INSTITUTE OF MICROELECTRONICS AND OPTOELECTRONICS

ANNUAL REPORT

2004

Edited by Agnieszka Mossakowska-Wyszyńska

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From the Director

This Annual Report summarizes the research activities of the Institute In 2004, as well as the teaching activities in the academic year 2003/2004. The activities of the Institute in the field of electronics and computer engineering are concentrated in the area of broadly defined microelectronics and optoelectronics. These include VLSI systems, microelectronic and nanoelectronic semiconductor devices, hybrid circuits (e.g. microwave, optoelectronic), sensors, laser optoelectronics, electronic imaging and image processing. It is worth to emphasize that research activities of the Institute span modelling, CAD, manufacturing and diagnostics.

The Institute of Microelectronics & Optoelectronics (IMiO) was founded in 1970. It evolved from the Chair of Radio Engineering established by Professor Janusz Groszkowski in 1929. Our Institute is linked with the beginnings of the Faculty of Electronics and Information Technology through the person of Prof. Groszkowski, who worked in IMiO until his death, as well as the territory – half of the Institute is situated in the Building of Radio Engineering on the WUT campus. Here the Institute's Technology Centre is located. It includes laboratories of silicon processing (clean-room), hybrid technologies and assembly techniques, fibre optic and integrated optoelectronic device fabrication, laser optoelectronics, characterization of new electronic and photonic materials and manufacturing processes, and last but not least the Centre of Photovoltaics (established in November 2002). These laboratories developed their activities based on research projects financed by Polish government as well as those within 5th and 6th UE Framework Programme.

In the field of teaching (three-level structure – B.Sc., M.Sc. and Ph.D. studies) the Institute continued to improve its contribution in the Electronics and Computer Engineering area (led together with the Institute of Electronic Systems) for on-campus studies. The involvement of the Institute in distance learning studies of Electronics and Telecommunications is also worth mentioning, especially post-diploma studies in the domain of tools and techniques of virtual education that began in 2004. The Institute aims for its teaching activities to meet the challenge of the development of modern technology and information society.

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

Warsaw, January 2005

Professor Andrzej Jakubowski, Prof., Ph.D., D.Sc.

CONTENTS:

1. GENERAL INFORMATION

1.1. Organisation of the Institute and Areas of its Activities

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

Our Institute consists of six divisions:

- Microelectronics and Nanoelectronics Devices Division;
- VLSI Engineering and Design Automation Division;
- Microwave Electronics and Photonics Division;
- Optoelectronic and Hybrid Devices Division
- Optoelectronics Division;
- Image Processing Division;

and two research and teaching groups: Vacuum Science and Technology Group, Characterization of Electronic Materials Group, which exist beyond the division structure.

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 the methods and measuring systems for electronic materials and electronic devices studies;
- generation of microwaves, microwave measurement techniques, and numerical methods for electromagnetics;
- processing, designing, optimisation techniques and development of VLSI (very large scale integration of circuits) computer-aided tools;
- developing the hybrid circuits technology with special emphasis on thick-film technology and its applications to hybrid microwave integrated circuits;
- laser physics (Fabry-Perot and distributed feedback lasers), laser spectroscopy of solid state active materials, and applications of lasers in medicine, manufacturing and telecommunications;
- construction and characterisation of optoelectronics elements and devices including fibre sensors, photovoltaics;
- computer-aided design of photoelectronic 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 5th and 6th UE Framework Programme, e.g. PV Centre, REASON, TUF, SINANO, EUROSOI, BIPV-CIC, NEMO.

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

1.2. Board of Directors

Till September 30th, 2004

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Deputy-Director for Teaching Affairs
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Since October 1st, 2004

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1.3. Microelectronics and Nanoelectronics Devices Division

Head of the Division

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Senior academic staff

Andrzej Jakubowski, Ph.D., D.Sc.	Tenured Professor
Bogdan Majkusiak, Ph.D., D.Sc.,	Tenured Professor
Jan Szmidt, Ph.D., D.Sc.,	Professor
Lidia Łukasiak, Ph.D., D.Sc.,	Associate Professor
Małgorzata Jurczak, PhD.,	Assistant Professor
Zbigniew Pióro, Ph.D.,	Assistant Professor
Sławomir Szostak, Ph.D.,	Assistant Professor
Jakub Walczak, Ph.D.,	Assistant Professor
Aleksander Werbowy, Ph.D.,	Assistant Professor
Jan Gibki, Ph.D.,	Senior Lecturer
Józef Maciak, M.Sc.	Senior Lecturer
Antoni Siennicki, Ph.D.,	Senior Lecturer

Junior academic staff

Agnieszka Zaręba, M.Sc.,	Assistant
Tomasz Bieniek, M.Sc.,	Ph.D. Student
Emil Dusiński, M.Sc.,	Ph.D. Student
Ryszard Gronau, M.Sc.,	Ph.D. Student
Małgorzata Kalisz, M.Sc.,	Ph.D. Student
Andrzej Kociubiński, M.Sc.,	Ph.D. Student
Adam Linkowski, M.Sc.,	Ph.D. Student
Robert Mroczyński, M.Sc.,	Ph.D. Student
Mariusz Sochacki, M.Sc.,	Ph.D. Student
Jędrzej Stęszewski, M.Sc.,	Ph.D. Student
Artur Szczęsny, M.Sc.,	Ph.D. Student
Mateusz Śmietana, M.Sc.,	Ph.D. Student
Paweł Śniecikowski, M.Sc.,	Ph.D. Student

Technical and administrative staff

Witold Ciemiewski,
Kazimierz Dalbiak,
Krzysztof Krogulski,
Małgorzata Trzaskowska.

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

To name a few examples of its research topics:

- Modelling and investigation on kinetics of silicon oxidation (particularly of the beginning stages of the process);
- Diagnostics and characterisation of properties of single and double insulating layers (gate stack including ultrathin 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 ultrathin oxide;
- New materials (semiconductors and dielectrics) for microelectronics applications (e.g.: diamond-like-carbon, borazone, silicon carbide, gallium nitride, silicon-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 ultrathin dielectric layers for MOSFET gate dielectric (SiO_2, Si_3N_4, SiO_xN_y).
- Very low temparuture processing of test structure;
- MEMS/MOEMS processing.

1.4. VLSI Engineering and Design Automation Division

Head of the Division

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Senior academic staff

Andrzej Pfitzner, Ph.D., D.Sc.	Professor
Zbigniew Jaworski, Ph.D.	Assistant Professor
Mariusz Niewczas, Ph.D.	Assistant Professor
Elżbieta Piwowarska, Ph.D.	Assistant Professor
Witold Pleskacz, Ph.D.	Assistant Professor
Andrzej Wielgus, Ph.D.	Assistant Professor
Adam Wojtasik, Ph.D.	Assistant Professor

Junior academic staff

Grzegorz Janczyk, M.Sc.	Assistant, Ph.D. Student
Włodzimierz Jońca, M.Sc.	Ph.D. Student
Adam Kowalczyk, M.Sc.	Ph.D. Student
Dominik Kasprowicz, M.Sc.	Ph.D. Student
Anna Sidlarewicz, M.Sc.	Ph.D. Student

Technical and administrative staff

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

The research carried out in the division falls into main area: design of microelectronics IC's (integrated circuits) and application of microelectronics in digital signal processing.

To name a few examples of its research topics:
- methods of formal and functional verification of IC design: methods of verification of logical circuits, methods of determination of circuit topography sensitivity on spot defects;
- novel mathematical methods of technological processing modelling in application to statistical simulation;
- novel two-dimensional mathematical simulation of semiconductor devices.

Current research projects in the Division are as follows:
- 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;
- design of analogue VLSI circuits: analogue implementations of fuzzy logic controllers with biomedical applications, methodologies of testing and design for testability of analogue VLSI integrated circuits;
- development of CAD tools for integrated circuit design and verification, with special emphasis on analogue full custom ASICs design;
- investigations of signal propagation and crosstalk in long interconnections in submicron VLSI circuits;
- design of digital and mixed VLSI circuits for special applications: CNN, data processing in physical experiments, etc.;
- fully integrated CMOS implementation of electronic circuits for spread spectrum communication based on chaos generators.

1.5. Microwave Electronics and Photonics Division

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Piotr Witoński, Ph.D.	Assistant Professor
Agnieszka Szymańska, Ph.D.	Assistant Professor
Bernard Jakubowski, Ph.D.	Senior Lecturer
Jerzy Skulski, M.Sc.	Senior Lecturer

Junior academic staff

Grzegorz Kędzierski, M.Sc.	Ph.D. Student
Robert Rajkowski, M.Sc.	Ph.D. Student

Technical and administrative staff
Bożena Janus

The research activity of the Microwave Electronics and Photonics Division is concerned with propagative electronics and microwave photonics. The characteristic feature of the electronics branch is the comparability between the time of system state change and the time of signal propagation between particular system points.

The research activity of the Microwave Electronics and Photonics Division is concentrated on:
- 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;
- analysis methods of transmission lines for modern mm-wave microwave integrated circuits.

From the new topics of research activity we can mention:
- modelling and computer aided design of microwave devices and circuits;
- microwave sensors for industrial applications;
- 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, photovaractors, phototransistors;
- modelling of semiconductor optical devices for telecommunication;
- optoelectronic and microwave devices for data transmission networks.

1.6. Optoelectronic and Hybrid Devices Division

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Senior academic staff

Michał Borecki, Ph.D.,	Assistant Professor
Agata Jasik Ph.D.,	Assistant Professor
Jerzy Kalenik, Ph.D.,	Assistant Professor
Ryszard Kisiel, Ph.D.,	Assistant Professor
Stanisław Pietruszko, Ph.D.,	Assistant Professor
Zbigniew Szczepański, Ph.D.,	Assistant Professor
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Junior academic staff

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Maciej Juźwik, M.Sc.
Adam Kozłowski, M.Sc.
Leszek Kryczka, B.Sc.
Wojciech Pietnoczka, M.Sc.
Krystyna Szylko.

