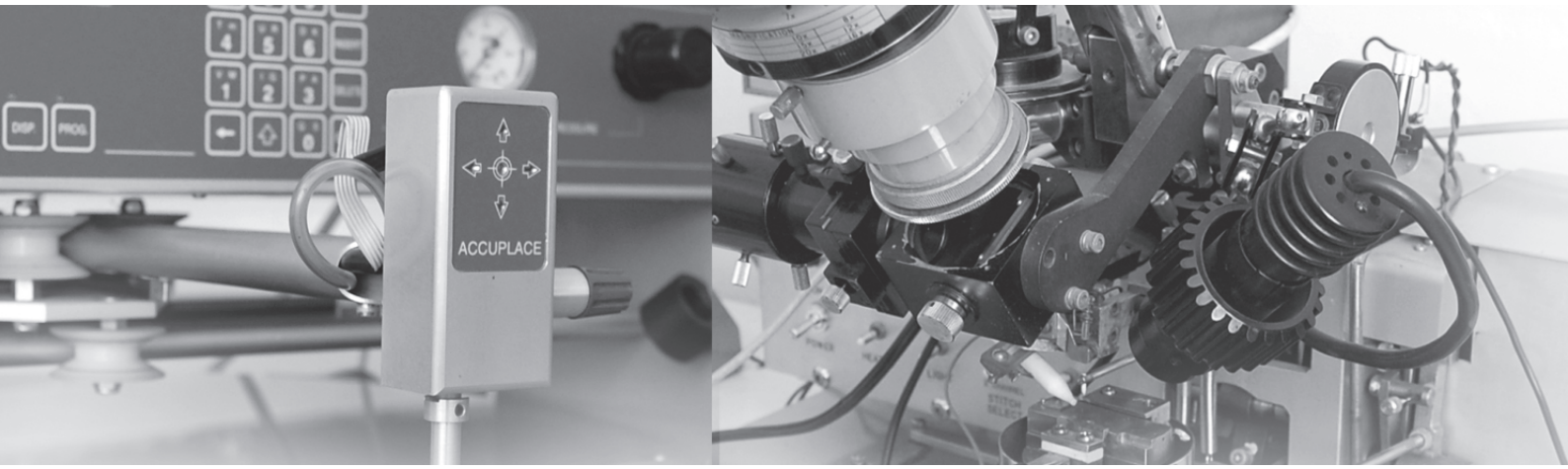
[Pro38] **Technology of new generation of hydrogen and hydrogen compounds sensor for over normative conditions applications "DETEH"**, (Opracowanie technologii nowej generacji czujnika wodoru i jego związków do zastosowań w warunkach ponadnormatywnych), EU structural project, project leader: Jan Szmidt, co-workers: Jerzy Kalenik, Piotr Firek, Aleksander Werbowy, Mateusz Śmietana, July 2009–June 2014

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

4.6. Other Projects

[Pro39] **Composite polymer fibers doped with RE^{3+} ions – new generation of active media for visible light sources** (Kompozytowe światłowody polimerowe domieszkowane jonami RE^{3+} – nowa generacja ośrodków aktywnych do zastosowań światła na zakres widzialny), project funded by Innovative Economy Programme (POIG) and The Foundation for Polish Science (VENTURES/2012-10/3), project leader: Anna Jusza, February 2013–January 2014

The main aim of the project is the development of manufacturing technology and investigation of luminescent properties of a new optically active materials for visible light sources applications – composite fibers based on polymer matrices doped with RE^{3+} activated nanocrystals. Composite materials, which are a combination of two different phases with different optical and mechanical properties – for example, a polymer matrix with embedded active nanocrystallites, creating the potential for the design and construction of an entirely new class of light sources, characterized by small size, low price and excellent optical and mechanical properties. These materials can be widely applied in modern optical telecommunications systems (such as FTTH networks based on polymer fibers), integrated optoelectronics, optical information processing, and many others. In particular, the specific nature of the composite material allows to obtain an efficient emission (and possible generation) in short-wavelength range of optical spectrum in materials of excellent thermo-mechanical properties, such as PMMA, which is considered as inapplicable in such active systems up to now (because of the high values of phonon energies).



Electronic Materials and Microsystem Technology Division

5. DEGREES AWARDED

5.1. D.Sc. Degrees

[DSc1] Ryszard Piramidowicz, **New active materials for application in a waveguide short-wavelength light sources** (Nowe materiały aktywne do zastosowań w światłowodowych źródłach promieniowania na zakres krótkofalowy), 16 April 2013

5.2. Ph.D. Degrees

[PhD1] Tomasz Borejko, **Highly stable voltage and current reference sources in CMOS technology and method of design** (Wysokostabilne źródła napięcia i prądu odniesienia w technologiach CMOS oraz metoda ich projektowania), supervisor: Witold Pleskacz, 26 March 2013

[PhD2] Paweł Sałek, **Modeling selected electrical parameters of modern MOS transistors** (Modelowanie wybranych parametrów elektrycznych współczesnych tranzystorów MOS), supervisor: Lidia Łukasiak, 8 January 2013

5.3. M.Sc. Degrees

[MSc1] Mateusz Mikołaj Bugaj, **Semi-analitycal model of Raman generation in silicon-on-insulator RIB waveguide** (Model generacji promieniowania lasera ramanowskiego w falowodzie typu RIB), advisor: Paweł Szczepański, very good, 15 March 2013

[MSc2] Maciej Domysławski, **Model of bistable operation in one dimension photonic crystal waveguide lasers with nonlinear absorbtion** (Model bistabilnej pracy falowodowego lasera wykonanego z jednowymiarowego kryształu fotonicznego z nieliniowym absorberem), advisor: Agnieszka Mossakowska-Wyszyńska, fairly good, 15 March 2013

[MSc3] Paweł Krystian Kluz, **Emission properties of erbium ions doped $SrTiO_3$-TiO_2 biphasic crystal** (Właściwości emisyjne dwufazowego kryształu $SrTiO_3$-TiO_2 domieszkowanego jonami erbu), advisor: Marcin Piotr Kaczkan, good, 24 May 2013

[MSc4] Cezary Kołaciński, **CMOS analog integrated readout circuit for THz detectors** (Układ odczytowy detektora promieniowania THz w technologii CMOS), advisor: Elżbieta Piwowarska, excellent, 22 March 2013

[MSc5] Krzysztof Krogulski, **Selective deep wet etching of fused silica optical fibers for sensing applications** (Technologia głębokiego trawienia kwarcowych struktur światłowodowych na potrzeby czujnikowe), advisor: Mateusz Jakub Śmietana, very good, 19 June 2013

[MSc6] Michał Kulik, **IMiOVIP virtual prototyping system** (System wirtualnego prototypowania IMiOVIP), advisor: Zbigniew Jaworski, excellent, 04 October 2013

[MSc7] Piotr Czesław Mąkosa, **Test of cooling performance of uranium neutron converter used in BNCT therapy in nuclear reactor Maria** (Badanie wydajności chłodzenia uranowego konwertera neutronów dla potrzeb terapii BNCT w reaktorze atomowym Maria), advisor: Witold Pleskacz, very good, 25 October 2013

[MSc8] Marcin Michał Myśliwiec, **Flip-chip assembly for packaging of SiC diodes working at high temperatures up to 350 C** (Połączenia typu flip-chip w montażu diod SiC pracujących w temperaturach do 350 C), advisor: Ryszard Kisiel, excellent, 08 February 2013

[MSc9] Jacek Andrzej Rutkowski, **The use of programmable integrated systems PSoC-type in ECG test** (Wykorzystanie zintegrowanych systemów programowalnych typu PSoC w badaniu EKG), advisor: Elżbieta Piwowarska, good, 12 April 2013

[MSc10] Dariusz Rafał Seweryn, **Optimalization of scheduling of production lines** (Optymalizacja harmonogramowania linii produkcyjnych), advisor: Sławomir Szostak, very good, 04 October 2013

[MSc11] Andrzej Szymon Steciuk, **Developing of a model to characterize the parameters of CCTV cameras** (Opracowanie modelu do charakteryzacji parametrów kamer CCTV), advisor: Piotr Garbat, good, 29 October 2013

[MSc12] Magdalena Szymańska, **High-k dielectric layers for applications in MOS/MISFET devices** (Warstwy dielektryczne o wysokiej wartości przenikalności elektrycznej dla zastosowań w przyrządach MOS/MOSFET), advisor: Robert Paweł Mroczyński, excellent, 19 June 2013

[MSc13] Mateusz Teodorowski, **Silicon nanowire junctionless transistor in CMOS technology** (Nanodrutowy bezzłączowy tranzystor krzemowy w technologii CMOS), advisor: Wiesław Kuźmicz, excellent, 28 June 2013

[MSc14] Paweł Maciej Westfalewicz, **Measurement system for three-dimensional presses parameter measurement used in furniture industry** (System pomiaru parametrów pracy pras trójwymiarowych przemysłu meblarskiego), advisor: Witold Pleskacz, very good, 19 June 2013

[MSc15] Michał Eligiusz Wołodźko, **Study and development of VeSFET electrical model** (Opracowanie i analiza elektrycznego modelu tranzystora VeSFET), advisor: Wiesław Kuźmicz, very good, 28 June 2013

[MSc16] Cezary Zawadzki, **Photovoltaic systems – comparison of technology and economic analysis (case study: PV systems installed at Warsaw University of Technology)** (Systemy fotowoltaiczne – porównanie technologii oraz analiza ekonomiczna (studium przypadku: systemy PV zainstalowane na Politechnice Warszawskiej)), advisor: Stanisław Pietruszko, good, 28 June 2013

[MSc17] Michał Grzegorz Zbieć, **FPGA-implementation generator of feed forward neural network** (Generator jednokierunkowej sztucznej sieci neuronowej w matrycy FPGA), advisor: Elżbieta Piwowarska, excellent, 22 March 2013

5.4. B.Sc. Degrees

[BSc1] Marcin Adamczyk, **Measuring setup for characterization of attenuation properties of polymer optical fibers** (Stanowisko do badań charakterystyk tłumiennościowych światłowodów polimerowych), advisor: Ryszard Piramidowicz, good, 15 February 2013

[BSc2] Kamil Ber, **Development of manufacturing technology ultra-thin silicon layers for quantum structures** (Opracowanie technologii wytwarzania ultracienkich warstw krzemowych dla struktur kwantowych), advisor: Romuald Beck, excellent, 08 February 2013

[BSc3] Piotr Bartosz Bilski, **Characterization and modification of the measuring circuit the power supplied from diathermy to electrosurgical instrument** (Charakteryzacja i modyfikacja toru pomiaru mocy dostarczanej z diatermii do narzędzia elektrochirurgicznego), advisor: Arkadiusz Władysław Łuczyk, good, 27 September 2013

[BSc4] Michał Brodowski, **Optical characteristics of biofuels undergoing forced thermal cycles in the capillary heads** (Charakterystyka właściwości optycznych biopaliw poddawanych wymuszonym cyklom termicznym w głowicach kapilarnych), advisor: Michał Borecki, good, 08 February 2013

[BSc5] Igor Łukasz Butryn, **Phase locked loop model for Bluetooth receiver in Matlab/Simulink** (Model układu pętli fazowej ogoodiornika Bluetooth w programie Matlab/Simulink), advisor: Witold Pleskacz, good, 28 June 2013

[BSc6] Piotr Jacek Cegielski, **Design of new dual-gate field effect based transistor as an element of SRAM memory excellentl** (Projekt dwubramkowego tranzystora polowego o nowej konstrukcji 3D" jako elementu pamięci SRAM), advisor: Andrzej Pfitzner, very good, 28 June 2013

[BSc7] Kamil Konrad Ciecierski, **Characterization of titanium dioxide layers deposited by magnetron sputtering method** (Charakteryzacja warstw tlenku tytanu osadzanego przy użyciu rozpylania magnetronowego), advisor: Piotr Firek, good, 15 February 2013