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

The main research areas are as follows:
– fabrication and investigation of the following optoelectronic devices: integrated passive and active lightwave guiding structures (modulators, bistable switches etc.) and fibre optic sensors;
– computer engineering for fibre optics;
– new techniques of surface mounted devices on PCB (printed circuit boards);
– application of thin and thick film technology in hybrid devices and thick film sensors fabrication,
– electronic packaging technology,
– investigation of the electronic structure, stability and optical properties of amorphous silicon and its devices (thin film transistors, solar cells, etc.),
– research, design and monitoring of photovoltaic systems, strategy for development of photovoltaic solar energy.

1.7. Optoelectronics Division

Head of the Division
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Senior academic staff

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Tadeusz Adamowicz, Ph.D., D.Sc.	Associate Professor
Jerzy Kęsik, Ph.D.	Assistant Professor
Agnieszka Mossakowska-Wyszyńska, Ph.D.	Assistant Professor
Ryszard Piramidowicz, Ph.D.	Assistant Professor
Anna Tyszka-Zawadzka, Ph.D.	Assistant Professor
Piotr Warda, Ph.D.	Assistant Professor

Junior academic staff

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Marcin Kaczkan, Ph.D.	Ph.D. Student
Wojciech Kamiński, M.Sc.	Ph.D. Student
Mariusz Klimczak, M.Sc.	Ph.D. Student
Monika Kowalska, M.Sc.	Ph.D. Student
Radosław Kreft, M.Sc.	Ph.D. Student
Kamila Leśniewska-Matys, M.Sc.	Ph.D. Student
Magdalena Nakielska, M.Sc.	Ph.D. Student
Robert Paszkiewicz, M.Sc.	Ph.D. Student
Adam Rudziński, M.Sc.	Ph.D. Student

Technical and administrative staff
Wojciech Kamiński, M.Sc.

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

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;
– research of light generation in metal vapour gas lasers, measurement of laser parameters, investigation of light generation in hollow cathode lasers, analysis of plasma discharge processes, research of the optogalvanic effect;
– optimisation of the construction of ion gas lasers, investigation of the processes in discharge tube ceramic ion laser and laser operation in various cavity geometry, investigation of light generation in ion gas lasers for medical applications.

1.8. Image Processing Division

Head of the Division
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Senior academic staff

Janusz Parka, Ph.D., D.Sc.	Associate Proffesor
Grzegorz Kukiełka, Ph.D.	Assistant Proffesor
Hanna Górkiewicz-Galwas, Ph.D.	Senior Lecturer

Junior academic staff
Tomasz Grudniewski, M.Sc. Ph.D. Student
Robert Żmijan, M.Sc. Ph.D. Student

Technical and administrative staff
Jerzy Domański, M.Sc.

The main areas of activity of the Division are education and research, both in the field of the technology of electronic imaging devices and of digital image processing. Members of the academic staff are involved in research and development works on:

- theoretical principles of image modelling;
- numerical methods of image analysis;
- implementation of digital image processing for detection, inspection and identification of objects;
- application of image processing methods for diagnostic control and measurement systems in industry, medicine, research and commerce;
- electrooptic effects in liquid crystals and their applications to LCD;
- photorefractive phenomenas in liquid crystals for dynamic holography and optical data storage

1.9. Vacuum Science and Technology Group

Head of the Group
Piotr Szwemin, Ph.D., D.Sc. Associate Professor
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Senior academic staff
Marek Niewiński, M.Sc. Lecturer, Ph.D. Student

The research work of the Vacuum Technology Team is concentrated on the three main fields:
- vacuum metrology (adaptation of Polish rules to European standards),
- gas flow simulation in vacuum systems, specially in metrological primary standard systems based on continous expansion method,
- development of CAD of vacuum systems.

These works are focused on modelling of low-pressure standards.

1.10. Characterization of Electronic Materials Group

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Senior academic staff
Mikołaj Baszun, Ph.D. Assistant Professor
Zdzisław Mączeński, Ph.D. Assistant Professor
Janusz Rogowski, Ph.D. Senior Lecturer

Junior academic staff
Waldermar Matuszewski, M.Sc. Ph.D. Student
Paweł Popow, M.Sc. Ph.D. Student
Tomasz Zychowicz, M.Sc. Ph.D. Student

Technical and administrative staff
Zbigniew Rudkowski.

The research activity of the Group of Characterization of Electronic Materials concentrates on electronic materials and sensors.

The main aims of this research are connected with ultrasensitive quantitative analysis of electromagnetic, electric, magnetic and piezoelectric phenomena for materials applied in electronic systems and microsystems. Expecially such measurements obey ultralow temperatures and ultrahigh microwave frequencies. Also SAW sensors are designed and produced.

1.11. Statistical Data

SPECIFICATION	2003	2004	DIFFERENCE
Academic staff	84	89	+5
Tenured professors	4	6	+2
Professors	7	6	-1
Associate professors	1	4	+3
Assistant professors	32	28	-4
Senior lecturers	8	8	0
Lecturers	1	1	0
Assistants and Ph.D. students	31	36	+5
Technical staff	15	17	+2
Administrative staff	4	5	+1
Space	3254,9	3254,9	0
Teaching laboratories	1275,9	1275,9	0
Other laboratories	341,3	341,3	0
Offices of academic staff	1637,7	1637,7	0
Computers	302	289	-13 (withdrawal from use old computers)
Library resources - Books (number of volumes)	9626	3297	-6329 (withdrawal from use old books)
Teaching activities	64	66	+2
Basic courses	51	49	-2
Advanced courses	10	14	+4
Special courses	3	3	0
Research projects	55	46	-9
Granted by the University	24	15	-9
Granted by State Institutions	19	18	-1
Granted by International Institutions	11	10	-1
Other projects	1	3	+2
Degrees awarded	104	74	-30
D.Sc. degrees	1	1	0
Ph.D. degrees	4	2	-2
M.Sc. degrees	48	31	-17
B.Sc. degrees	51	40	-11
Publications	166	148	-18
Sci.-tech. books	5	3	-2
Sci.-tech. papers in journals	48	53	+5
Sci.-tech. papers in conference proceedings	113	92	-21
Reports	42	37	-5
Patents	2	0	-2
Conferences	62	45	-17
Organised by the Institute	1	1	0
Others	61	44	-17

2. STAFF

2.1. Senior Academic Staff

Tadeusz Adamowicz, M.Sc. ('62), Ph.D. ('73), D.Sc. (’03), Quantum Electronics, Gas Discharges; Assistant Professor, part time, Optoelectronics Division, Member of Plasma Physics Section at the Committee of Physics of the Polish Academy of Sciences (’94-), Member of IEEE (’99)

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Romuald B. Beck, M.Sc. ('76), Ph.D. ('82), D.Sc. ('96), Microelectronics, Electronics, Associate Professor, full time, Head of Microelectronics and Nanoelectronics Devices Division (’04), Leader of the Technology, Diagnostics and Modelling Group ('85-), Vice President of the Microelectronics Section of the Electronics and Telecommunication Committee of the Polish Academy of Sciences ('93-), Member od Programme Comm. of :Diagnostics & Yield Conference (’88-), Senior Member of IEEE (’97-), Member of Electrochemical Society (’98-)

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Waldermar Matuszewski	M.Sc.	Ph.D. Student	660-7939
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Alina Redlich		Senior Clerk	660-7708
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3. TEACHING ACTIVITIES

3.1. Basic Courses

[Edu1] **Application of Matlab in Calculation Methods** (Matlab w zastosowanych metodach obliczeniowych) **MZMO**, Mikołaj Baszun

[Edu2] **Basics of Vacuum Technics** (Podstawy techniki próżni), **PTP**, Piotr Szwemin

[Edu3] **Basics of Optics** (Podstawy Optyki), **POPT**, Jerzy Woźnicki

[Edu4] **CAD for PCB (PADS)** (Wspomaganie komputerowe projektowania obwodów drukowanych), **PADS**, Ryszard Kisiel, Jerzy Kalenik

[Edu5] **Characterisation of Microelectronic Structures and Technologies** (Charakteryzacja struktur i technologii mikroelektronicznych), **CSTM**, Bogdan Majkusiak

[Edu6] **Characterisation of Solid State** (Metody badania ciała stałego), **BCS**, Piotr Szwemin

[Edu7] **Computer Aided Design and Manufacturing of Microwave Circuits** (Komputerowe projektowanie i realizacja obwodów mikrofalowych), **KPROM**, Sławomir Palczewski

[Edu8] **Design of audio system** (Konstrukcja aparatury audio), **KAA,** Zbigniew Pióro

[Edu9] **Electronics 3** (Elektronika 3), **ELKA3**, Wiesław Kuźmicz

[Edu10] **Fields and waves**, (Pola i fale), **POFA**, Adam Abramowicz

[Edu11] **Fundamentals of Microprocessor Techniques** (Podstawy techniki mikroprocesorowej), **TMIK**, Lidia Łukasiak

[Edu12] **Fundamentals of Solid State Electronics** (Elektronika ciała stałego), **ELCS**, Jan Szmidt, Witold Pleskacz

[Edu13] **Hardware Implementation of Algorithms in VLSI Circuits** (Sprzętowa implementacja algorytmów w układach VLSI), **SAV**, Elżbieta Piwowarska

[Edu14] **High Frequency Techniques** (Podstawy techniki w.cz.), **TWCZ**, Bogdan Galwas

[Edu15] **Hybrid Integrated Circuits Technology** (Technologia hybrydowych układów scalonych), **THUS**, Zbigniew Szczepański

[Edu16] **Hybrid Systems** (Układy hybrydowe), **UKH**, Ryszard Kisiel

[Edu17] **Integrated Optoelectronics** (Optoelektronika zintegrowana), **OZT**, Michał Malinowski, Agnieszka Mossakowska-Wyszyńska

[Edu18] **Introduction to the UNIX System** (Użytkowanie systemu UNIX), **USUX**, Andrzej Wielgus