[BSc8] Mieczysław Maria Dąbrowski, **Soft-core microcontrol environment** (Implementacja w języku opisu sprzętu syntezowalnego środowiska mikro-sterowania), advisor: Arkadiusz Władysław Łuczyk, very good, 15 February 2013

[BSc9] Tomasz Marek Drążewski, **Characterisation and etching of magnetron deposited thin Al_2O_3 films** (Charakteryzacja i trawienie warstw Al_2O_3 nanoszonych magnetronowo), advisor: Piotr Firek, good, 15 February 2013

[BSc10] Bartosz Andrzej Gąsowski, **Implementation of ring oscillator VCO for 5 Gbps serial link application in CMOS 65 nm process** (Implementacja układu oscylatora pierścieniowego VCO do zastosowań w 5 Gbps łączach transmisji szeregowej w technologii CMOS 65 nm), advisor: Witold Pleskacz, excellent, 15 February 2013

[BSc11] Aleksandra Golba, **L-band erbium doped fiber amplifier** (Wzmacniacz światłowodowy EDFA na pasmo L), advisor: Ryszard Piramidowicz, good, 27 September 2013

[BSc12] Piotr Gromada, **Analog to digital converter in CMOS 65 nm technology** (Przetwornik A/C typu Flash w technologii CMOS 65 nm), advisor: Zbigniew Jaworski, good, 20 September 2013

[BSc13] Rafał Łukasz Hołyński, **Portable photovoltaic charger** (Fotowoltaiczna ładowarka przenośna), advisor: Stanisław Pietruszko, good, 01 February 2013

[BSc14] Marta Teresa Jastrząb, **Developing a method of calibration of a 3D mapping system** (Opracowanie metodyki kalibracji układu projekcji wideo z mapowaniem 3D), advisor: Piotr Garbat, good, 27 September 2013

[BSc15] Adam Andrzej Kaim, **Etch process modeling for statistical simulation in the design of integrated circuits** (Modelowanie procesu trawienia pod kątem symulacji statystycznej w projektowaniu układów scalonych), advisor: Andrzej Pfitzner, good, 28 June 2013

[BSc16] Kamil Malec-Kruszyński, **Lossy and lossless compression of 3D images** (Kompresja stratna i bezstratna obrazów 3D), advisor: Marek Sutkowski, fairly good, 05 July 2013

[BSc17] Piotr Mardowski, **Model of photoconductivity kinetics in semi-insulating materials** (Model kinetyki fotoprzewodnictwa w materiałach półizolujących), advisor: Antoni Siennicki, good, 15 March 2013

[BSc18] Krzysztof Jan Matusiewicz, **Analysis of working conditions of optical capillaries filled with opaque liquids located in head of sensors** (Analiza warunków pracy kapilar optycznych w głowicach czujników wypełnionych cieczami mętnymi), advisor: Michał Borecki, good, 15 February 2013

[BSc19] Greta Maria Miller, **Properties of Al ohmic contacts to Si** (Właściwości kontaktów Al do podłoża Si), advisor: Piotr Firek, good, 19 June 2013

[BSc20] Wojciech Antoni Osman, **Graphical user interface (GUI) for the visualization of the rectangular dielectric waveguide mods and energy efficiency of the waveguide Fabry-Perot laser** (Opracowanie środowiska graficznego (GUI) do wizualizacji i analizy rozkładu modów w światłowodzie prostokątnym oraz sprawności energetycznej falowodowego lasera F-P), advisor: Agnieszka Mossakowska-Wyszyńska, good, 27 September 2013

[BSc21] Grzegorz Krzysztof Parosa, **Reactive Ion Etching (RIE) of metallic layers in boron-chloride plasma** (Reaktywne trawienie jonowe (RIE) warstw metalicznych w plazmie borowo-chlorowej), advisor: Robert Paweł Mroczyński, good, 22 March 2013

[BSc22] Michał Konrad Pawłowski, **The design of digital-analog converter in 90 nm CMOS technology** (Projekt przetwornika cyfrowo-analogowego w technologii CMOS 90 nm), advisor: Zbigniew Jaworski, good, 20 September 2013

[BSc23] Andrzej Łukasz Połatyński, **Analysis of the effect of temperature on the dielectric properties of barium titanate thin films**,(Analiza wpływu temperatury na właściwości dielektryczne cienkich warstw tytanianu baru), advisor: Piotr Firek, good, 15 February 2013

[BSc24] Bartosz Powałka, **Design, construction and programming the device to measure the capacity of battery AA/AAA** (Projekt, wykonanie i zaprogramowanie urządzenia do pomiaru pojemności baterii AA/AAA), advisor: Zbigniew Pióro, good, 05 July 2013

[BSc25] Krzysztof Sędek, **NAND logic gate design with novel 3-D double gate transistor VeSFET** (Projekt dwubramkowego tranzystora o nowej konstrukcji 3-D (VeSFET) jako elementu bramki NAND), advisor: Andrzej Pfitzner, good, 27 September 2013

[BSc26] Mateusz Słowikowski, **Optical fiber power combiner** (Światłowodowy sumator mocy optycznej), advisor: Ryszard Piramidowicz, good, 15 February 2013

[BSc27] Paweł Soćko, **Implementation algorithms for polarization imaging using Nvidia CUDA platform** (Implementacja algorytmów do przetwarzania obrazów polaryzacyjnych z wykorzystaniem platformy Nvidia CUDA), advisor: Piotr Garbat, good, 19 June 2013

DEGREES AWARDED

[BSc28] Tomasz Stańczyk, **Investigation of properties of metamaterial structures in gigahertz and terahertz range** (Badanie właściwości struktur metamateriałowych w zakresie gigahercowym i terahercowym), advisor: Janusz Parka, good, 28 June 2013

[BSc29] Mateusz Starzyk, **Microcontroller-based unit controlling liquid crystal optoelectronic converters** (Mikrokontrolerowy układ sterowania ciekłokrystalicznymi przetwornikami optoelektronicznymi), advisor: Sławomir Szostak, good, 04 October 2013

[BSc30] Jakub Walczuk, **Model of optical transitions in active dielectric materials doped with rare-earth ions** (Model przejść optycznych w dielektrycznych ośrodkach aktywnych domieszkowanych jonami ziem rzadkich), advisor: Marcin Piotr Kaczkan, good, 15 February 2013

[BSc31] Michał Wardaszka, **Expanding functionalities of visual surveillance systems with an audio interface** (Rozszerzanie funkcjonalności systemów monitoringu wizyjnego interfejsem dźwiękowym), advisor: Piotr Garbat, good, 08 February 2013

[BSc32] Marcin Jan Waszczuk, **WiFI influence on Bluetooth communication** (Wpływ sieci WiFI na komunikację w standardzie Bluetooth), advisor: Arkadiusz Władysław Łuczyk, good, 08 February 2013

[BSc33] Łukasz Wiechowski, **Implementation of the analog-to-digital converter with demodulator model for Bluetooth receiver** (Implementacja modelu przetwornika analogowo-cyfrowego wraz z układem demodulacji dla ogoodiornika Bluetooth), advisor: Witold Pleskacz, very good, 28 June 2013

[BSc34] Konrad Wiśniewski, **ADEC lab website design including the user registration system** (Projekt strony internetowej laboratorium ADEC wraz z systemem rejestracji użytkownika), advisor: Arkadiusz Władysław Łuczyk, very good, 04 October 2013

6. PUBLICATIONS

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

NUMBER	JOURNAL	AUTHORS	TITLE	VOLUME	PAGES
[Pub1]	Acta Physica Polonica A	J.Grochowski, M.Myśliwiec, P.Mikulic, W.J.Bock, M.Śmietana	Temperature cross-sensitivity for highly refractive index sensitive nanocoated long-period gratings	Vol. 124 No. 3	421–424
[Pub2]		M.Myśliwiec, J.Grochowski, K.Krogulski, P.Mikulic, W.J.Bock, M.Śmietana	Effect of wet etching of arc-induced long-period gratings on their refractive index sensitivity	Vol. 124 No. 3	521–524
[Pub3]	Annals of Noninvasive Electrocardiology	M.Lewandowski, A.Przybylski, W.Kuźmicz, H.Szwed	Reduction of the inappropriate ICD therapies by implementing a new fuzzy logic–based diagnostic algorithm	Vol. 18 No. 5	457–466
[Pub4]	Applied Physics B- Lasers and Optics	M.Kaczkan, Z.Boruc, B.Fetliński, M.Malinowski	Temperature dependence of $^3P_0$ Pr^{3+} fluorescence dynamics in $Y_4Al_2O_9$ crystals	No. 113	277–283
[Pub5]	Applied Physics Letters	R.Kowerdziej J.Krupka, E.Nowinowski-Kruszelnicki	Microwave complex permittivity of voltage-tunable nematic liquid crystals measured in high resistivity silicon transducers	Vol. 102	1–4
[Pub6]		R.Kowerdziej, J.Parka, J.Krupka, M.Olifierczuk, E.Nowinowski--Kruszelnicki, L.Jaroszewicz, O.Chojnowska	Dielectric properties of highly anisotropic nematic liquid crystals for tunable microwave components	Vol. 103	1–5
[Pub7]	Artificial Intelligence in Medicine	A.Bárdossy, A.Blinowska, W.Kuźmicz, J.Ollitrault, M.Lewandowski, A.Przybylski, Z.Jaworskic	Fuzzy logic-based diagnostic algorithm for implantable cardioverter defibrillators	No. 60	113–121
[Pub8]	IEEE Photonics Journal	S.Stopiński, M.Malinowski, R.Piramidowicz, E.Kleijn, M.K.Smit, X.J.M.Leijtens	Integrated optical delay lines for time-division multiplexers	Vol. 5 No. 5	1–10
[Pub9]	IEEE Photonics Technology Letters	K.Ławniczuk, C.Kazmierski, C. Provost, J.Wale, R.Piramidowicz, P.Szczepański	InP-based photonic multiwavelength transmitter with DBR laser array	Vol. 25 No. 4	352–354
[Pub10]		K.Ławniczuk, O.Patard, R.Guillamet, N.Chimot, A.Garreau, C.Kazmierski, G.Aubin, K.Merghem	40-Gb/s colorless reflective amplified modulator	Vol. 25 No. 4	341–343
[Pub11]	IEEE Transactions on Applied Superconductivity	J.Krupka, J.Wosik, C.Jastrzębski, T.Ciuk, J.Mazierska, M.Zdrojek	Complex conductivity of YBCO films in normal and superconducting states probed by microwave measurements	Vol. 23 No. 2	1–6
[Pub12]	Journal of Crystal Growth	K.Racka, E.Tymicki, K.Grasza, I.A.Kowalik, D.Arvanitis, M.Pisarek, K.Kościewicz, R.Jakieła, B.Surma, R.Diduszko, D.Teklińska, J.Mierczyk, J.Krupka	Growth of SiC by PVT method in the presence of cerium dopant	Vol. 377	88–95
[Pub13]	Journal of Physics	A.Malinowski, T.Takeuchi, S.Chen, T.Suzuki, K.Ishikawa, M.Sekine, M.Hori, L.Łukasiak, A.Jakubowski	A novel fast and flexible technique of radical kinetic behaviour investigation based on pallet for plasma evaluation structure and numerical analysis	Vol. 46	1–11

[1] Institute for Scientific Information (Philadelphia, USA)