[Edu19] **Laser Applications** (Zastosowania laserów), **ZLA**, Jerzy Kęsik

[Edu20] **Laser Engineering** (Technika laserów), **TL**, Faculty of Applied Physics and Mathematics WUT, Tadeusz Adamowicz

[Edu21] **Laser Physics** (Fizyka laserów), **FLA**, Paweł Szczepański

[Edu22] **Lasers – Fundamental Course** (Lasery - kurs podstawowy), **LKP,** Paweł Szczepański

[Edu23] **Logic Circuits** (Układy logiczne), **ULOGE**, Tadeusz Łuba

[Edu24] **Microelectronics Development Trends** (Kierunki rozwoju mikroelektroniki), **KRM**, Andrzej Jakubowski

[Edu25] **Microwave and Lightwave Integrated Circuits** (Mikrofalowe i optofalowe układy scalone), **MOUS**, Jerzy Piotrowski

[Edu26] **Models and Systems of Image Processing** (Modele i systemy przetwarzania obrazów), **MSPO**, Jerzy Woźnicki

[Edu27] **Modern semiconductor memory** (Współczesne pamięci półprzewodnikowe), **WPP,** Andrzej Jakubowski, Sławomir Szostak

[Edu28] **Noise Reduction in Electronics Systems** (Minimalizacja zakłóceń w aparaturze i systemach elektronicznych), **MZA**, Zdzisław Mączeński

[Edu29] **Numerical Methods** (Metody numeryczne), **MNM**, Institute of Electronic Fundamentals WUT, Jerzy Krupka

[Edu30] **Object Programming in Java** (Praktyka programowania obiektowego w Javie), **PPOJ**, Adam Wojtasik

[Edu31] **Object Programming** (Programowanie obiektowe), **PROBI**, Adam Wojtasik

[Edu32] **Object Programming Practice** (Praktyka programowania obiektowego), **PRM**, Michał Borecki

[Edu33] **Operating Systems** (Systemy operacyjne), **SOE**, Andrzej Wielgus

[Edu34] **Optowave Telecommunication** (Telekomunikacja optofalowa), **TEOP**, Bogdan Galwas

[Edu35] **Optoelectronic elements and systems** (Elementy i systemy optoelektroniczne), **ESO**, Michał Malinowski

[Edu36] **Photoelectric Phenomena in Semiconductors** (Zjawiska fotoelektryczne w półprzewodnikach), **ZFPP**, Stanisław Pietruszko

[Edu37] **Photonics' Fundamentals** (Podstawy fotoniki), **FOT**, Michał Malinowski

[Edu38] **Physical Fundamentals of Information Processing** (Fizyczne podstawy przetwarzania informacji), **FPPI**, Bogdan Majkusiak

[Edu39] **Physics of Solid State** (Fizyka ciała stałego), **FCSR**, Jan Szmidt

[Edu40] **Programming 8051 microcontroler** (Programowanie mikrokontrolera), **PMIK**, Lidia Łukasiak

[Edu41] **Quality in Design and Manufacturing** (Jakość w procesach projektowania i wytwarzania), **JPPW**, Zdzisław Mączeński

[Edu42] **Semiconductor Devices** (Przyrządy półprzewodnikowe), **PP**, Andrzej Jakubowski, Andrzej Pfitzner

[Edu43] **Semiconductor Devices for Optoelectronics** (Półprzewodnikowe elementy optoelektroniczne), **PEO**, Paweł Szczepański

[Edu44] **Silicon Thin Films** (Cienkie warstwy krzemowe), **CWK**, Stanisław Pietruszko

[Edu45] **Surface Mounting Technology** (Technologia montażu powierzchniowego), **TMP**, Ryszard Kisiel

[Edu46] **Technology of Integrated Circuits Fabrication** (Technologia monolitycznych układów scalonych), **TWMUS**, Romuald Beck

[Edu47] **Thick film sensors** (Grubowarstwowe czujniki pomiarowe), **GCZP**, Zbigniew Szczepański

[Edu48] **Thin Film Material Engineering** (Cienkowarstwowa inżynieria materiałowa), **CIM**, Jerzy Kruszewski

[Edu49] **VLSI Design in Stansard Cell Style** (Projektowanie układów scalonych VLSI w stylu komórek standardowych), **PUVS**, Zbigniew Jaworski

3.2. Advanced Courses

[Edu50] **Advanced Microelectronic and Optoelektronic Technologies** (Zaawansowane technologie mikroelektroniczne i optoelektronczne), **ZTMO**, Romuald Beck

[Edu51] **Advanced Physical Fundamentals of Optoelectronics** (Zaawansowane podstawy fizyczne optoelektroniki), **ZPFO**, Paweł Szczepański

[Edu52] **Design of Microprocessors** (Projektowanie mikroprocesorów), **PMS**, Michał Borecki

[Edu53] **Design of VLSI Circuits** (Projektowanie struktur scalonych VLSI), **PSSV**, Wiesław Kuźmicz

[Edu54] **Digital Image Processing** (Cyfrowe przetwarzanie obrazów), **CPOO**, Grzegorz Kukiełka

[Edu55] **Electronic and Photonic Devices for Telecommunication** (Przyrządy elektroniki i fotoniki dla telekomunikacji), **PEFT**, Bogdan Galwas

[Edu56] **Fundamentals of Photovoltaics** (Podstawy fotowoltaiki), **PFOT,** Stanisław Pietruszko

[Edu57] **Integrated Optoelectronic Circuits and Optical Logic Circuits** (Zintegrowane układy optoelektroniczne i optyczne układy logiczne), **ZOUL**, Michał Malinowski

[Edu58] **Lasers – Advanced Course** (Lasery - kurs zaawansowany), **LKZ,** Paweł Szczepański

[Edu59] **Nanotechnologies** (Nanotechnologie), **NAN**, Jan Szmidt

[Edu60] **Optical Waveguide Lasers** (Wzmacniacze i lasery światłowodowe), **WLŚ**, Ryszard Piramidowicz

[Edu61] **Optoelectronics Techniques of Information Processing** (Optoelektroniczne techniki przetwarzania informacji) ,**OTZI**, Janusz Parka, Jerzy Woźnicki

[Edu62] **Physical Fundamentals of Nanoelectronics** (Podstawy fizyczne nanoelektroniki, **PFN**, Bogdan Majkusiak

[Edu63] **Semiconductor Structures for VLSI and ULSI Circuits** (Struktury półprzewodnikowe dla układów VLSI i ULSI), **SPVU**, Andrzej Jakubowski

3.3. Courses in English

[Edu64] **Electronics 1, EELE1,** Bogdan Majkusiak

[Edu65] **Physics 3, A,** Bogdan Majkusiak

[Edu66] **Quality Management, EQUMA,** Zdzisław Mączeński

4. RESEARCH PROJECTS

Project definition and description - 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 projektowania oraz metod wytwarzania i badania materiałów i przyrządów w dziedzinie mikroelektroniki i optoelektroniki), project leader: Andrzej Pfitzner, August 2003 - March 2004, **sub-projects:**

[Pro1.1] **Modelling and investigation of planar waveguide lasers** (Modelowanie i badanie planarnych struktur laserowych), sub-project leader: Michał Malinowski

Diode-pumped, solid-state lasers have a wide variety of applications in the industrial, military, medical, and research sectors. Here we discuss the use of a planar waveguide lasing geometry, which is well matched to that of a diode bar reducing or eliminating the need for beam shaping. In this work a general modelling of Nd and Yb -doped planar lasers is presented. Approximate analytical results are derived for the threshold and the output intensities. Experimental work is oriented on the technology and investigation of Nd, Yb and Pr activated YAG planar waveguides and micro-.

[Pro1.2] **The development of software tools for designing process symulation of microwave amplifiers** (Opracowanie narzędzi symulacji procesu projektowania wzmacniaczy mikrofalowych), sub-project leader: Bogdan Galwas, co-workers: Jarosław Dawidczyk, Jerzy Skulski, R. Wojtyra

The goal of this project is application of Java programming tools for designing of simple, one-transistor microwave amplifiers. Main work tasks are connected with the following topics: development of software for drawing characteristics on Smith's, chart and polar chart, development of software for calculation, of gain and impedance matching in unilateral model of the amplifier, development of software user's manual.

[Pro1.3] **Manufacturing and characterisation of ultrathin gate dielectric SiOxNy layers for future CMOS-ULSI applications** (Wytwarzanie i charakteryzacja struktur z ultracienką warstwą SiOxNy jako dielektrykiem bramkowym dla przyszłych generacji układów CMOS-ULSI)), sub-project leader: Romuald B. Beck, co-workers: Andrzej Jakubowski, Bogdan Majkusiak, Jan Szmidt, Aleksander Werbowy, Lidia Łukasiak, Sławomir Szostak, Witold Ciemiewski, Kazimierz Dalbiak, Małgorztata Trzaskowska and students.

The aim of this project is tuning the PECVD process to allow deposition of ultrathin silicon oxynitride layers (SiOxNy) the quality of which would allow their application in CMOS-ULSI technology as gate dielectrics. The properties of the formed layers are investigated by means of ellipsometric spectroscopy, XPS, as well as by analysis of electrical characteristics (applying specially designed test structure and technology).

[Pro1.4] **Properties of the high vacuum standards** (Badanie właściwości systemów metrologicznych wysokich próżni), sub-project leader: Piotr Szemin

The accuracy of the vacuum standards depends among others on the gas flux distribution in the calibration and pumping chambers. Because of the poor accuracy of vacuum gauges comparing to the level of irregularity of the flux, this effect can not be measured and can be only estimated by the use of computer simulation. The main aim of this work was to determine the influence of gas flux distribution on the generated pressure. The calculations were made IMGC vacuum standard. The gas flux distribution irregularity expressed as correction factors at the location of gauge ports are: in the calibration chamber $2x10^{-4}$, in the pumping chamber $5x10^{-4}$. The second aim of this work was to estimate the limits of Monte-Carlo simulation implementation connected with floating point arithmetic. The carried out tests show that this MC method simulation can give results with the accuracy of the 10^{-6}.