[Pub14]	Journal of Vacuum Science &Technology B	J.Jasiński, B.Majkusiak	Small-signal admittance model as a characterization tool of the MOS tunnel diode	Vol. 31 No. 1	01A111– –01A111-7
[Pub15]	Measurement Science and Technology	J.Krupka	Contactless methods of conductivity and sheet resistance measurement for semiconductors, conductors and superconductors	Vol. Nr 24	1–13
[Pub16]		M.Śmietana, W.J.Bock, P.Mikulic	Effect of high-temperature plasma-deposited nano-overlays on the properties of long-period gratings written with UV and electric arc in non-hydrogenated fibers	Vol. 24 No. 9	1–9
[Pub17]	Microelectronic Engineering	J.Jasiński, A.Mazurak, B.Majkusiak	Study of the effect of tunneling through the traps inside the insulator on small-signal admittance of the MOS structure	Vol. 109	1–4
[Pub18]	Microprocessors and Microsystems	K.Marcinek, W.Pleskacz	ELEON3LP – Superscalar and low-power enhancements of single issue general purpose processor model	Vol. 37	693–700
[Pub19]	Nuclear Instruments & Methods in Physics Research	S.Stopiński, M.Malinowski, R.Piramidowicz, M.K.Smit, X.J.M.Leijtens	Data readout system utilizing photonic integrated circuit	725	183–186
[Pub20]	Optica Applicata	M.Kozłowski, J.Radomska, H.Wronka, E.Czerwosz, P.Firek, K.Sobczak, P.Dłużewski	Annealing time effects on the surface morphology of C–Pd films prepared on silicon covered with SiO_2	Vol. XLIII No. 1	1
[Pub21]	Opto-Electronics Review	A.Tyszka-Zawadzka, P.Szczepański, A.Mossakowska-Wyszyńska, M.Karpierz, M.Bugaj	Semi-analytical model of Raman generation in silicon-on-insulator rib waveguide with DBR/F-P resonator	Vol. 21 No. 4	382–389
[Pub22]		P.Garbat, W.Skarbek, M.Tomaszewski	Structured light camera calibration	Vol. 21 No. 1	23–38
[Pub23]	Science of Advanced Materials	M.O.Ramirez, P.Molina, L.Mateos, S.Turczyński, M.Kaczkan, M.Malinowski, D.A.Pawlak, L.E.Bausa	Pr^{3+}-based fluorescent TiO_2 split ring resonator-like crystalline microstructures	Vol. 5	927–932
[Pub24]	Thin Solid Films	A.Kaźmierczak-Bałata, J.Bodzenta, M.Krzywiecki, J.Juszczyk, J.Szmidt, P.Firek	Application of scanning microscopy to study correlation between thermal properties and morphology of $BaTiO_3$ thin films	Vol. 545	217–221

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

NUMBER	JOURNAL	AUTHORS	TITLE	VOLUME	PAGES
[Pub25]	Elektronika – konstrukcje, technologie, zastosowania	M.Ciepłucha	Cyclone II implementation of a high-perfomance universal multiplier-accumulator	Vol. LIV No.12	13–16
[Pub26]		P.Szczepański, R.Kisiel, R.Romaniuk,	Konferencja Technologia Elektronowa ELTE'2013	Vol. LIV No. 6	69–73
[Pub27]		P.Knyps, E.Dumiszewska, M.Wesołowski, W.Strupiński, J.Kalbarczyk, M.Teodorczyk	Pomiary elektryczne i optyczne ogniw fotowoltaicznych Ge/InGaAs/InGaP	Vol. No. 5	22–24
[Pub28]		M.Borecki, J.Szmidt, P.Doroz, P.Pszczółkowski, M.Duk, A.Kociubiński, M.Korwin-Pawłowski	Wieloparametryczna klasyfikacja właściwości użytkowych biopaliw ciekłych – optymalizacja głowicy sensora	Vol. 54 No. 9	49–51

[Pub29]	Fundacja Edukacyjna Perspektywy	J.Woźnicki	Pomóc i dać szansę	Vol. 133 No. 3	54
[Pub30]	International Journal of Microelectronics and Computer Science	D.Kasprowicz, B.Swacha	Small-signal parameters of the VeSFET and its application in analog circuits	Vol. 4 No. 2	79–86
[Pub31]	Materials Science Forum	K.Król , M.Sochacki, M.Turek, J.Zuk, H.Przewlocki, T.Gutt, P.Borowicz, M.Guziewicz, J.Szuber, M.Kwoka, P.Koscielniak, J.Szmidt	Influence of nitrogen implantation on electrical properties of Al/SiO_2/4H-SiC MOS structure	Vol. 740–742 No.	733–736
[Pub32]		K.Król, M.Kalisz, M.Sochacki, J.Szmidt	The influence of post-oxidation annealing process in O_2 and N_2O on the quality of Al/SiO_2/n-type 4H-SiC MOS interface	Vol.740–742 No.	753–756
[Pub33]	Proc. SPIE 8702, Laser Technology 2012: Progress in Lasers, (pub. January 15, 2013)	W.Kamiński, J.Kęsik, P.Warda, S.Jonak	Analysis of influence of buffer gas admixtures on laser generation conditions in noble gas ion lasers	Vol. 8702	87020P-1–87020P-6
[Pub34]		W.Kamiński, J.Kęsik, P.Warda	Analysis of simultaneous generation of argon and krypton laser lines in ion lasers filled with argon-krypton mixture	Vol. 8702	87020O-1–87020O-10
[Pub35]	Proc. SPIE 8703, Laser Technology 2012: Applications of Lasers, (pub. January 22, 2013)	W.Kamiński, P.Warda, J.Kasprzak, J.Kęsik	Argon-krypton ion laser as light source for medical photocoagulation applications	Vol. 8703	870306-1–870306-6
[Pub36]	Proc. SPIE 8902, Electron Technology Conference 2013, (pub. July 25, 2013)	M.Mysliwiec; M.Guziewicz; R.Kisiel	Aspects of SiC diode assembly using Ag technology	Vol. 8902	89020T-1–89020T-8
[Pub37]		W.Kuźmicz, P.Mierzwiński	Bipolar transistor in VESTIC technology	Vol. 8902	89020M-1–89020M-7
[Pub38]		J.Gryglewicz, P.Firek, J.Jasiński, R.Mroczyński, J.Szmidt	Characterization of thin Gd_2O_3 magnetron sputtered layers	Vol. 8902	89022M-1–89022M-7
[Pub39]		D.Tanous, B.Majkusiak	Description of tunneling through a metal-insulator-metal junction considering Coulomb Blockade	Vol. 8902	89020P-1–89020P-8
[Pub40]		A.Mossakowska-Wyszyńska, A.Tyszka-Zawadzka, P.Szczepański, R.B.Beck, R.Mroczyński	Designing of Raman lasers with Bragg mirrors	Vol. 8902	89021H-1–89021H-10
[Pub41]		J.Jasiński, L.Łukasiak, A.Jakubowski,D.K.Kim, D.S.Kim, S.H.Halm, J.H.Lee	Electrical characterization of GaN-channel MOSFETs	Vol. 8902	89020U-1–89020U-6
[Pub42]		P.Szczepański, R.Kisiel, R.Romaniuk	Electron Technology – ELTE'2013	Vol. 8902	890202-1–890202-11
[Pub43]		A.Taube, J.Kaczmarski, M.Ekielski, D.Pucicki, E.Kamińska, A.Piotrowska	Fabrication and characterization of thin-film transistors with amorphous In-Ga-Zn-O layers	Vol. 8902	89020N-1–89020N-6
[Pub44]		K.Ber, R.B.Beck	Formation of ultrathin silicon layers by PECVD and their modification for nanoelectronic and nanophotonic applications	Vol. 8902	89022A-1–89022A-10
[Pub45]		J.Kaczmarski, A.Taube, E.Dynowska, J. Dyczewski, M. Ekielski, D. Pucicki, E. Kamińska, A. Piotrowska	In-Ga-Zn-O amorphous thin films for transparent electronics	Vol. 8902	89022N-1–89022N-8

[Pub46]	Proc. SPIE 8902, Electron Technology Conference 2013, (pub. July 25, 2013)	M.Mroczkowski, J.Kalenik, J.Szmidt	Influence of selected environmental factors on electrical and physical properties of polymer-semiconductor layers	Vol. 8902	89022P-1– –89022P-4
[Pub47]		J.Jasiński, L. Łukasiak, A.Jakubowski, C.Casteleiro, T.Whall, E.Parker, M.Myronov, D.R.Leadley	Influence of series resistance determination on the extracted mobility in MOS transistors with Ge channel	Vol. 8902	89020O-1– –89020O-8
[Pub48]		K.Marcinek, W.A.Pleskacz	Instruction set extension for software defined radio in mobile GNSS applications	Vol. 8902	89020D-1– –89020D-8
[Pub49]		P.Szczepański, R.Kisiel, R.Romaniuk	Introduction	Vol. 8902	890201-17– –890201-20
[Pub50]		A.Mazurak, D.Tanous, B.Majkusiak	Investigation of current-voltage characteristics of the transistor structures with double-potential barrier DBMOS	Vol. 8902	89020S-1– –89020S-6
[Pub51]		D.Tanous, A.Mazurak, B.Majkusiak	Investigation of temperature effect on electrical characteristics of the double barrier metal-oxide-semiconductor structure	Vol. 8902	89020R-1– –89020R-6
[Pub52]		A.Tyszka-Zawadzka, P.Szczepański, A.Mossakowska-Wyszyńska, M.Bugaj, M.Karpierz	Light generation of DBR/F-P laser based on Raman effect in a silicon-on-insulator rib waveguide	Vol. 8902	89021E-1– –89021E-10
[Pub53]		J.Skulski, A.Szymańska	Liquid crystal tunable microwave band stop filters	Vol. 8902	89022E-1– –89022E-6
[Pub54]		A.Grodzicki, W.A.Pleskacz	Low noise charge pump	Vol. 8902	890207-1– –890207-8
[Pub55]		L.Łukasiak, B.Majkusiak	Modeling the current of a double-gate MOSFET with very thin active region taking into account mobility dependence on the transverse electric field	Vol. 8902	89020L-1– –89020L-7
[Pub56]		A.Kołodziej, L.Łukasiak, M.Kołodziej	Nanostructures applied to bit-cell devices	Vol. 8902	89020X-1– –89020X-7
[Pub57]		A.Kołodziej, A.Jakubowski, M.Kołodziej	Nanostructures in thin film opto-electronics	Vol. 8902	890205-1– –890205-8
[Pub58]		J.Piotrowski, J.Parka, E.Nowinowski-Kruszelnicki	Nematic Liquid Crystals in Inverted Microstrip Structures	Vol. 8902	89022B-1– –89022B-7
[Pub59]		M.Borecki, T.Niemiec, M.L.Korwin--Pawlowski, B.Kuczyńska, P.Doroz, K.Urbańska, M.Szmidt, J.Szmidt	Optoelectronic and photonic sensors of mastitis in cow milk	Vol. 8902	890213-1– –890213-9
[Pub60]		A.Dębowska, M.Śmietana, E.Brzozowska, S.Górska-Frączak, W.Bock, P.Mikulic	Preparation of long-period gratings (LPGs) for biological substances detection	Vol. 8902	89021O-1– –89021O-6
[Pub61]		A.Kamińska, S.Krawczyk, H.Wronka, E.Czerwosz, P.Firek, J.Kalenik, J.Szmidt	Properties of carbonaceous-palladium hydrogen sensor	Vol. 8902	89021T-1– –89021T-7
[Pub62]		A.Werbowy, P.Firek, N.Kwietniewski, A.Olszyna	Reactive impulse plasma ablation deposited barium titanate thin films on silicon	Vol. 8902	89022O-1– –89022O-9
[Pub63]		A.Wielgus, B.Potrykus	Resistive shorts characterization in CMOS standard cells for test pattern generation	Vol. 8902	89020W-1– –89020W-7
[Pub64]		Z.Jaworski, P.Wysokiński	Robustness of digital approach to mismatch compensation in analog circuits realized in nanometer technologies	Vol. 8902	89020Z-1– –89020Z-7

[Pub65]	Proc. SPIE 8902, Electron Technology Conference 2013, (pub. July 25, 2013)	K.Krogulski, M.Śmietana, N.Kwietniewski, K.Król	Selective deep wet etching of fused silica optical fibers for sensing applications	Vol. 8902	89021K-1– –89021K-6
[Pub66]		A.Krysiński, M.Śmietana, R.Mroczyński, N.Kwietniewski, W.Bock, P.Mikulic	Silicon nitride (SiN_x) plasma deposition on optical fiber sensors: coating symmetry perspective	Vol. 8902	89021P-1– –89021P-6
[Pub67]		P. Polis, A.Jastrzębska, J.Jureczko, A.Jusza, R.Piramidowicz, K.Anders, A.Olszyna, A.Kunicki, W.Fabianowski	Synthesis and characterization of polymer composite base on RE^{3+}:Al_2O_3 nanopowders doped by rare earth metals for application in optoelectronics	Vol. 8902	89022T-1– –89022T-9
[Pub68]		K.Madziar, A.Szymańska, B.Galwas	The use of photonic techniques in tunable microwave oscillators	Vol. 8902	89021M-1– –89021M-8
[Pub69]		M.Kalisz, R.Mroczyński, M.Szymańska	Ultra-shallow fluorine and nitrogen implantation from r.f. plasma and its effect on electro-physical parameters of Al/HfO_2/Si MOS structures	Vol. 8902	89020E-1– –89020E-7
[Pub70]	Proc. SPIE 8903, Photonics Applications in Astronomy, Communications Industry and High-Energy Physics Experiments 2013, (pub. October 25, 2013)	M.Borecki, A.Kociubiński, M.Duk, N.Kwietniewski, M.L.Korwin-Pawlowski, P.Doroz, J.Szmidt	Large-area transparent in visible range silicon carbide photodiode, w: Photonics Applications in Astronomy	Vol. 8903	89030H-1– –89030H-9
[Pub71]		A.Kociubiński, M.Duk, M.Masłyk, N.Kwietniewski, M.Sochacki, M.Borecki, M.Korwin-Pawłowski	Technology and characterization of 4H-SiC p-i-n junctions	Vol. 8903	89030V-1– –89030V-6
[Pub72]	Proc. SPIE. 8781, Integrated Optics: Physics and Simulations, (pub. May 07, 2013)	C. Robinson, J.Alvaro, K.Ławniczuk, A.Corradi, X.J.M.Leijtens, E.A.J.Bente, G.Carpintero	Dual-wavelength operation of monolithically integrated arrayed waveguide grating lasers for optical heterodyning	Vol. 8781	87810F-1– –87810F-8
[Pub73]	Proc. SPIE. 8794, Fifth European Workshop on Optical Fibre Sensors, (pub. May 20, 2013)	M.Śmietana, J.Grochowski, W.J.Bock, P.Mikulic, Ł.Wachnicki, B.Witkowski, M.Godlewski	Tuning properties of long-period gratings by atomic layer deposited zinc oxide nano-coating	Vol. 8794	879413-1– –879413-4
[Pub74]	Proc. SPIE. 8923, Micro/Nano Materials, Devices, and Systems, (pub. December 7, 2013)	M.Śmietana, T.Drążewski, P.Firek, P.Mikulic, W.Bock	Comparison of Al_2O_3 nano-overlays deposited with magnetron sputtering and atomic layer deposition on optical fibers for sensing purposes	Vol. 8923	89231G-1– –89231G-8
[Pub75]	Proc. SPIE. 8924, Fourth Asia Pacific Optical Sensors Conference, (pub. October 15, 2013)	M.Śmietana, A.Krysiński, W.Bock, P.Mikulic	Plasma post-processing of diamond-like carbon nano-coated long-period gratings	Vol. 8924	89243A-1– –89243A-4
[Pub76]	Studia Biura Analiz Sejmowych Kancelarii i Sejmu	J.Woźnicki	Szkolnictwo wyższe w procesie przemian – zmiany systemowe 2007–2012	Vol.3 No. 35	71–88
[Pub77]	Technika Transportu Szynowego	B.Czejdo, J.Zalewski, D.Trawczynki, M.Baszun	Designing safety critical embedded systems with time-triggered architecture	Vol. No.10	2265–2276

6.3. Scientific and Technical Papers Published in Conference Proceedings

NUMBER	CONFERENCE	AUTHORS	TITLE	CITY, COUNTRY	PAGES
[Pub78]	3DIC: IEEE International 3D Systems Integration Conference, October 2–4	T.Bieniek, G.Janczyk, D.Szmigiel, R.Dobrowolski, M.Ekwińska, P.Grabiec, P.Janus, J.Zając	Dedicated MEMS-based test structure for 3D SiP interconnects reliability investigation	San Francisco, USA	1–6
[Pub79]	3rd International Conference on RARE EARTH MATERIALS (REMAT) Advances in Synthesis, Studies and Applications, April 26–28	A.Jusza, L.Lipińska, P.Polis, R.Piramidowicz	Thulium doped yttria nanocrystallites and polymer nanocomposites	Wrocław, Poland	P–51
[Pub80]		A.Jusza, L.Lipińska, R.Piramidowicz	Visible emission properties of praseodymium doped YF^3-YOF-Y_2O_3 nanopowders		P–27
[Pub81]		K.Anders, P.Andrejuk, D.Piątkowski, R.Piramidowicz	Short wavelength luminescence behavior of Er:zblan glasses under upconversion pumping		P–2
[Pub82]	6 Konferencja Urządzenia i Systemy Radioelektroniczne (UISR) October 24–25	T. Borejko, K.Siwiec, A.Berent, K.Marcinek, J.Grądzki, A.Koter, D.Pieńkowski, W.A.Pleskacz	Dual-mode blocks of the integrated circuit GALILEO and GPS signal receiver in nanometer CMOS technology for precise positioning of mobile objects	Jachranka, Polska	
[Pub83]	7th Conference Integrated Optics – Sensors, Sensing Structures and Methods IOS`2013, February 25–March 1	R.Bogdanowicz, M.Ficek, J.Śmietana, J.Jasiński, M.Gnyba, J.Ryl, M.Sobaszek	Optical and electronic properties of thin boron-doped diamond films grown by MW PECVD method: born level studies	Szczyrk, Poland	
[Pub84]	7th International Conference on Sensing Technology, December 3–5	M.Śmietana, M.Koba, P.I.Tripathi, P.Mikulic, W.Bock	Improving sensing properties of the long-period gratings by reactive ion etching	Wellington, New Zealand	669–672
[Pub85]	7th International Workshop NDT in Progress 2013, November 7–8	B.Salski, W.Gwarek, J.Krupka, P.Korpas A.Y.B.Chong, V.Kappatos, C.Selcuk, T.H.Gan, P.Theodorakeas, V.Dritsa, M.Koui, H.Tekin, C.Sampaz	Radio frequency sensing for non-destructive testing of carbon fibre reinforced composite materials for structural health monitoring	Dresden, Germany	1–6
[Pub86]	9th Workshop of the Thematic Network on Silicon on Insulator Technology, Devices and Circuits, EUROSOI, IEEE France Section, January 21–23	J.Jasiński, B.Majkusiak	Modeling the effect of oxide traps on the small-signal admittance of the MOS tunnel diode	Paris, France	
[Pub87]	18th Annual Symposium of the IEEE Photonics Benelux Chapter, 25–26 November	K.Ławniczuk, M.J.Wale, P.Szczepanski, R.Piramidowicz, M.K.Smit, X.J.M.Leijtens	Single contact double-waveguide SOAs in AWG-based lasers fabricated on InP generic photonic integration platform	Eindhoven, Netherlands	
[Pub88]	18th Conference of Insulating Films on Semiconductors, June 25–28	J.Jasiński, A.Mazurak, B.Majkusiak	Study of the effect of tunneling through the traps inside the insulator on small-signal admittance of the MOS structure	Kraków, Poland	144–145
[Pub89]	20th International Conference MIXDES 2013, IEEE, June 20–22	W.Kuźmicz, P.Mierzwiński	A compact model of VES-BJT device	Gdynia, Poland	96–100
[Pub90]		D.Kasprowicz, H.Wada	Computer-Aided Detection of Plagiarism in Integrated- Circuit Layout		213–217
[Pub91]		M.Ciepłucha	High performance FPGA-based implementation of a parallel multiplier-accumulator		485–489

[Pub92]	36th International Spring Seminar on Electronics Technology (ISSE) IEEE, May 8–12	P.Firek, J.Grygleicz, J.Jasiński	Influence of the deposition process parameters on electophysical properties of Al_2O_3 thin films	Alba Iulia, Romania	1–2
[Pub93]		M.Myśliwiec, M.Guziewicz, R.Kisiel	Aspects of applying flip-chip technology for SiC power devices assembly		90–93
[Pub94]	37th International Conference of IMAPS-CPMT,IEEE, September 22–25	P.Firek	Forty years of isfetology	Kraków, Poland	1
[Pub95]		M.Mroczkowski, P.Firek, J.Kalenik, M.Kozłowski, J.Szmidt	Influence of temperature and humidity on titanium electrodes intended for an above normative conditions sensors		1
[Pub96]		P.Firek, M.Waśkiewicz, B.Stonio, J.Szmidt	Technology of MIS/ISFET with SiO_2/AlN system as gate insulator		1
[Pub97]	43rd European Microwave Conference IEEE, October 8–10	R.Dwiliński, R.Doradziński, R.Sierzputowski, R.Kucharski, M.Zając, J.Krupka	Highly resistive GaN substrates for high frequency electronics	Nuremberg, Germany	523–525
[Pub98]	IEEE 16th International Symposium on Design and Diagnostics of Electronic Circuits & Systems (DDECS), April 08–10	D.Kasprowicz, B.Swacha	VeSFET as an analog-circuit component	Karlovy Vary, Czech Republic	199–204
[Pub99]		K.Siwiec, A.Koter, W.A.Pleskacz	Intermediate frequency filter calibration method for radio frequency receivers in modern CMOS technologies		165–169
[Pub100]	International Conference on Microtechnology and Thermal Problems in Electronics, MicroTherm 2013, June 25 –28	M.Myśliwiec, R.Kisiel	Thermal and Mechanical Properties of Sintered Ag Layers for Power Module Assembly	Łódź, Poland	29–34
[Pub101]	MOC'13 18th MICROOPTICS CONFERENCE, October 27–30	M. Śmietana, A.Dębowska, P.Mikulic, W.Bock	Refractive index sensing with high temperature nano-coated electric arcinduced long-period gratings working at dispersion turning point	Tokyo, Japan	1–2
[Pub102]	Optical Fiber Communication Conference and Exposition (OFC) and The National Fiber Optic Engineers Conference (NFOEC), 17–21 March	C.Kazmierski, D.Carrara, K.Ławniczuk, G.Aubin, J.Provost, R.Guillamet	12.5 GB Operation of a Novel Monolithic 1.55 μm BPSK Source Based on Prefixed Optical Phase Switching	Anaheim, USA	
[Pub103]		K.Ławniczuk, M.Wale, P.Szczepański, R.Piramidowicz, M.Smit, X.Leijtens	Photonic multiwavelength transmitters with DBR laser array for optical access networks		
[Pub104]		S.Stopiński, M Malinowski, R Piramidowicz, M.K.Smit, X.J.M.Leijtens	Monolithically Integrated 8-Channel WDM Reflective Modulator		
[Pub105]	The European Conference on Lasers and Electro-Optics and the International Quantum Electronics Conference (CLEO®/Europe-IQEC) 2013, May 12–16	S.Stopiński, K.Ławniczuk, K.Welikow, A.Jusza, P.Gdula, P.Szczepański, X.J.M.Leijtens, M.K.Smit, R.Piramidowicz	Application specific photonic integrated circuits for telecommunications	Munich, Germany	CI-2.2
[Pub106]		A.Jusza, L.Lipińska, P.Polis, R.Piramidowicz, K.Welikow	Luminescent properties of PMMA-based nanocomposites doped with Pr^{3+}:YF^{3}-Y_2O_3 nanocrystallites		CE-P.25
[Pub107]		K. Welikow, P. Gdula, P. Szczepański, R. Buczyński, R. Piramidowicz	Microstructured Plastic Optical Fibers with Limited Modal Dispersion and Bending Losses		CE-P.29
[Pub108]	The Fourth International Conference on Sensor Device Technologies and Applications, IARIA Conference, August 25–31	M.Borecki, P.Doroz, J.Szmidt, M.Korwin-Pawłowski, A.Kociubiński, M.Duk	Sensing method and fiber optic capillary sensor for testing the quality of biodiesel fuel	Barcelona, Spain	19–24