[Pro1.5] **Development of a standard cell library for deep submicron CMOS technologies** (Opracowanie biblioteki komórek logicznych dla technologii submikronowych CMOS), sub-project leader: Wiesław Kuźmicz, co-workers: Elżbieta Piwowarska, Witold Pleskacz, Zbigniew Jaworski, Andrzej Wielgus and students

The goal of this project is to develop a library of standard cells for at least one of deep submicron CMOS technologies available in European silicon foundries. Although foundries make their libraries available for IC designers, full layouts of the cells are not disclosed. This is sufficient for routine design of digital ICs but not for research work. Our own library will allow to study layout-related effects on the performance and manufacturability of IC designs.

[Pro1.6] **The design and technology of optoelectronical and hybrid circuit development** (Rozwój metod projektowania i technologii układów optoelektronicznych i hybrydowych), sub-project leader: Michał Borecki, co-workers: Jerzy Kruszewski, Paweł Wrzosek

The topic consist of three parts. First part involve the investigation of electrical mini connections which were made in Pb free technology with small amount of Ag. Second part concern the micro-opto-mechanical vibration sensor construction. The main aim of this section is investigation of optical fiber mounting and positioning in silicon substrate technology. The last part involve characterization of photovoltaic systems' measurement method.

[Pro1.7] **2D-object feature specific measurements (**Parametryzacja i wymiarowanie obiektów 2D), sub-project leader: Jerzy Woźnicki

Measurements that can be performed on each of the individual features of objects in images can be grouped into four classes: brightness (including colour values), location (both absolute position and relative to other features present), size and shape. For each class quite a variety of different specific measurements can be made and there are a variety of different ways to perform the operations. Most image analysis systems offer to deal with several different measurement parameters. The problem is frequently to decide which of the measured parameters is most useful or appropriate for solving a particular problem.

We have developed experimental system for tests of different object representation features in form of 2D primitives. These primitives are multi-modal local descriptors that carry information about visual aspects such as orientation, contrast transition and colour in a condensed way.

[Pro1.8] **Characterization of single crystal dielectric oxides and microwave ferrites** (Badania zespolonej przenikalności elektrycznej monokryształów tlenkowych oraz wybranych magnetycznych właściwości ferrytów mikrofalowych), sub-project leader: Jerzy Krupka

Main goal of this work is to characterize electromagnetic properties of different single-crystal materials at microwave frequencies from room to liquid helium temperatures and measurements of the complex permeability of microwave ferrites. Since single crystal materials are usually expensive, we plan to measure them by two different techniques. The first technique will be the dielectric rod resonator technique operating on TE_{011} and HE_{111} modes for all possible materials. This measurement technique requires small samples and it is relatively fast and cost effective. The second technique will be whispering gallery mode (WGM) technique that will be used for to measure the lowest loss materials. This work is partially supported by Australian Research Council Under Polish-Australian INVESTIGATIONS AND CHARACTERIZATION OF NEW MATERIALS FOR WIRELESS COMMUNICATIONS.

[Pro2] **The Development of Design, Processing and Testing Methods of the Electronic Devices and Materials for Microelectronics and Optoelectronics** (Rozwój metod projektowania oraz metod wytwarzania i badania materiałów i przyrządów w dziedzinie mikroelektroniki i optoelektroniki), project leader: Andrzej Jakubowski, July 2004 - March 2005, **sub-projects:**

[Pro2.1] **Design of low power CMOS integrated circuits with application to control unit for implantable cardioverter defibrillator** (Projektowanie układów scalonych CMOS bardzo małej mocy, z przykładem zastosowania do sterowania wszczepilanym defibrylatorem), sub-project leader: Wiesław Kuźmicz, co-worker: Zbigniew Jaworski

The goal is to design an integrated controller with extremely low power consumption, for application in implantable cardioverter defibrillators (ICD). This is a lifesaving device for patients with life threatening cardiac arrhythmias. Existing ICDs use a very primitive diagnostic algorithm which often results in unnecessary painful shock therapies applied to the patients' heart. This work aims at hardware implementation of a new control algorithm which practically eliminates unnecessary shocks. For this purpose an ultra low power digital CMOS integrated circuit with special dedicated architecture will be developed.

[Pro2.2] **Developing of microwave measurement computer controlled system idea** (Opracowanie koncepcji mikrofalowego systemu pomiarowego sterowanego przez komputer), sub-project leader: Bogdan Galwas

The goal of this project is to develop the main principles of operation and controlling software for microwave measurement system with network analyzer, which will be used to determine the scattering matrix. Main work tasks are connected with the following topics: developing of the measurement system idea; developing of the software for computer controlling of the system; performing of test run measurements.

[Pro2.3] **Digital image analysis and processing of polarized images** (Analiza obrazów spolaryzowanych metodą przetwarzania cyfrowego), sub-project leader: Jearzy Woźnicki, co-workers: Janusz Parka, Grzegorz Kukiełka, Tomasz Grudniewski, Hanna Górkiewicz-Galwas, Jerzy Domański

Polarized images present the subject of interest of contemporary optics. They carry information about the objects in not clearly visible areas in the scene (masked by fog, smoke, dust et al.) due to the difference of dispersion of lightened electromagnetic wave for both perpendicular wave polarization.

The aim of the project is to propose optimized procedures for polarized images analysis in various spectral ranges. Algorithms of edge segmentation and area segmentation of such images have been elaborated. Application of prepared numerical programs for investigation of polarized images will allow to assess the chosen method of analysis.

[Pro2.4] **Formation and characterization of structures with ultrathine SiO_xN_4 layers on containing SiGe substrates** (Wytwarzanie i charakteryzacja struktur z ultracienką warstwą SiO_xN_4 na podłożach zawierających warstwy SiGe), sub-project leader: Romuald B. Beck, co-workers: T.Bieniek, W.Ciemiewski, K.Dalbiak, A.Jakubowski, M.Kalisz, L.Łukasiak, B.Majkusiak, R.Mroczyński, J.Szmidt, A.Werbowy, M.Trzaskowska

The project aims at experimental study of methods of ultrathin SiO_xN_4 layers formation on substrates strained by the SiGe layers. Particular attention has to paid on preserving the strain through compute test structure manufacturing by appreciate changes in the device technology.

[Pro2.5] **High Q-factor microwave resonators – new technologies and measurements of dielectric properties of spherical samples** (Nazwa tematu: Rezonatory mikrofalowe o dużej dobroci – nowe technologie i metody pomiaru), sub-project leader: Jerzy Krupka, co-workers: Mikołaj Baszun, Zdzisław Mączeński, Janusz Rogowski, Jerzy Rudkowski

The main goals of this project are construction and investigation of new hollow spherical dielectric resonators with Bragg effects and development of new technique for the complex permittivity measurements of spherical dielectric samples. This work constitutes part of joint international projects: Polish-Australian linkage grant: INVESTIGATIONS AND CHARACTERIZATION OF NEW MATERIALS FOR WIRELESS COMMUNICATIONS and European grant TUNABLE FILTERS BASED ON DIELECTRIC RESONTORS.

[Pro2.6] **Lead –free solder joints in thick film hybrid circuits – investigation of some chosen properties** (Bezołowiowe połączenia lutowane w grubowarstwowych układach hybrydowych - badanie wybranych właściwości), sub-project leader: Jerzy Kalenik, co-workers: Jerzy Kalenik, Ryszard Kisiel, Ryszard Biaduń, Krystyna Szylko

Since 1.07.2006 lead will be banned from electronic equipment. SnAg and SnAgCu solders were chosen to replace SnPb solder in printed circuit boards. The aim of this work is to investigate some properties of lead-free solder joints to thick film hybrid circuit solder pads.

[Pro2.7] **Modelling and investigation of waveguide laser structures for visible wavelengths** (Modelowanie i badanie falowodowych struktur laserowych na zakres widzialny), sub-project leader: Michał Malinowski

Currently there is interest in developing compact, short wavelength, all solid state laser sources for display, data storage and material processing applications. One of the promising approaches is to use upconversion-pumping schemes leading to laser action at wavelength shorter than that of pump radiation. The program is focused on studying upconversion phenomena in trivalent rare-earth doped fibers and planar waveguides. The significant interest in studying Ho^{3+}, Pr^{3+} and Nd^{3+} materials results from the energy spectrum of these ions containing several metastable multiplets offering possibility of simultaneous laser emission at various wavelengths from ultraviolet to infrared.

[Pro2.8] **The investigation of high vacuum standards properties with use of simulation methods** (Badania parametrów wzorców wysokich próżni metodami symulacyjnymi), sub-project leader: Piotr Szwemin, co-worker: Marek Niewiński

The work was concerned on analyse and evaluation of numerical errors in floating point arithmetic used in Monte-Carlo simulation's routines for determining the gas state parameters in UHV standards. The main focus was put on *errors in summation,* which are very important in evaluation of gas number density. It was showed that format IEEE 754 of number representation is sufficient to getting result with uncertainty of 10^{-4}. Additionally, the gas flux distributions in chambers of IMGC standard were determined. They allow recognising the source of uncertainty in backstream effect's coefficient determination. The simulation software were also extended with two new model of gas surface interaction. They will be tested in future work.

[Pro3] **Analysis of angiogenesis – methods and tools development** (Analiza procesu angiogenezy – rozwój metod i narzędzi algorytmicznych), project leader: Hanna Górkiewicz-Galwas, co-workers: Jerzy Woźnicki, Grzegorz Kukiełka, Jerzy Domański; July 2004 – December 2004

Analysis of digital angiogenesis microscopic images presents promising method for research works in medicine and pharmacology.

The purpose of the project is to check on usefulness of several methods of angiographic images segmentation (by means of applying different types of filters for detecting new vascularizarion formed due to the angiogenesis process) and methods of their quantification. For calculating the new blood vessels in tissue and measuring their parameters the procedures applied in professional software Image Pro Plus have been used.

Results and conclusions of investigations give good material to project optimised digital system for acquisition and analysis of angiogenesis microscopic images.

[Pro4] **Automation and computerization of laboratory experiments** (Automatyzacja i komputeryzacja eksperymentów laboratoryjnych), project leader: Bogdan Galwas, co-workers: Jerzy Skulski, Grzegorz Kędzierski, Daniel Paluch, July 2004 - December 2004,

The aim of this project is developing, designing, test run and analysis of the microwave synthesizer with double measurement signal source. The most modern system with fraction PLL loop and Sigma-Delta compensation will be used as a frequency stabilizer. The opportunity of synthesizer controlling by internal microchip or desktop computer will make possible the application of this device in computerized microwave measurement systems.

[Pro5] **Modelling and synthesis of optical asymmetric couplers (**Modelowanie i synteza światłowodowych sprzęgaczy asymetrycznych), project leader: Michał Borecki, July 2004 - December 2004

The optical asymmetric couplers executed for multimode technology find in practice much application, for example construction of optical sensors.

The modelling and synthesis of optical asymmetric couplers were carry on with intensity method. The intensity modelling concerns representation of optical radiation in the medium folding from areas: source, optical track and detection. Close and far fields describe radiation in macro scale. The micro scale effects are described with appropriate rights of optics. The close field is the surface density of radiation, and far –angular density.

The statistical formulation of intensity methods permitted on delimitation the parameters of constructional components of optical track. The polymer optical fiber type PFM - 750 - 22E was used in presented work for experiments. The proposed method of modelling and synthesis of optical asymmetric couplers turns out to be correct in mathematical sense and confirmation in experience pick up.

[Pro6] **Method of measurements of the very-low frequency relaxation properties of bio-materials in suspensions and solutions** (Metoda badania niskoczęstotliwościowych właściwości relaksacyjnych biomateriałów w roztworach), project leader: Zdzisław Mączeński, co-worker: Janusz Rogowski, July 2004 – December 2004

Analysis and interpretation of the bio-impedance belongs to the fastest developing methods of the diagnosis of the living organisms, tissues and others multi-molecule biological structures. The method of the credible broadening of the measurement wavelength spectrum towards the sub-acoustic frequencies has been proposed. The multi-electrode cell for bio-suspension and bio-solutions impedance measurements has been developed and tested. The idea of the cell design and its interfacing with the excitation system and the signal analysing system has been verified.

[Pro7] **Optimization of construction, technology and work conditions of ion laser for operation in ultraviolet range** (Optymalizacja konstrukcji, technologii i warunków pracy lasera jonowego w zakresie promieniowania ultrafioletowego), project leader: Jerzy Kęsik, co-workers: Wojciech Kamiński, July 2004– December 2004

The main aim of the project is optimisation of construction, technology and work conditions of ion argon and krypton lasers for operation in ultraviolet range (330-363nm). The work includes studies on new laser line width.

[Pro8] **Software for the system of MIS structure characterization by means of charge pumping** (Oprogramowanie systemu do charakteryzacji struktur MIS metodą pompowania ładunku), project leader: Sławomir Szostak, co-workers: L. Łukasiak, Z. Pióro, W. Ciemiewski, July 2004 - December 2004

Software has been developed to control a measurement system for the characterization of electrophysical parameters of new-generation MIS structures. The software enhanced the system with the options of: measurements of a family of electrical characteristics, testing of the interconnection set-up, introduction of limitations to voltages applied to the investigated structure, visualization of measurement results.

[Pro9] **The development of the sectional SSOI-MOS simulation model** (Rozwój modelu sekcyjnego tranzystorów SSOI-MOS), project leader: Grzegorz Janczyk, July 2004 - December 2004

The PhD elaborated SSOI-MOS (Sectional SOI-MOS) DC model of SOI-MOS transistors has been additionally equipped with subthreshold operation region. Some important algorithm changes have been also introduced. The special attention was paid to the sectional nature of the phenomena present within the MOS SOI transistor's body. Along with the theoretical algorithms and the software implementation of the model many electrical measurements have been done. It is a beginning of the post-PhD model development.

[Pro10] **Analysis of detection limit of steam saturation in power boiler exhaust by microwave measurement methods** (Analiza wykrywalności metodami mikrofalowymi stopnia nasycenia pary wodnej w spalinach kotłów energetycznych), project leader: Bogdan Galwas, co-workers: Paweł Sobieszak, Grzegorz Kędzierski, May 2004 – December 2004

The goal of this project is analysis of application the microwave Fabry-Perot resonator as a measurement device for steam saturation detection in power boiler exhaust. Using of such resonator makes possible free run of the exhaust and easy steam saturation detection by resonator quality factor measurement. Main work tasks are connected with the following topics: designing of the measurement system; simulation calculations of steam saturation influence on quality factor of microwave resonator.

[Pro11] **Analysis of microwave-optical frequency conversion processes on PIN photodiodes** (Badanie procesów optomikrofalowej przemiany częstotliwości na fotodetektorach PIN), project leader: Bogdan Galwas, co-worker: Jarosław Dawidczyk, May 2004 – December 2004

The aim of this work is analysis of microwave-optical frequency conversion processes on PIN photodiodes. During this project the non-linear equivalent circuit of PIN photodiode was proposed as well as the method of circuit parameters extraction from simple microwave measurements. Using this equivalent circuit the influence of non-linear: responsivity, series resistance, capacitance and junction resistance were investigated.

[Pro12] **Analysis of working conditions and investigations of dielectric laser micro-structures obtained by ion implantation** (Analizy warunków pracy i badanie planarnych mikrostruktur laserowych wytwarzanych metodą implantacji jonów), project leader: Michał Malinowski, May 2004 – December 2004

In this work Pr:YAG thin films (4 μm thickness) were used as substrates to manufacture the channel waveguides by the implantation technique. In crystalline materials, like e.g. Pr:YAG, ion implantation produces strongly damaged and strained area in the implanted region. It leads to the local changes in the refractive index. Ion implanted optical channels are obtained by creating barriers of negative refractive index change in the implanted range compared with that in the layer.

[Pro13] **Modeling of electrical characteristics of SiC devices** (Modelowanie charakterystyk elektrycznych przyrządów wytwarzanych na węgliku krzemu), project leader: Aleksander Werbowy, co-workers: J. Stęszewski, M. Sochacki, D. Maj, W. Ciemiewski, K. Dalbiak, M. Trzaskowska, May 2004 – December 2004

The aim of the project was such modification of models implemented in Silvaco Atlas and Athena software as so to obtain more realistic simulations of fabrication processes as well as of the performance of so produced SiC devices. Models were modified taking into account the actual parameters of the technology available at the Institute, and thus better correlation between simulations and parameters of fabricated SiC structures was achieved.

[Pro14] **Shallow carbon implantation into silicone substrate for fast microelectronics technology needs** (Płytka implantacja węgla do krzemu na potrzeby technologii szybkiej mikroelektroniki), project leader: Jan Szmidt, co-workers: M. Wiatroszak, R. Gronau, D. Maj, T. Nowak, W. Ciemiewski, K. Dalbiak, M. Trzaskowska. May 2004 – December 2004

Carbon can be a dopant for silicone and particularly for silicone germanium, having influence to change of electron properties of these materials. Doping process changes a width of a band gap and improves carriers mobility. In consequence, one can get higher work frequencies of obtained devices. Fabrication technology demands very shallow junction that can be obtained during shallow implantation of carbon ions taking place in plasma deposition processes of carbon films (e.g. DLC, NCD).

[Pro15] **Software for design of low loss SAW devices** (Opracowanie oprogramowania do projektowania niskostratnych podzespołów elektronicznych z akustyczną falą powierzchniową), project leader: Jerzy Krupka, co-workers: Mikołaj Baszun, Adam Szczepański, Waldemar Matuszewski, Paweł Popow, Jerzy Rudkowski, May 2004 – December 2004

There was formulated mathematical model of SAW devices with inter digital transducers, which were be used to design of software for modelling and simulation of low loss SAW devices. Practical models of 70 MHz SAW dispersive lelay lines were made and measured. Good fit of theoretical and experimental data were obtained.

4.2. Projects Granted by the State Committee for Scientific Research (KBN)

[Pro16] **Tunable filters based on dielectric resonators TUF** (Przestrajalne filtry oparte na rezonatorach dielektrycznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jerzy Krupka, April 2002 – March 2004

TUF will focus on novel approaches for frequency tuning of dielectric resonators based filters. The project has the following technical objective:

- To provide a tunable dielectric filter capable of satisfying 3 rd, 4 th Generation and satellite requirements.
- To apply tunable dielectric technology to nano-scale detectors.
- To search for new materials and approaches in electronic tuning of dielectric resonators.

[Pro17] **Design methodology of analog ASICs based on the notion of virtual prototyping** (Metodologia projektowania analogowych układów ASIC oparta na koncepcji wirtualnego prototypowania), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Zbigniew Jaworski, co-workers: Wiesław Kuźmicz, Andrzej Pfiztner, Adam Wojtasik, Elżbieta Piwowarska, Grzegorz Janczyk, Jacek Laskowski, Dominik Kasprowicz, Adam Jarosz, Jerzy Gempel, Stanisław Jeszka, April 2002 - March 2005

The most difficult problems in the design of analog circuits are design optimization and yield maximization. These tasks require statistical simulation and prototypes manufacturing and measuring, what is time consuming and costly. What 's more, commercial simulators do not account for correlation of device parameters so the simulation results are far from realistic ones. The aim of this project is to propose and build a design environment based on idea of virtual prototyping. This system will provide an engineer with the ability to automatically simulate manufacturing process and obtain required circuit characteristics taking into account process disturbance and correlations of device parameters. In addition, the system will allow to build VHDL-AMS models of analog macros.