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[Pub109]	The Fourth International Workshop on Advanced Spectroscopy and Optical Materials, IWASOM 2013, July 14 –19	B.Fetliński, Z.Boruc, M.Kaczkan, M.Malinowski, L.Lipińska	Downshifting in the YAM:Tb^{3+}-Yb^{3+} system	Gdańsk, Poland	131
[Pub110]		K.Anders, A.Jusza, T.M.Benson, A.B.Seddon, T.Zhuoqi, L.Sojka, D.Furniss, S.Sujecki, R.Piramidowicz	Dysprosium doped GeAsGaSe glasses for application in MIR light sources		165
[Pub111]		J.D.Fidelus, A.Suchocki, M.Barczak, R.Piramidowicz, C.J. Monty	Fabrication, microstructure and optical properties of TiO_2:Yb-based systems for photonic and biomedical applications		75
[Pub112]		J.Barzowska, K.Szczodrowski, A.Chruścińska, K.Anders, R.Piramidowicz, M.Grinberg	Influence of the Ti^{4+} dopant on the Sr_2SiO_4:Eu^{2+} luminescence		159
[Pub113]		K.Anders, P.Andrejuk, R.Piramidowicz	IR and red to UV-VIS up-conversion properties of erbium doped ZBLAN glasses		164
[Pub114]		A.Jusza, K.Anders, P.Polis, R.Stępień, L.Lipińska, R.Piramidowicz	Luminescent properties in the visible of Er^{3+}/Yb^{3+} activated composite materials		174
[Pub115]		M.Kaczkan, Z.Boruc, S.Turczyński, M.Malinowski	Site-selective laser spectroscopy of Sm^{3+} ions in Y_4Al_2O		84
[Pub116]		M.Malinowski, M.Kaczkan, Z.Boruc	Temperature effects on the Pr^{3+} ion fluorescence in various hosts		24
[Pub117]		Z.Boruc, M.Kaczkan, B.Fetliński, S.Turczyński, M.Malinowski	Temperature influence on Sm^{3+} luminescence in YAM crystals		108
[Pub118]		Z.Boruc, G.Gawlik, M.Kaczkan, M.Malinowski	Temperature measurements during ion beam excitation of Er^{3+} in Gd_2O_3:Bi		80
[Pub119]	V Workshop on Physics and Technology of Semiconductor Lasers, November 17–20	K.Anders, A.Jusza, F.Dybała, A.Bercha, W.Trzeciakowski, R.Piramidowicz	Investigating up-conversion phenomena in active glasses using pressure-tuned laser diodes	Kraków, Poland	105–106
[Pub120]		S.Stopiński, K.Ławniczuk, M.Nawrot, P.Gdula, A.Jusza, K.Anders, P.Szczepański, X.J.M.Leijtens, M.K.Smit, R.Piramidowicz	Photonic integrated circuits for application in multi-wavelength communication systems		107–108
[Pub121]	VII Workshop of Research Center for Advanced Studies, June 7–9	K.Ławniczuk	Fotoniczne nadajniki wieloczęstoliwościowe do zastosowań w optycznych sieciach dostępowych nowej generacji	Lipnik Park, Poland	27–28
[Pub122]	VIII Workshop of Research Center for Advanced Studies, October 25–27	K.Anders	Badanie i analiza emisji krótkofalowej w materiałach aktywowanych jonami erbu	Sterdyń, Poland	11
[Pub123]		A.Jusza	Właściwości luminescencyjne kompozytów na bazie PMMA domieszkowanych nanokryształami aktywowanymi jonami ziem rzadkich		15
[Pub124]	XI Konferencja Naukowa: Technologia Elektronowa ELTE'2013, April 16–20	R.Mroczyński, L.Łukasiak, A.Jakubowski	(R)ewolucja technologii tranzystorów MOS	Ryn, Poland	19–20
[Pub125]		M.Mroczkowski, P.Firek, J.Kalenik, J.Szmidt, E.Czerwosz	Badania lamp elektronoluminecscencyjnych o zimnej emisji elektronów		447–448
[Pub126]		T.Osuch, M.Koba, P.Szczepański, Z.Jaroszewicz	Badania własności spektralnych i generacyjnych złożonych struktur quasi-periodycznych jednowymiarowych kryształów fotonicznych		261–262
[Pub127]		A.Mazurak, D.Tanous, B.Majkusiak	Badanie charakterystyk prądowo-napięciowych struktur tranzystorowych z podwójną barierą potencjału DB MOS		209–210

[Pub128]	XI Konferencja Naukowa: Technologia Elektronowa ELTE'2013, April 16–20	D.Tanous, A.Mazurak, B.Majkusiak	Badanie wpływu temperatury na charakterystyki elektryczne struktur metal-tlenek-pół -przewodnik z podwójną barierą potencjału (DB MOS)	Ryn, Poland	167–168
[Pub129]		M.Nakielska, A.Wajler, K.Leśniewska-Matys, A.Kozlowska, D.Podniesiński, K.Anders, R.Piramidowicz	Ceramiczne nieliniowe absorbery z Co:$MgAl_2O_4$ do pasywnej modulacji dobroci rezonatorów laserowych		421–422
[Pub130]		J.Gryglewicz, P.Firek, J.Jasiński, R.Mroczyński, J.Szmidt	Charakteryzacja cienkich warstw Gd_2O_3 wytworzonych magnetronowo		369–370
[Pub131]		P.Garbat, M.Sutkowski, J.Woźnicki, J.Parka, E.Nowinowski--Kruszelnicki, J.Domański	Charakteryzacja przestrajalnych filtrów ciekłokrystalicznych dla potrzeb systemów wizyjnych		269–270
[Pub132]		M.Szymańska, A.Krysiński, M.Grobelny, E.Szmidt, P.Wysokiński, P.Firek1, R.Mroczyński	Charakteryzacja strukturalna i elektryczna warstw tlenku hafnu (HfO_x) wytwarzanego metodą rozpylania magnetronowego		161–162
[Pub133]		P.Klata, M.Guziewicz, R.Kruszka, W.Rzodkiewicz, J.Z.Domagała, M.Juchniewicz, W.Słysz	Charakteryzacja ultracienkich warstw NbNi Nb(Ti)N		407–408
[Pub134]		H.Musaringo, P.Firek, J.Szmidt	Charakteryzacja warstw TiO_2 wytwarzanych metodą rozpylania magnetronowego		393–394
[Pub135]		A.Wielgus, B.Potrykus	Charakteryzacja zwarć rezystywnych w komórkach standardowych CMOS dla generacji wektorów testowych		141–142
[Pub136]		J.Skulski, A.Szymańska	Ciekłokrystaliczne mikrofalowe przestrajalne filtry pasmowo-zaporowe		385–386
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[Pub138]		P.Firek, I.Piwoński, J.Szmidt	Cienkie warstwy TiO_2 na potrzeby wytwarzania nanoziaren srebra		395–396
[Pub139]		J.Walczak, B.Majkusiak	Elektrostatyczne właściwości struktury MOS z krzemowymi nanokrystlitami w tlenku brmkowym dla potrzeb fotoniki krzemowej		151–152
[Pub140]		J.Jasiński, L.Łukasiak, A.Jakubowski, D.K.Kim, D.S.Kim, S.H.Halm, J.H.Lee	Elektryczna charakteryzacja tranzystorów MOS z kanałem z azotku galu		143–144
[Pub141		K.Madziar, A.Szymańska, B.Galwas	Fotoniczne metody przestrajania oscylatorów optoelektronicznych		257–258
[Pub142]		R.Piramidowicz, S.Stopiński, P.Szczepański	Fotoniczne układy scalone – technologia przyszłości?		9–10
[Pub143]		M.Koba, J.Suffczyński	Fotoniczne wzmocnienie magnetooptycznego efektu Kerra w półprzewodnikach półmagnetycznych		239–240
[Pub144]		S.Stopiński, X.J.M.Leijtens, M.K.Smit, M.Malinowski, R.Piramidowicz	Fotoniczny układ scalony dla jednostki odczytu danych w detektorze neutrin KM3NeT		275–276
[Pub145]		A.Tyszka-Zawadzka, P.Szczepański, A.Mossakowska--Wyszyńska, M.Bugaj, M.Karpierz	Generacja promieniowania w falowodowym ramanowskim laserze DBR/F-P wykonanym w te chnologii krzemowej		251–252
[Pub146]		Z.Jaworski, P.Wysokiński, P.Narożnik	Kompensacja wpływu rozrzutów produkcyjnych na parametry układów analogowych realizowanych w technologiach nanometrycznych		153–154

[Pub147]	XI Konferencja Naukowa: Technologia Elektronowa ELTE'2013, April 16–20	A.Jusza, P.Mergo, R.Piramidowicz	Kompozytowe materiały polimerowe do zastosowań w światłowodach aktywnych nowej generacji	Ryn, Poland	281–282
[Pub148]		K.Anders, P.Andrejuk, A.Bercha, F.Dybała, M.Klimczak, R.Piramidowicz	Konwersja wzbudzenia w szkłach niskofononowych domieszkowanych jonami Er^{3+} przy pobudzaniu przestrajalnymi ciśnieniowo diodami laserowymi		277–278
[Pub149]		L.Łukasiak, B.Majkusiak	Modelowanie prądu dwubramkowego tranzystora MOS z bardzo cienkim obszarem aktywnym z uwzględnieniem zależności ruchliwości od poprzecznego pola elektrycznego		139–140
[Pub150]		A.Kołodziej, L.Łukasiak, M.Kołodziej, A.Jakubowski	Nanostruktury w elektronice cienkowarstwowej		31–32
[Pub151]		J.Piotrowski, J.Parka, E.Nowinowski-Kruszelnicki	Nematyczne ciekłe kryształy w strukturze odwróconej linii mikropaskowej		389–390
[Pub152]		A.Grodzicki, W.Pleskacz	Niskotętniąca pompa ładunkowa		175–176
[Pub153]		R.Mroczyński, A.Sierakowski, A.Mossakowska-Wyszyńska, A.Tyszka-Zawadzka, R.Piramidowicz, M.Malinowski, P.Szczepański, R.B.Beck	Nowa testowa struktura laserowa SOI z krzemowym falowodem grzbietowym i wbudowaną diodą P^+-i-N^+ pompowana optycznie		267–268
[Pub154]		D.Tanous, B.Majkusiak	Opis tunelowania przez złącze metal-izolator-metal z uwzględnieniem blokady kulombowskiej		207–208
[Pub155]		M.Borecki, T.Niemiec, M.Korwin-Pawlowski, B.Kuczyńska, P.Doroz, K.Urbańska, M.Szmidt, J.Szmidt	Optoelektroniczne i fotoniczne czujniki mastitis		49–50
[Pub156]		M.Szymańska, R.Mroczyński	Optymalizacja procesu osadzania tlenku hafnu (HfO_x) metodą rozpylania magnetronowego		163–164
[Pub157]		J.Kalenik, K.Kiełbasiński, J.Jasiński, A.Kamińska, S.Krawczyk, E.Czerwisz	Palladowo-węglowy czujnik wodoru		249–250
[Pub158]		T.Ciuk, I.Pasternak, A.Krajewska, J.Sobieski, J.Szmidt, W.Strupiński	Porównanie własności elektrycznych pojedynczej i podwójnej warstwy grafenowej na podłożach dielektrycznych		351–352
[Pub159]		R. Bogdanowicz, M.Śmietana, M.Gnyba, Ł.Gołuński	Procesy zarodkowania oraz nukleacji cienkich mikrokrystalicznych warstw diamentowych na światłowodach kwarcowych		223–224
[Pub160]		M.Koba, P.Szczepański,T.Osuch, T.Kossek	Progowy model generacji promieniowania w laserach posiadających ośrodek aktywy w postaci kwadratowej i trójkątnej		247–248
[Pub161]		A.Mossakowska-Wyszyńska, A.Tyszka-Zawadzka, P.Szczepański, R.B.Beck, R.Mroczyński	Projektowanie struktur laserów ramanowskich ze zwierciadłami Bragga		249–250
[Pub162]		J.Parka, R.Kowerdziej, U.Chodorow	Przestrajalne struktury metamateriałowe, ich właściwości i zastosowania		63–64
[Pub163]		A.Dębowska, M.Śmietana, E.Brzozowska, S.Gorska-Frączak, W.J.Bock, P.Mikulic	Przygotowanie światłowodowych siatek długookresowych (LPG) do detekcji czynników pochodzenia biologicznego		245–246
[Pub164]		K.Krol, M.Sochacki, W.Strupiński, M.Turek, J.Żuk, P.Borowicz, H.M.Przewłocki, M.Kwoka, P.Kościelnia, J.Szuber, J.Szmidt	Redukcja stanów pułapkowych w strukturze MOS 4H-SiC(0001) pod wpływem implantacji azotu – wpływ pro ilu implantacji		155–156

[Pub165]	XI Konferencja Naukowa: Technologia Elektronowa ELTE'2013, April 16–20	M.Kozłowski, J.Rymarczyk, E.Czerwosz, K.Sobczak, P.Firek	Struktura warstw C-Pd wytworzonych w procesie PVD/CVD na podłożu Si z cienką warstwą DLC	Ryn, Poland	391–392
[Pub166]		M.Śmietana	Struktury siatek światłowodowych w zastosowaniach biosensorycznych		59–60
[Pub167]		K.Welikow, P.Gdula , R.Buczyński, P.Szczepański, R.Piramidowicz	Światłowody polimerowe do zastosowań telekomunikacyjnych		285–286
[Pub168]		P.Polis, A.Jastrzębska, J.Jureczko, A.Jusza, R.Piramidowicz, K.Anders, A.Olszyna, A.Kunicki, W.Fabianowski	Synteza i charakteryzacja kompozytów PMMA bazujących na nanoproszku Al_2O_3 domieszkowanym metalami ziem rzadkich do zastosowań w optoelektronice.		359–360
[Pub169]		S.Stopiński, P.Gdula , K.Welikow, K.Anders, A.Jusza, K.Ławniczuk, M.Nawrot, P.Szczepański, X.J.M.Leijtens, R.Piramidowicz	System nadawczo-odbiorczy WDM w technologii fotoniki scalonej		283–284
[Pub170]		P.Firek, M.Kozłowski, E.Kowalska, J.Kalenik, E.Czerwosz, J.Szmidt, P.Dłużewski	Technologia czujnika wodoru na bazie warstw palladowo-węglowych		109–110
[Pub171]		K.Krogulski, N.Kwietniewski, M.Śmietana,	Technologia głębokiego trawienia kwarcowych struktur światłowodowych na potrzeby czujnikowe		225–226
[Pub172]		A.Krysiński, M.Szymańska, S.Gierałtowsa, P.Firek, R.Mroczyński	Technologia i charakteryzacja struktur tranzystorów cienkowarstwowych (TFT) z wykorzystaniem InGaZnO oraz HfO_x		205–206
[Pub173]		M.Duk, A.Kociubiński, N.Kwietniewski, M.Sochacki, M.Borecki, J.Szmidt	Technologia i charakteryzacja złączy p-i-n z węglika krzemu		185–186
[Pub174]		A.Krysiński, M.Śmietana, R.Mroczyński, N.Kwietniewski, W.J.Bock, P.Mikulic	Technologia plazmowego osadzania azotku krzemu (SiN_x) na potrzeby czujników światłowodowych z punktu widzenia symetrii ich pokrycia		243–244
[Pub175]		N.Kwietniewski M.Sochacki, M.Myśliwiec, M. Guziewicz, J.Szmidt,	Technologie połączeń dla przyrządów SiC pracujących w wysokich temperaturach		99–100
[Pub176]		W.Kuźmicz, P.Mierzwiński	Tranzystor bipolarny w technologii VESTIC		135–136
[Pub177]		A.Pfitzner	Tranzystor VeSFET i nowa koncepcja realizacji układów scalonych		25–26
[Pub178]		L.Łukasiak, P.Sałek, A.Malinowski, A.Jakubowski	Tranzystory wielobramkowe		33–34
[Pub179]		A.Malinowski, A.Jakubowski, L.Łukasiak, T.Takeuchi, K.Ishikawa, M.Sekine, M.Hori	Trawienie fotorezystu ArF 193 nm za pomocą wiązki rodników wodoru		173–174
[Pub180]		M.Kalisz, R.Mroczyński, M.Szymańska	Ultra-płytka implantacja fluoru z plazmy w.cz. jako metoda poprawy właściwości elektro-fizycznych struktur MOS (Al/HfO_x/Si)		133–134
[Pub181]		K.Marcinek, W.Pleskacz	Uniwersalna lista rozkazów procesora GNSS		125–126
[Pub182]		K.Kiełbasiński, J.Jakubowski, P. Firek, J.Kalenik, A.Kamińska, J.Szmidt, E.Czerwosz	Uniwersalny układ pomiarowy do testowania głowic czujnikowych		291–292
[Pub183]		M.Myśliwiec, M.Guziewicz, R.Kisiel	Uwarunkowania montażu diod SiC w oparciu o technologię srebrową		165–166

[Pub184]	XI Konferencja Naukowa: Technologia Elektronowa ELTE'2013, April 16–20	M.Milczarek, R.Kisiel	Warstwy Ag w operacjach montażowych podzespołów mocy	Ryn, Poland	157–158
[Pub185]		P.Firek, M.Borecki, J.Szmidt	Warstwy metali na kontakty w układach do inteligentnej klasyfikacji cieczy		311–312
[Pub186]		A.Werbowy, P.Firek, N.Kwietniewski, A.Olszyna	Warstwy tytanianu baru wytwarzane na krzemie techniką ablacji spiekanego targetu w plazmie impulsowej		353–354
[Pub187]		A.Kociubiński, M.Duk, N.Kwietniewski, M.Sochacki, M.Pawlowski, M.Borecki, J.Szmidt	Wielkopowierzchniowe fotodiody z węglika krzemu		183–184
[Pub188]		A.Kamińska, S.Krawczyk, H.Wronka, E.Czerwosz, P.Firek, J.Kalenik, J.Szmidt	Właściwości palladowo-węglowego czujnika wodoru		303–304
[Pub189]		K.Anders, K.Czyż, P.Witoński, R.Piramidowicz	Włóknowy laser iterbowy – modelowanie i badanie parametrów		279–280
[Pub190]		B.Stonio, P.Firek, M.Grobelny, J.Szmidt	Wpływ parametrów procesu osadzania na właściwości elektro-fizyczne cienkich warstw AlN		375–376
[Pub191]		J.Jasiński, L.Łukasiak, A.Jakubowski, C.Casteleiro, T.E.Whall, E.H.Parker, M.Myronov, D.R.Leadley	Wpływ sposobu wyznaczania rezystancji szeregowej na ekstrakcję ruchliwości w tranzystorach MOS z kanałem SiGe		145–146
[Pub192]		M.Sochacki, N.Kwietniewski, K.Król, P.Caban,J.Szmidt	Wpływ technologii materiałów półprzewodnikowych z szeroką przerwą zabronioną na rozwój nowoczesnych aplikacji na rynku motoryzacyjnym, telekomunikacyjnym i odnawialnych źródeł energii		97–98
[Pub193]		M.Mroczkowski, J.Kalenik, J.Szmidt	Wpływ wybranych czynników klimatycznych na właściwości elektrofizyczne warstw polimerowo-półprzewodnikowych		405–406
[Pub194]		K.Madziar, A.Szymańska	Wykorzystanie technik fotonicznych w układach przestrajalnych filtrów mikrofalowych		235–236
[Pub195]		J.Kalenik, P.Firek, J.Szmidt	Wytwarzanie cienkich warstw azotku tytanu metodą reaktywnego rozpylania magnetronowego		449–450
[Pub196]		P.Wysokiński, P.Firek, M.Kalisz, R.Mroczyński, M.Szymańska, J.Szmidt	Wytwarzanie i charakteryzacja cienkich warstw HfO_xN_y		373–374
[Pub197]		A.Taube, J.Kaczmarski, M.Ekielski, D.Pucicki, E.Kamińska, A.Piotrowska	Wytwarzanie i charakteryzacja tranzystorów TFT z warstwą amorficznego półprzewodnika In-Ga-Zn-O		169–170
[Pub198]		K.Ber, R.B.Beck	Wytwarzanie ultracienkich warstwy krzemowych metodą PECVD i ich modyfikacja dla potrzeb nanoelektroniki i nanofotoniki		417–418
[Pub199]		K. Racka, E.Tymicki, K.Grasza, B.Surma, R.Jakieła, M.Pisarek, K.Krzyżak, D.Teklińska, J.Krupka	Wzrost kryształów SiC metodą PVT – stabilizacja politypu 4H-SiC w obecności domieszki Ce		433–434
[Pub200]	XXIV International Conference on Coordination and Bioinorganic Chemistry, 2–7 June 2013	D.Basiak, W.Ziemkowska, A.Olszyna, P.Kurtycz, R.Piramidowicz, A.Jusza, K.Anders	Synthesis and Characterization of Nanosized Titania Doped with Noble Metals	Smolenice, Slovakia	

[Pub201]	XXXII-th IEEE-SPIE Joint Symposium on Photonics, Web Engineering, Electronics for Astronomy and High Energy Physics Experiments, 26 May – 02 June	M.Nawrot, P.Gdula, S.Stopiński, R.Piramidowicz	Design and development of a 4-channel WDM transmitter in photonic integration technology	Wilga, Poland	
[Pub202]		A.Golba, K.Anders, R.Piramidowicz	Development of a simple, low -cost L-band erbium doped fiber amplifier		
[Pub203]		P.Andrejuk, K.Anders, R.Piramidowicz	Er:ZBLAN glasses for applications in short wavelength fiber lasers		

6.4. Scientific and Technical Books

NUMBER	AUTHORS	PUBLISHER	TITLE, VOLUME, PAGES
[Pub204]	R.Piramidowicz	Oficyna Wydawnicza Politechniki Warszawskiej	Nowe materiały aktywne do zastosowań w światłowodowych źródłach promieniowania na zakres krótkofalowy, rozprawa habilitacyjna, (New active materials for application in a waveguide short-wavelength light sources), p. 235
[Pub205]	P.Polis, P.Mosdorf, E.Karwowska, A.Jastrzębska, A.Olszyna, A.Kunicki, R.Piramidowicz, K.Anders, A.Jusza	Springer Berlin Heidelberg	Influence of Al_2O_3/Pr Nanoparticles on Soil, Air and Water Microorganisms in "Characterization and Development of Biosystems and Biomaterials", Öchsner A., da Silva F. L., Holm A., Advanced Structured Materials, vol. 29, p 1–8
[Pub206]	P.Szczepański, R.Kisiel, R.S.Romaniuk, Editors	SPIE – International Society for Optics and Photonics, ISBN: 9780819495211	Proceedings of SPIE, Volume 8902: Electron Technology Conference 2013, p. 752
[Pub207]	M.Śmietana	Oficyna Wydawnicza Politechniki Warszawskiej	Technologia światłowodowych siatek długookresowych (ang. long-period grating, LPG) z pokryciami cienkowarstwowymi dla zastosowań czujnikowych, rozprawa habilitacyjna
[Pub208]	W.Woliński, Z.Jankiewicz, R.Romaniuk, Editors	SPIE – International Society for Optics and Photonics, ISBN: 9780819494948	Proceedings of SPIE, Volume 8703: Laser Technology 2012: Applications of Lasers, p. 170
[Pub209]	W.Woliński, Z.Jankiewicz, R.Romaniuk, Editors	SPIE – International Society for Optics and Photonics, ISBN: 9780819494931	Proceedings of SPIE, Volume 8702: Laser Technology 2012: Progress in Lasers, p. 176
[Pub210]	J.Woźnicki (Editor)	Institute of Knowledge Society, Polish Rectors Foundation	Financing and Deregulation in Higher Education, p. 144
[Pub211]	J.Woźnicki	Institute of Knowledge Society, Polish Rectors Foundation	Financing and Deregulation in Higher Education: Preface, pp. 7–9
[Pub212]	J.Woźnicki	Institute of Knowledge Society, Polish Rectors Foundation	Financing and Deregulation in Higher Education: The Role of Deregulation in the Higher Eeducation System (HES) in Poland, pp. 13–26
[Pub213]	J.Woźnicki	Institute of Knowledge Society, Polish Rectors Foundation	Financing and Deregulation in Higher Education: 2010–2020 Development Strategy for the Higher Education System The Academic Community's Proposal, pp. 131–141
[Pub214]	J.Woźnicki (Editor)	Instytut Społeczeństwa Wiedzy Fundacja Rektorów Polskich, ISBN 9788378141242	Misja i służebność uniwersytetu w XXI wieku, p. 325
[Pub215]	J.Woźnicki	Instytut Społeczeństwa Wiedzy Fundacja Rektorów Polskich, ISBN 9788378141242	Misja i służebność uniwersytetu w XXI wieku: Słowo wstępne, pp. 7–8
[Pub216]	J.Woźnicki	Instytut Społeczeństwa Wiedzy Fundacja Rektorów Polskich, ISBN 9788378141242	Misja i służebność uniwersytetu w XXI wieku: Refleksja o znaczeniu misji w kulturze instytucjonalnej uniwersytetu, pp. 87–92