[Pro18] **Modelling of transport phenomena and electrical characteristics of the MOS and MOS SOI tunnel devices** (Modelowanie zjawisk transportu i charakterystyk elektrycznych przyrządów tunelowych MOS I MOS SOI), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Bogdan Majkusiak, co-workers:, Romuald B. Beck, Jakub Walczak, Aleksander Werbowy, Agnieszka Zaręba, Józef Maciak, Małgorzata Trzaskowska, Kazimierz Dalbiak, Witold Ciemiewski, October 2002 - Januar 2005

The aim of the project is to investigate and describe physical phenomena responsible for operation of MOS and MOS SOI devices with ultrathin gate oxide layers, that operate with the use of tunnelling or resonance tunnelling phenomenon.

[Pro19] **Determination of UV light generation conditions in active Nd^{3+} doped fibres** (Określenie warunków generacji promieniowania z zakresu ultrafioletu w światłowodach aktywnych domieszkowanych jonami Nd^{3+}), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Piramidowicz, co-workers: Wiesław Woliński, Michał Malinowski, Marcin Kaczkan, Paweł Szczepański, November 2002 – November 2004

In the last few years an increasing number of laboratories world-wide have become involved in research and development of optical active fibre devices. Narrow-band, single mode fibre lasers are being developed as potential sources for a wide range of

applications. One of the most intensively investigated are short wavelength fibre lasers, especially based on up-conversion pumping mechanisms.

The main objective of this research project is to design and investigate neodymium doped ZBLAN fibre laser operating in the ultra-violet region of spectrum. In particular – the project covers study of one and two-photon excitation of UV emission in Nd^{3+} doped ZBLAN samples, determination of up-conversion mechanisms, analysis of main deactivation processes (both radiative and nonradiative), modelling of laser action threshold parameters and, finally, lasing experiments.

[Pro20] **Analysis of a gas pumping effect in ion argon and krypton lasers** (Analiza i modelowanie zjawisk przepompowywania gazu w jonowych laserach argonowych i kryptonowych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Wojciech Kamiński, March 2003 – February 2004

The purpose of the project is analysis of gas pumping effect in ion argon and krypton lasers. This is parasitic effect in this kind of lasers which diminishes the efficiency of a laser generation and the life-time of the laser tube. Results will be used to minimize this effect in the new design of ion argon laser discharge tube with quasi-continuous discharge capillary.

[Pro21] **Microelectronic semiconductor devices with chemical sensitive carbon film** (Mikroelektroniczne przyrządy półprzewodnikowe z chemoczułą warstwą węglową), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: J. Szmidt, co-workers: T. Guzdek, A. Karczemska, M. Cłapa, W. Ciemiewski, K. Dalbiak, M. Trzaskowska. April 2003 – April 2004.

The main goal of the project is development of fabrication technology of open gate metal-insulator-semiconductor field effect transistor (Open Gate MISFET) playing the role of chemical sensitive device. As a chemical sensitive element, a diamond-like carbon (DLC) film with embedded diamond nanocrystallites is applied. Obtained transistor structures demonstrate sensitivity to nitrogen containing organic compounds.

[Pro22] **Analysis of the short wavelength emission excitation in holmium activated $SrLaGa_3O_7$ and $SrLaGaO_4$ crystals** (Warunki wzbudzania promieniowania krótkofalowego w laserowych kryształach $SrLaGa_3O_7$ i $SrLaGaO_4$ aktywowanych jonami holmu), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał malinowski, co-worker: Marcin Kaczkan, May 2003 – May 2004

The purpose of this investigation is to study the optical properties of Ho^{3+} in $SrLaGa_3O_7$ (SLG) and $SrLaGaO_4$ (SLO) crystals to better understand the behaviour of the rare-earth ions in these hosts and to predict their potential laser properties.

The principal interest in studying rare earth doped SLG and SLO crystals is due to their structural disorder and resulting strong inhomogeneous broadening of the optical transitions and due to the ability of this matrix to accept high concentrations of activator. Holmium ion has been chosen as a dopant because it shows laser action at different wavelengths, from 550 nm to 3.9 μm, in a variety of hosts and offers various upconversion mechanisms which may be enhanced in SLG and SLO system because of their structural properties.

The samples with different activator concentrations were used for the studies. Absorption, emission spectra and observed lifetimes of excited states were measured and discussed using Judd-Ofelt theory. Emissions from $^3D_3$, $^5F_3$, $^5S_2$, $^5F_5$, $^5I_5$, $^5I_6$, and $^5I_7$ levels were characterized under one-photon and multi-photon excitation. The experimental lifetimes for the $^5S_2$, $^5F_5$, $^5I_6$, $^5I_7$ states were compared to the theoretical values, calculated using Judd-Ofelt theory. Upconverted, ultraviolet emission from the $^3D_3$ level under cw 647 nm excitation at room temperature was observed and investigated. Based on the energy level diagram of Ho^{3+}, the pump intensity dependencies and experimental time dependencies of the observed emissions, an excitation scheme was proposed. The observed line-narrowed fluorescence from $^5S_2$ level of Ho^{3+} ion after selective $^5I_8 \rightarrow {}^5S_2$ excitation transition was used to analyze the origin of spectral line broadening phenomenon in SLG and SLO hosts.

[Pro23] **Test vectors generation for digital CMOS integrated circuits based on ststistical analysis of manufacturing defects** (Generacja wektorów testowych dla cyfrowych układów scalonych CMOS wykorzystująca statystyczną analizę defektów produkcyjnych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Witold Pleskacz, co-workers: Wiesław Kuźmicz, Andrzej Wielgus, Adam Wojtasik, Grzegorz Janczyk, Tomasz Borejko, Jerzy Gempel, Stanisław Jeszka, Andrzej Wałkanis, May 2003 – May 2006

It is well known that classical test generation methods cannot handle the actual behaviour of faulty digital circuits implemented as CMOS integrated circuits (IC). These methods allow to generate test vectors using logic-driven gate-level models to represent the circuit design and abstract fault models (e.g. the stuck-at fault model – SAF) to describe manufacturing defects causing IC failure. As a result the circuit layout, physical defects characteristics and the actual circuit behaviour are ignored. The main aim of the project is development of new methodology for probabilistic modelling of physical defects in CMOS gates and estimation of the effectiveness of test patterns for detecting physical defects. Quality of testing depends also on quality of test patterns generated for a circuit under test. Evaluation criteria for digital circuits testing are fault coverage and test application time. Low efficiency of the classical stuck-at fault model in real defect coverage in CMOS logic has initiated the need of new test approaches. These approaches extend the CMOS standard cells characterisation methodology for voltage defect based testing and for I_{DDQ} testing. The proposed methodology will allow finding the types of faults which may occur in a real IC, to determine their probabilities, and to find the input test vectors that detect these faults. Additionally obtained information can be used for defect oriented fault simulation and test generation at higher levels of circuit abstraction.

[Pro24] **Semiclassical model of radiation in laser with Photonic Crystal active medium** (Półklasyczny model promieniowania w laserze posiadającym aktywny ośrodek w postaci krydształu fotonowego), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Paweł Czuma, October 2003 – October 2004

The main project purpose is elaborate semiclassical model of light generation in lasers with Photonic Crystal (PC) active medium. This model will take into account both nonlinear phenomena (gain saturation, spatial hole burning, mode competition) characteristic for above threshold laser generation and full spatial electromagnetic field distribution. Elaborating model will let us know influence of PC (eg.: higher gain enhancement near photonic bandgap) on generated light parameters and enable us to optimize parameters to get the best efficiency of light generation in this kind of structures.

[Pro25] **Extremely shallow (<10nm) silicon inplantation (e.g. with nitrogen) for gate stack formation of future generations of microelectronics and nanoelectronic devices** (Ekstremalnie płytko (<10 nm) implantowany (np. Azotem) krzem w konstruowaniu struktur bramkowych dla przyszłych generacji przyrządów mikroelektroniki i nanoelektroniki), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: R.B. Beck, co-workers: K. Domański, G. Gawlik, A. Kudła, Z. Pióro, J. Gibki, S. Szostak, A. Werbowy, J. Walczak, A. Zaręba.
October 2003 – April 2006

This project aims at performing detailed studies on the effect of surface region modification by means of extrelely shallow ion implantation from plasma on following dormation of dielectric layers (gate stacs). The attempt will be made to gain control of these effects that finally would allow e.g. simultaneous formation of gate dielectric layer of different thickness.

[Pro26] **Electrically conductive adhesives for inner layer connections in printed circuit boards** (Kleje elektrycznie przewodzące do realizacji połączeń międzywarstwowych w płytkach drukowanych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Kisiel, co-workers: Ryszard Biaduń, Krystyna Szylko, Jerzy Kalenik, Zbigniew Szczepański, October 2003 – January 2006

The main goal of the project is to elaborate the family of electrically conductive adhesives for preparing inner connections in double sided PCbs as well as PCB with microvia. Such composition will be based on epoxy resin with Ag fillers and other additives. The main idea of this work is to elaborate the materials which can replace the environmentally harmful process of hole electroplating in PCB production.

[Pro27] **Analysis of modulation bandwidth in planar lasers with photonic band gap (**Analiza pasma modulacji w laserach planarnych z przerwą fotonową**),** Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Agnieszka Mossakowska-Wyszyńska, co-workers: Paweł Szczepański, Paweł Czuma, Stanisław Jonak, November 2003 – May 2006

In this project, we analyse modulation bandwidth and relaxation oscillations in planar waveguide lasers based on photonic crystal structure. In our theoretical model, we take into account the gain saturation effect, transverse and longitudinal field distribution. We consider laser structures with F-P, DBR and DFB cavities. That model allows to define in easy way the influence of the real structure parameters such as photonic crystal geometry, waveguide geometry, losses as well as strength of feedback on the damping rate and the frequency of relaxation oscillations and 3dB modulation bandwidth. With the help of this model it is possible to defined optimal geometry of the laser structures having F-P and DFB cavities, which provides maximal modulation bandwidth for given pumping level (characterized by small signal gain).