[Pub217] J.Woźnicki	Polska Akademia Umiejętności, ISBN 9788376761640	Seminarium Polskiej Akademii Umiejętności: Polskie uniwersytety wczoraj, dziś, jutro, vol. X, pp. 89–106
[Pub218] J.Woźnicki	Wydawnictwo Adam Marszałek, ISBN 9788377807071	Współczesna teoria i praktyka badań społecznych i humanistycznych: Kierunki i szanse rozwojowe dyscypliny pn. „Nauki o polityce publicznej", vol. 1, pp. 147
[Pub219] J.Woźnicki	Wydawnictwo SGGW, ISBN 9788389871270	Wykłady inaugurujące rok akademicki 2013/2014: Czego uczy nas historia uniwersytetu? Przesłanie adresowane do studentów, pp. 165–172

7. PATENTS

[Pat1] M.Borecki, J.Szmidt, M.Bebłowska, C.Galiński, **Head of icing reflective sensor** (Głowica odbiciowego czujnika oblodzenia), zgłoszenie patentowe nr P-402554, 25.01.2013

[Pat2] M.Borecki, M.Korwin-Pawłowski, J.Szmidt, M.Bebłowska, A.Jakubowski, M.Szmid, **Measurement head with optical capillary** (Głowica pomiarowa z kapilarą optyczną), Patent UP RP, 19.06.2013 till 28.08.2014

[Pat3] M.Borecki, M.Korwin-Pawłowski, J.Szmidt, M.Bebłowska, A.Jakubowski, H. Zamojski, **Optical capillary for measurement with photonic structure** (Optyczna kapilara pomiarowa ze strukturą fotoniczną), Patent UP RP, 08.10.2013 till 28.08.2014

[Pat4] J. Fidelus, R. Piramidowicz, K. Anders, A. Jusza, **Polydimethylsiloxane based luminescent composite material manufacturing method, involves mixing additional material with phosphor, and heating liquefied PDMS to perform ultrasonic sonication process and mechanical stirring process** (Kompozyt luminescencyjny na bazie PDMS i sposób wytwarzania kompozytu luminescencyjnego na bazie PDMS), Patent UP RP no. PL399409-A1, 09.12.2013

[Pat5] W.Kamiński, P.Warda, J.Kęsik, **A method of forming the spectral characteristics of the gas ion laser radiation and laser discharge tube** (Sposób kształtowania charakterystyki widmowej promieniowania gazowego lasera jonowego oraz laserowa rura wyładowcza), zgłoszenie patentowe no. P-402517, 22.01.2013

[Pat6] J.Kęsik, M.Osiniak, W.Kamiński, **Method for regulating pressure in ion laser discharge tubes** (Sposób zmiany ciśnienia gazu aktywnego w rurze wyładowczej lasera gazowego i rura wyładowcza do jego stosowania), Patent UP RP, 20.11.2013 till 26.07.2014

[Pat7] Z.Pióro, **Device for monitoring deflections of roofing elements** (Urządzenie do monitorowania ugięć elementów konstrukcji dachów), zgłoszenie patentowe nr P-402496, 21.01.2013

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[Rep1] **Analysis of bridging faults tolerance of digital circuits implementing fuzzy operations** (Badanie odporności na zwarcia cyfrowych bloków realizujących operacje rozmyte), project leader: Andrzej Pfitzner

[Rep2] **Design and manufacturing of complete microwave sensor based measurement system intended for electromagnetic properties investigations of graphene** (Opracowanie systemu z mikrofalową głowicą pomiarową w postaci rezonatora dielektrycznego do badań właściwości elektrycznych grafenu), project leader: Jerzy Krupka

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

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

[Rep5] **Future Internet Engineering** (Inżynieria Internetu Przyszłości), project leader: Paweł Szczepański

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

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

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

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

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

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

[Rep12] **Investigation and modeling of photonic structures and characterization of optically active materials** (Badania i modelowanie struktur fotonicznych oraz charakteryzacja ośrodków optycznie aktywnych), project leader: Michał Malinowski

[Rep13] **Investigation of coherent radiation sources for photonic integreated circuits made in SOI technology** (Badania nad źródłami promieniowania koherentnego dla fotonicznych układów zintegrowanych wykonanych w technologii krzemowej), project leader: Paweł Szczepański

[Rep14] **Light sources with cold emitters** (Źródła światła z zimnymi emiterami), project leader: Jan Szmidt

[Rep15] **Long-period grating structures for monitoring of deformation and defects in structural materials** (Struktury długookresowych siatek światłowodowych do monitorowania odkształceń i uszkodzeń materiałów konstrukcyjnych), project leader: Mateusz Śmietana

[Rep16] **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), project leader: Jan Szmidt

[Rep17] **Microstructured polymer optical fibers for application in access networks** (Mikrostrukturalne światłowody polimerowe do zastosowań w sieciach dostępowych), project leader: Katrin Welikow

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

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

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

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

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

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

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

[Rep25] **Preparation and characterization of MOSFETs structures made in self-aligned technology** (Wytwarzanie i charakteryzacja struktur MOSFET wykonanych w technologii samocentrującej), project leader: Romuald B. Beck

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

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

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

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

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

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

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

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

[Rep34] **The acquisition and signal processing to analyze the shape of the 3D objects in the THz and optical fiber Bragg gratings** (Pozyskiwanie i przetwarzanie sygnałów do analizy kształtu obiektów 3D w zakresie THz oraz światłowodowych siatek Bragga), project leader: Janusz Parka

[Rep35] **The conditions of short-wavelength emission excitation in optically active low-phonon glasses and composite materials pumped with pressure-tuned laser diodes** (Warunki wzbudzania emisji krótkofalowej w aktywnych optycznie szkłach niskofonowych i materiałach kompozytowych pompowanych przestrajalnymi ciśnieniowo diodami laserowymi), project leader: Ryszard Piramidowicz

[Rep36] **The influence of subsurface doping of silicon carbide (4H-SiC) by ion implantation on electrophysical properties of MOS structures fabricated by thermal oxidation** (Wpływ przypowierzchniowego domieszkowania węglika krzemu 4H-SiC techniką implantacji jonów na właściwości elekrofizyczne struktur MOS otrzymywanych w wyniku utleniania termicznego), project leader: Jan Szmidt

[Rep37] **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

[Rep38] **The on-board computer for supersonic missiles** (System komputera pokładowego do rakiety naddźwiękowej, grant Koła Naukowego Mikrosystemów ONYKS), project leader: Zbigniew Pióro

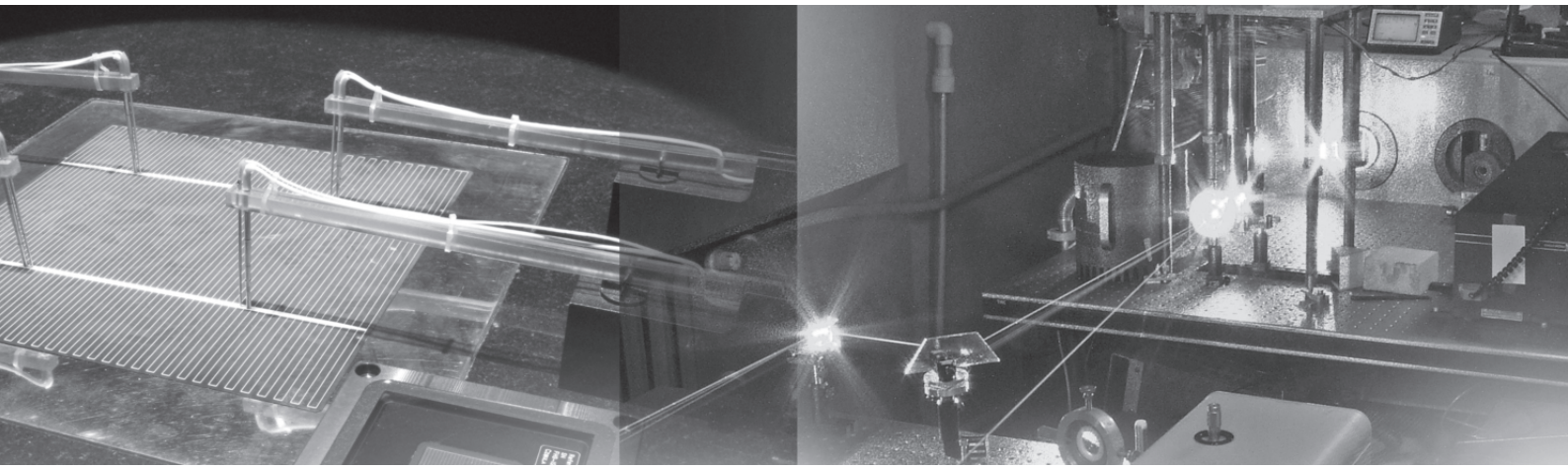
[Rep39] **The study of optical properties of erbium doped materials for short wavelength upconversion lasers** (Badania właściwości optycznych ośrodków aktywnych domieszkowanych jonami erbu do zastosowań w układach laserów z konwersją wzbudzenia na zakres krótkofalowy), project leader: Krzysztof Anders