[Pro28] **Semi classical theory of light generation in circular-grating distributed-feedback lasers** (Półklasyczna teoria generacji promieniowania w laserze z rozłożonym sprzężeniem zwrotnym DBR\DFB z siatką o symetrii cylindrycznej z uwzględnieniem przestrzennego rozkładu pola), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Robert Paszkiewicz, April 2004 – April 2005

The general multimode operation of CG-DBR/DFB laser is investigated. With the help of semi classical theory, general equations describing the multimode operation, including nonlinear effects related to the saturation, mode competition and spatial hole burning, are derived. In particular, by extracting the time-dependent equations for output power the stability conditions in the case of two-mode operation have been determined.

[Pro29] **Thin film $BaTiO_3$ ceramics for metal-ferroelectric-semiconductor (MFS) structures** (Cienkowarstwowa ceramika $BaTiO_3$ dla struktur metal-ferroelektryk-półprzewodnik (MFS)), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Aleksander Werbowy, co-workers: J.Szmidt, W.Ciemiewski, K.Dalbiak, M.Trzaskowska, May 2004 – May 2007

The main goal of the project is development of the fabrication method of ultra-fine grained, high-k and high-resistive thin film $BaTiO_3$ ceramics as well as investigation of its properties from the viewpoint of the material's applicability as a dielectric layer for electronic devices. The attempt will be made to develop the technology (proper semiconductor surface pre-treatment, $BaTiO_3$ selective etching, metal contacts forming) that would enable producing test electronic structures, like MFS capacitors and field-effect transistors (FETs) with discussed ceramics playing the role of ferroelectric gate insulator.

[Pro30] **Polarization sensitive liquid crystal filter in the digital image processing system** (Spektralno – polaryzacyjny filtr ciekłokrystaliczny w systemie cyfrowego przetwarzania i analizy obrazu), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jerzy Woźnicki, co-workers: Andrzej Walczak, Edward Nowinowski-Kruszelnicki, Janusz Parka, Hanna Górkiewicz-Galwas, Tomasz Grudniewski, Jerzy Domański; October 2004 – April 2007

The project is devoted to preparation and investigation of the new liquid crystal filter and its application in the digital image processing system. Analysed filter is polarization sensitive because of special – hybrid, planar, circular or planar-homeotropic - alignment of the liquid crystal layer placed between crossed polarizes. Properties of the filter depend on applied liquid crystal. It is analysed in detail.

It will be shown that such filter while joined with digital acquisition of the scene provides new possibilities in the optical signal processing. Proper system for that task will be constructed.

[Pro31] **Luminescence properties of epitaxial thin films of YAG:Pr^{3+}** (Właściwości luminescencyjne cienkich, monokrystalicznych warstw epitaksjalnych z YAG:Pr^{3+}), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał Malinowski, November 2004 – November 2005

In bulk YAG crystals grown using the Czochralski method the maximum doping concentration by Pr^{3+} ions is limited to about 1.5 at. %, however in the epitaxial films we have obtained much higher concentrations, up to about 10 at. % of praseodymium. The liquid phase epitaxy (LPE) technique has been used for growing Pr:YAG/YAG optical waveguide structures. The creation of active YAG waveguide on YAG substrate requires an increase of refractive index difference between epitaxial layer and substrate. For this purpose the substitution of aluminum by gallium was employed. For high active ion concentration, and in the case of optical waveguiding, much stronger interactions between Pr^{3+} ions could be expected. Three types of multi-ion and multi-photon processes have been studied: the cross-relaxation quenching of visible emission from the $^3P_0$ state of praseodymium, IR to blue-green wavelength up-conversion via the $^1G_4$ state and the visible to ultra-violet 4f5d emission up-conversion. The time evolution of the investigated emissions and the cw spectra dependence on Pr^{3+} concentration were measured and analysed. Cross-relaxation and up-conversion probabilities have been determined in the highly Pr^{3+} doped YAG waveguides.

[Pro32] **The study of durability, optimization of construction and technology of ion argon laser discharge tube with quasi-continuous discharge capillary** (Badanie trwałości oraz optymalizacja konstrukcji i technologii wykonania rury wyładowczej jonowego lasera argonowego z quasi-ciągłą kapilara wyładowczą), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Wojciech Kamiński, November 2004 – November 2005

The purpose of the project is the optimization of construction and technology of ion argon laser discharge tube with quasi-continuous discharge capillary made of silicon carbide in order to increase the durability of discharge tube.

[Pro33] **Diamond-like carbon films in optical waveguide sensing techniques** (Warstwy diamentopodobne w światłowodowej technice czujnikowej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, co-workers: M.Śmietana, J.Kalenik, P.Niedzielski, W.Ciemiewski, K.Dalbiak, M.Trzaskowska. November 2004 – March 2006

Carbon layers (NCD, DLC) demonstrate specific chemical and biochemical activity. In consequence they can find application as chemical sensitive films in fibre optic or optical waveguide sensing structures. During project realisation a technology of such optoelectronic structures fabrication will be worked out. The technology includes: NCD and DLC deposition onto specify substrates, selective etching of deposited films and coupling of a optical signal source (laser) and detector (photodiode) to the structure. Electrophysical and functional properties of constructed structures will be also investigated.

4.3. Projects Granted by International Institutions

[Pro34] **Researches on metal vapour - noble gas discharges for UV laser generation** (Badania wyładowań w mieszaninach gazów szlachetnych i par metali dla generacji laserowej w obszarze ultrafioletu), Research Institute for Solid State Physics and Optics of the Hungarian Academy of Sciences, Hungary, project leader: Tadeusz M.Adamowicz, co-workers: Krzysztof Dzięciołowski, Wojciech Kamiński, 1998 – 2005

Investigations of several noble gas – metal vapour lasing systems (He/Ne-Cu, He/Ne-Zn, He-Ag, He-Au) operating in IR, visible and UV range, diagnostics of plasma and laser medium parameters, modelling of the discharge parameters.

[Pro35] **High beam quality UV lasers for microelectronics** (Opracowanie ultrafioletowych laserów generujących wysokiej jakości wiązki promieniowania dla zastosowań w mikroelektronice), NATO Science for Peace Programme, Project NATO-SfP-971989-Excimer Lasers, project co-director: Tadeusz M.Adamowicz, co-workers: Krzysztof Dzięciołowski, Wojciech Kwaśniewski, Wojciech Kamiński, Jerzy Kęsik, Piotr Warda, May 1999 – April 2004

The Project other partners are as follow:

Department of Laser Physics of the Institute for Solid State Physics and Optics of the Hungarian Academy of Sciences, (Hungary).

- Department of Experimental Physics of Szeged University, (Hungary).
- Metal Vapour Laser Department of the Institute of Solid State Physics of the Bulgarian Academy of Sciences, (Bulgaria).
- -Ruhr-University Bochum, Arbeitsgruppe fur Grundlagen der Elektrotechnik, (Germany).
- Department of Physics, Eindhoven University of Technology, (The Netherlands).
- Centre de Physique des Plasmas et Applications de Toulouse (SPAT), (France).
- Department of Chemistry, University of Antwerp, (Belgium).

- Lasram Laser Ltd., Budapest (Hungary)
- Zakład Ceramiki Specjalnej WACER W.Bujnowski, (Poland).

The main objective of this project is to R&D noble gas-metal vapour ion lasers operating on the UV CuII 248,4 nm transition (Ne-Cu, Ne-CuBr lasers) and ZnII (potential laser transitions of 210 and 193 nm in Ne/He-Zn mixtures). The lasers will be used as oscillators for excimer amplifiers (KrF and ArF) providing good quality laser beam for photolithography of VLSI systems, as well as for deep UV laser spectroscopy.

[Pro36] **REASON (Research and Training Action for System on Chip Design),** (Badania i szkolenia w zakresie projektowania systemów jednoukładowych) (IST–2000-30193), project co-ordinator: Wiesław Kuźmicz (Warsaw University of Technology, Poland), project partners: 22 partners from EU member states and from Central and Eastern Europe, January 2002 – December 2004,

The goal of this project is to facilitate integration of the academic and research institutions of Central and Eastern Europe working in the field of microelectronics into the mainstream R&D activities going on in the EU countries. The main objectives of the project are as follows:

- Raising the level of awareness of industrial problems and the level of competencies among researchers in CEE in methodologies of system-on-chip design and test and analogue and mixed signal IC design for wireless communication, networking, and multimedia.
- Strengthening of links between academic and industrial partners, in order to facilitate formulation of new RTD projects and formation of project consortia.
- Maintaining and expanding the research infrastructure in the academic and research institutions of Central and Eastern Europe.
- Knowledge transfer to the SMEs and raising the level of awareness of the IST programme, in order to facilitate participation of SMEs in FP5 and the next Framework Programme projects.

[Pro37] **PV Centre - Photovoltaic Centre of Competence in Poland** (Fotowoltaiczne Centrum Doskonałości w Polsce), European Commission 5 Framework Programme on RTD (NNE5-2002-00019), project leader: Stanislaw M. Pietruszko, November 2002 – October 2005, SPUB-M.

The Centre of Photovoltaics (PV Centre) in Poland promotes the widespread use of solar photovoltaic (PV) energy as realistic, reliable, and economic energy sources, to encourage the integration of PV energy into Poland's research, economy, and everyday life. The PV Centre serves as a focal point to conduct and stimulate research and demonstration activities; educate and allow students to work on real-world PV solar energy issues; organise expert meetings, workshops, symposia, and conferences; and disseminate information and address environmental issues.

[Pro38] **PV Enlargement – Technology Transfer, Demonstration and Scientific Exchange Action for the Establishment of a strong European PV Sector,** project leader: Stanislaw M. Pietruszko, SPUB-M, January 2003 – December 2006

Important issue of PV-Enlargement project is monitoring of installed PV façade. Meteorological and electrical parameters will be measured and performance of the PV system will be analysed. All the measured data and analysis results will be compared with data from other PV systems installed in the PV Enlargement project. Project complementary to the project granted by European Commission 5 Framework Programme on RTD (NNE5-2001-736).