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

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

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

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



Optoelectronics Division

9. CONFERENCES, SEMINARS AND MEETINGS

9.1. Conferences

NUMBER	CONFERENCE	PARTICIPANTS
[Con1]	3DIC: IEEE International 3D Systems Integration Conference San Francisco, USA, October 2–4	G.Janczyk
[Con2]	3rd International Conference on RARE EARTH MATERIALS (REMAT) Advances in Synthesis, Studies and Applications, Wrocław, Poland, April 26–28	A.Jusza, R.Piramidowicz
[Con3]	7th Conference Integrated Optics – Sensors, Sensing Structures and Methods IOS`2013 Szczyrk, Poland, February 25–March 1	A.Kociubiński, M.Duk, M.Borecki, N.Kwietniewski, J.Śmietana, J.Jasiński, J.Szmidt
[Con4]	7th International Conference on Sensing Technology, Wellington, New Zealand, December 3–5	M.Śmietana, M.Koba
[Con5]	18th Conference of Insulating Films on Semiconductors, Kraków, Poland, June 25–28	J.Jasiński, B.Majkusiak, A.Mazurak,
[Con6]	20th International Conference MIXDES 2013 Gdynia, Poland, June 20–22	D.Kasprowicz, M.Ciepłucha, W.Kuźmicz, P.Mierzwiński, H.Wada
[Con7]	37th International Conference of IMAPS-CPMT Kraków, Poland, September 22–25	M.Mroczkowski, P.Firek, J.Kalenik, M.Kozłowski, J.Szmidt, M.Waśkiewicz, B.Stonio,
[Con8]	43rd European Microwave Conference Nuremberg, Germany, October 8–10	J.Krupka
[Con9]	IEEE 16th International Symposium on Design anthd Diagnostics of Electronic Circuits & Systems (DDECS), Karlovy Vary, Czech Republic, April 08–10	D.Kasprowicz, K.Siwiec, A.Koter, W.A.Pleskacz
[Con10]	International Conference on Microtechnology and Thermal Problems in Electronics, MicroTherm Łódź, Poland, June 25–28	M.Myśliwiec, R.Kisiel
[Con11]	MOC'13 18th MICROOPTICS CONFERENCE Tokyo, Japan, October 27–30	M.Śmietana
[Con12]	Optical Fiber Communication Conference Anaheim, USA, March 17–21	K.Ławniczuk, P.Szczepański, R.Piramidowicz, S.Stopiński
[Con13]	The European Conference on Lasers and Electro-Optics and the International Quantum Electronics Conference (CLEO®/Europe-IQEC) Munich, Germany, May 12–16	K.Anders, S.Stopiński, K.Welikow, A.Jusza, P.Szczepański, R.Piramidowicz, K.Ławniczuk
[Con14]	The Fourth International Conference on Sensor Device Technologies and Applications, IARIA Conference, Barcelona, Spain, August 25–31	M.Borecki, P.Doroz, J.Szmidt, A.Kociubiński
[Con15]	XI Konferencja Naukowa: Technologia Elektronowa ELTE'2013 Ryn, Poland, April 16–20 organizing committee members: R.Piramidowicz, K.Anders, A.Jusza, K.Madziar, A.Mossakowska-Wyszyńska, M.Mroczkowski, H.Sater, M.Sochacki, A.Tyszka-Zawadzka, K.Welikow, P.Witoński science committee members: R.B.Beck, M.Borecki, A.Jakubowski, R.Kisiel, J.Krupka, L.Łukasiak, B.Majkusiak, M.Malinowski, J.Parka, A.Pfitzner, W.Pleskacz, P.Szczepański, J.Szmidt, W.Woliński, J.Woźnicki	K.Anders, R.B.Beck, M.Borecki, P.Caban,T.Ciuk, J.Domański, M.Duk, P.Firek; B.Galwas, P.Garbat, A.Grodzicki, J.Gryglewicz, A.Jakubowski, J.Jasiński, Z.Jaworski, A.Jusza, J.Kalenik, M.Koba, K.Kiełbasiński, R.Kisiel, K.Król, J.Krupka, W.Kuźmicz, K.Leśniewska-Matys, N.Kwietniewski, L.Łukasiak, K.Madziar, B.Majkusiak, A.Malinowski, M.Malinowski, K.Marcinek, A.Mazurak, A.Mossakowska-Wyszyńska, M.Mroczkowski, R.Mroczyński, A.Olszyna, J.Parka, A.Pfitzner, J.Piotrowski, R.Piramidowicz, W.Pleskacz, J.Skulski, M.Sochacki, S.Stopiński, M.Sutkowski, P.Szczepański, J.Szmidt, A.Szymańska, M.Śmietana, D.Tanous, A.Taube, A.Tyszka-Zawadzka, J.Walczak, K.Welikow, A.Werbowy, A.Wielgus, P.Witoński, J.Woźnicki

9.2. Schools, Seminars and Meetings

NUMBER	CONFERENCE	PARTICIPANTS
[Con16]	7th International Workshop NDT in Progress 2013, Dresden, Germany, November 7–8	J.Krupka
[Con17]	9th Workshop of the Thematic Network on Silicon on Insulator Technology, Devices and Circuits, EUROSOI, IEEE France Section, Paris, France, January 21–23	J.Jasiński, B.Majkusiak
[Con18]	18th International Hasselt Diamond Workshop on CVD diamond and other carbon materials SBDD XVIII, Hasselt, Belgium, February 27–March 1	M.Śmietana
[Con19]	23rd International Travelling Summer Schools on Microwaves and Lightwaves, ITSS, Warszaw, Poland, July 6–12 organizing comitee members: K.Madziar, H.Sater, B.Galwas, P.Szczepański programme comitee members: B.Galwas, P.Szczepański, Y.Yashchyshyn (IRE)	K.Madziar, S.Stopiński
[Con20]	36th International Spring Seminar on Electronics Technology (ISSE), Alba Iulia, Romania, May 8–12	M.Myśliwiec, M.Guziewicz, R.Kisiel, P.Firek, J.Grygleicz, J.Jasiński
[Con21]	Jesienne Warsztaty Naukowe Centrum Studiów Zaawansowanych PW, Sterdyń, Poland, October 25–27	A.Jusza, K.Anders
[Con22]	The Fourth International Workshop on Advanced Spectroscopy and Optical Materials, IWASOM 2013, Gdańsk, Poland, July 14–19	K.Anders, A.Jusza, R.Piramidowicz
[Con23]	V Workshop on Physics and Technology of Semiconductor Lasers, Kraków, Poland, November 17–20	A.Jusza, R.Piramidowicz, S.Stopiński
[Con24]	VII Workshop of Research Center for Advanced Studies, Lipnik Park, Poland, June 7–9	K.Ławniczuk

10. AWARDS

[Award1] Krzysztof Anders, **First Award in ELTE'2013 Scientific Committee Young Scientist Awards competition, for the poster "Up-conversion phenomena in low phonon energy glasses doped with Er^{3+} ions under pressure-tuned laser diodes excitation" on XI Conference on Electron Technology ELTE'2013** – co-authors: P.Andrejuk, A.Bercha, F.Dybała, M.Klimczak, R.Piramidowicz (I miejsce w konkursie dla młodych naukowców na XI Konferencji Naukowej Technologia Elektronowa ELTE'2013 za plakat „Konwersja wzbudzenia w szkłach niskofononowych domieszkowanych jonami Er^{3+} przy pobudzaniu przestrajalnymi ciśnieniowo diodami laserowymi"), Ryn, Poland, April 16–20

[Award2] Tomasz Borejko, **First Award in the competition for young researchers at the scientific conference UiSR'2013 – Radio-electronic Devices and Systems, for the best paper "Dual-mode blocks of the integrated circuit GALILEO and GPS signal receiver in nanometer CMOS technology for precise positioning of mobile objects"** – co-authors: K.Siwiec, A.Berent, K.Marcinek, J.Grądzki, A.Koter, D.Pieńkowski, W.A.Pleskacz (I miejsce w konkursie dla młodych naukowców na konferencji naukowej UiSR'2013 – Urządzenia i Systemy Radioelektroniczne za artykuł „Bloki dwusystemowego, scalonego odbiornika sygnałów nawigacji satelitarnej GALILEO i GPS w technologii nanometrowej CMOS do dokładnego pozycjonowania obiektów przenośnych"), Jachranka, Poland, October 25

[Award3] Anna Jusza, **First SPIE Best Presentation Award in the competition for students and PhD students at ELTE'2013 conference, for the poster "Composite polymer materials for active optical fibers of next generation" on XI Conference on Electron Technology ELTE'2013** – co-authors: P.Mergo, R.Piramidowicz (pierwsza nagroda w konkursie SPIE dla studentów i doktorantów na XI Konferencji Naukowej Technologia Elektronowa ELTE'2013 za plakat „Kompozytowe materiały polimerowe do zastosowań w światłowodach aktywnych nowej generacji"), Ryn, Poland, April 16–20

[Award4] Anna Jusza, **First Award in Best Poster Presentation Contest on VIII Fall Workshop of Research Center for Advanced Studies for poster "Luminescent properties of PMMA-based composites doped with rare earth activated nanocrytals"** (I nagroda za najlepszą prezentację plakatową na VIII Jesiennych Warsztatach Naukowych Centrum Studiów Zaawansowanych Politechniki Warszawskiej za „Właściwości luminescencyjne kompozytów na bazie PMMA domieszkowanych nanokryształami aktywowanymi jonami ziem rzadkich"), Serdyń, Poland, October 25–27

[Award5] Andrzej Pfitzner, **WUT Rector's Individual Award for Organizing Achievements (2nd stage)** (Nagroda Indywidualna II stopnia JM Rektora PW za osiągnięcia organizacyjne)

[Award6] Urszula Piotrkowicz, **President's of the Republic of Poland Siver Medal for Long-Term Service** (Srebrny Medal za Długoletnią Służbę nadany przez Prezydenta Rzeczypospolitej Polskiej)

[Award7] Elżbieta Piwowarska, **WUT Rector's Individual Award for Organizing Achievements (3rd stage)** (Nagroda Indywidualna III stopnia JM Rektora PW za osiągnięcia organizacyjne)

[Award8] Witold Pleskacz, **Medal of National Education Commission** (Medal Komisji Edukacji Narodowej)

[Award9] Jadwiga Radzyńska, **President's of the Republic of Poland Gold Medal for Long-Term Service** (Medal Złoty za Długoletnią Służbę nadany przez Prezydenta Rzeczypospolitej Polskiej)

[Award10] Stanisław Stopiński, **Second SPIE Award in the competition for students and PhD students at ELTE'2013 conference, for the poster "TX-RX WDM system manufactured in integrated photonics technology" on XI Conference on Electron Technology ELTE'2013** – co-authors: P.Gdula, K.Welikow, K.Anders, A.Jusza, K.Ławniczuk, M.Nawrot, P.Szczepański, X.J.M.Leijtens, R.Piramidowicz (druga nagroda w konkursie SPIE dla studentów i doktorantów na XI Konferencji Naukowej Technologia Elektronowa ELTE'2013 za plakat „System nadawczo-odbiorczy WDM w technologii fotoniki scalonej"), Ryn, Poland, April 16–20

AWARDS

[Award11] Stanisław Stopiński, **III. prize in the contest for doctoral candidates for the best presentation at the 23rd International Travelling Summer School on Microwaves and Lightwaves**, **"Recent advances in photonic integration technology"** – co-authors: M.Malinowski, P.Szczepański, R.Piramidowicz, M.K.Smit, X.J.M.Leijtens (III. nagroda w konkursie na najlepszą prezentację doktoranta na 23rd International Travelling Summer School on Microwaves and Lightwaves, „Najnowsze osiągnięcia w technologii fotoniki scalonej", Warsaw, Poland, July 6–12

[Award12] Mateusz Śmietana, **Diploma of Excellence awarded by the Ministry of Education and Science, University of Technology of Romania during PROINVENT editia a XI-a, 2013, Cluj-Napoca for: Optical Fiber Sensor with Bacteriophage Overlay for Selective Bacteria Detection** – co-authors: S.Tripathi, W.J.Bock, P.Mikulic, M.Zourob, E.Staryga (Diploma de Excelentã si Medalia de Aur przyznany przez Ministerului Educatiei Nationale si Academiei de Stiinte Technice Din Romania podczas Salonul International De Inventicã PROINVENT editia a XI-a, 2013, Cluj-Napoca za: Optical Fiber Sensor with Bacteriophage Overlay for Selective Bacteria Detection)

[Award13] Mateusz Śmietana, **Diploma of Technical University of Moldova for: Optical fiber sensor with bacteriophage overlay for selective bacteria detection** – co-authors: S.Tripathi, W.J.Bock, P.Mikulic, M.Zourob, E.Staryga (Diploma a Universităţii Tehnice a Moldovej se acordă "Optical fiber sensor with bacteriophage overlay for selective bacteria detection")

[Award14] Jerzy Woźnicki, **November 14, 2013 was given the title of Doctor Honoris Causa of Wrocław University of Environmental and Life Sciences** (14 listopada 2013 r. nadano tytuł Doktora Honoris Causa Uniwersytetu Przyrodniczego we Wrocławiu)