21 kW PV system will be installed on the façade of Faculty of Microelectronics and Optoelectronics at Warsaw University of Technology. That will be the largest PV system (in Poland) and first PV façade in Poland. The PV laboratory will be established. It will be used for research work and education.

[Pro39] **PV-NAS-NET-Co-ordination of NAS and European Union RTD Programmes on PV Solar Energy** (Koordynacja Europejskiego i Krajowych (Krajów Kandydujących) Programów Rozwoju Fotowoltaicznej Energii Słonecznej), project leader: Stanislaw M. Pietruszko, EC FP5 RTD (NNE5-2002-00046), January 2003 – December 2004

The overall objective of the PV-NAS-NET project is better co-ordination of science and technology activities in the sector of photovoltaics in the Newly Associated States (NAS), thus integrating them into the European Research Area. To obtain this, the benchmarking of the national programmes supporting PV will be performed and recommendations for the European Commission and national governments will be formulated.

[Pro40] **SOLTRAIN- Photovoltaic Training Courses in EU Candidate Countries,** project leader: Stanislaw M.Pietruszko, Altener 4.1030/Z/02-67 (ALT-2002-067), February 2003 – January 2005

The main objective of SOLTRAIN is to enlarge the understanding and application of photovoltaic solar electricity power systems in candidate EU member countries through the training courses.

[Pro41a] **Silicon-based Nanodevices – SINANO, Network of Excellence within IST 6FP of UE** (Przyrządy naonelektroniki oparte na krzemie – SINANO), Sieć doskonałości w ramach 6-tego Programu Ramowego UE, project leader: Romuald B.Beck, co-workers: B.Majkusiak, L.Łukasiak, K.Dalbiak, W.Ciemiewski, T.Bieniek, R.Mroczyński, D.Tomaszewski, J.Grabowski, January 2004 – December 2006

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

- manufacturing of CMOS device based on classical approach, as well as on SOI, multigate or strained (SiGe) platforms;
- characterization of the manufactured test devices and diagnostics of problems that should be solved either by technology or

device design modifications;
- modelling of all types of structures under investigation in this project.

[Pro41b] **Supplementary funds providing part of national share of costs of research performed within the from work of "Silicon-based Nanodevices – SINANO," Network of Excellence within IST 6FP of UE** (Przyrządy naonelektroniki oparte na krzemie – SINANO), Sieć doskonałości w ramach 6-tego Programu Ramowego UE – część finansowana przez stronę Polską: SPB

[Pro42] **Thematic Network on Silicon on Insulator Technology, Devices and Circuits - Coordination Action EUROSOI,** project leader: Bogdan Majkusiak, co-worker: J. Walczak, December 2003 – December 2005

The aim of the project is to integrate the European research community in the topic of silicon-on-insulator technology.

[Pro43] **Network of Excellence for Micro-Optics – NEMO, Network of Excellence within 2nd IST 6FP of UE** (Mikronowe i sub-mikronowe przyrządy dla fotoniki - NEMO), Sieć doskonałości w ramach 6-tego Programu Ramowego UE, project responsible person in IMiO: Paweł Szczepański, co-workers: Paweł Czuma, Piotr Firek, Marcin Kaczkan, Wojciech Kamiński, Mariusz Klimczak, Kamila Leśniewska-Matys, Michał Malinowski, Agnieszka Mossakowska-Wyszyńska, Robert Paszkiewicz, Ryszard Piramidowicz, Adam Rudziński, Jan Szmidt, Mateusz Śmietana, Paweł Śniecikowski, Anna Tyszka-Zawadzka, Piotr Warda, Aleksander Werbowy, Piotr Witoński, September 2004 – August 2008

NEMO is running since 1 September 2004 and aims at providing Europe with a complete Micro-Optics food-chain by setting up durable service and technology centres and long-term research centres. NEMO will be the networking platform of 30 European partners for the next 4 years and beyond. Each of the 30 institutes involved in NEMO is a key role player in micro-optics. NEMO's main objective is to structure and integrate the expertise and core-competences of its partners while strengthening their R&D activities in the emerging field of micro-optics.

The main types of activities in which the Institute of Microelectronics and Optoelectronics actively participates within this project are:
- Centre for Modelling and Design;
- Centre for Measurement and Instrumentation;
- Infra-Red Micro-Optics.

More information are at http://consortium.micro-optics.org/

4.4. Other Projects

[Pro44] **Elaboration of upconversion fiber laser for visible wavelengths** (Opracowanie i wykonanie modułu lasera włóknowego na zakres widzialny z konwersją wzbudzenia), project leader: Michał Malinowski, July 2004 – June 2007

Diode pumped Pr^{3+} activated visible fiber laser is investigated. Single spatial mode laser diode is used as a pump source in double doped Pr^{3+}+Yb^{3+}:ZBLAN upconversion fiber laser. Lasing by upconversion means applying two infra red photons to a medium that responds by emitting one photon in the visible. Theoretical analysis and modelling of energy transfer processes in Pr/Yb double doped fiber lasers are performed. Experimental work is oriented on the construction and investigation of fiber lasers based on Pr/Yb:ZBLAN glass.

[Pro45] **Study of technology and construction as well as realization of micro mechanical switch** (Opracowanie technologii i konstrukcji oraz wykonanie przełącznika mikromechanicznego), project leader: Jerzy Kruszewski, co-workers: Michał Borecki, Maria Bebłowska, Paweł Wrzosek, Ryszard Biaduń, July 2004 – June 2007

Work relates micro - optical switches. Proposed switch consists from head and optical fibers. The components of switch were mathematical modeling in aim of study of construction. The actuator is the key component of switch head. The construction of electromagnetic actuator with magnetic latch of show on exceptional usefulness under conducted analysis.

[Pro46] **The sensor module study and realization for measurement of vibration** (Opracowanie i wykonanie modułu czujnika do pomiaru wibracji), project leader: Jerzy Kruszewski, co-workers: Michał Borecki, Maria Bebłowska, Paweł Wrzosek, Ryszard Biaduń, July 2004 – June 2007

The work concerns the micro mechanical optical sensor of vibration. The sensor module consists from the following opto electronic components: head, fibers track, supply and detection scheme. Optical track is open in the head for sensing purposes. The modulation of optical radiation happens in this place through a micro mechanical component. The method of optical and mechanical parameters characterization for the head was worked out.

5. DEGREES AWARDED

5.1. D.Sc. Degrees

[DSc1] Piotr Szwemin, **Modelling the molecular gas flow in high vacuum standards,** (Modelowanie przepływu gazu w układach wzorców wysokich próżni), 29 June 2004

5.2. Ph.D. Degrees

[PhD1] Marcin Kaczkan, **Analysis of the short wavelength emission excitation in holmium activated $SrLaGa_3O_7$ and $SrLaGaO_4$ crystals** (Warunki wzbudzania promieniowania krótkofalowego w laserowych kryształach $SrLaGa_3O_7$ i $SrLaGaO_4$ aktywowanych jonami holmu), supervisor: Michał Malinowski, 14 December 2004

[PhD2] Wojciech Kwaśniewski, **Diffusion coefficient of metal atoms in noble gases determined in sputtered HCD metal ion lasers** (Badania dyfuzji atomów metali we wnękowych laserach jonowych na mieszaninach gazów szlachetnych i par metali), supervisor: Tadeusz Adamowicz, 22 June 2004

5.3. M.Sc. Degrees

[MSc1] Wojciech Barszczewski, **Analiza generacji promieniowania w laserach z ośrodkiem aktywnym w postaci kryształu fotonowego,** advisor Paweł Szczepański, good

[MSc2] Artur Bicki, **Wbudowywanie funkcji w środowisko Mathcad,** advisor Michał Borecki, very good

[MSc3] Piotr Chmielarz, **Badanie trwałości rury wyładowczej lasera,** advisor Jerzy Kęsik, very good

[MSc4] Tomasz Derdej, **System do głosowania w Internecie na potrzeby badań mechanizmów percepcji wzrokowej człowieka,** advisor Grzegorz Kukiełka, very good

[MSc5] Jerzy Domański, **Zastosowanie algorytmu wododziału do segmentacji obrazów mikroskopowych tkanki biologicznej,** advisor Jerzy Woźnicki, very good

[MSc6] Krzysztof Duk, **Zastosowania resamplingu cyfrowego w analizie rządowej,** advisor Zbigniew Pióro, very good

[MSc7] Ardashes Garabedian, **Rozwój sieci czystooptycznych,** advisor Agnieszka Szymańska, fairly good

[MSc8] Grzegorz Głuszko, **Modelowanie charakterystyk prądowo - napięciowych tranzystora MOS SOI z kanałem SiGe,** advisor Andrzej Jakubowski, very good

[MSc9] Ryszard Gronau, **Zastosowanie technik plazmowych w płytkiej implantacji jonów,** advisor Jan Szmidt, very good

[MSc10] Mariusz Klimczak, **Zagadnienie emisji UV w szkłach ZBLAN aktywowanych jonami Nd^{3+},** advisor Ryszard Piramidowicz, very good

[MSc11] Grzegorz Klocek, **Zagadnienie emisji promieniowania w zakresie widzialnym we włóknie ZBLAN domieszkow. jonami Ho^{3+},** advisor Michał Malinowski, very good

[MSc12] Krzysztof Kłos, **Optymalizacja parametrów epitaksji cdxHg_{1-x}Te metodą MOCVD,** advisor Jan Szmidt, very good

[MSc13] Radosław Kreft, **Analiza generacji promieniowania w laserach z ośrodkiem o strukturach kryształu fotonowego ponad progiem generacji,** advisor Paweł Szczepański, excellent

[MSc14] Marek Leśko, **Badanie wpływu temperatury na parametry i charakterystyki C(V) struktur MOS,** advisor Jan Szmidt, very good

[MSc15] Arkadiusz Łuczyk, **Klasyfikacja obrazów binarnych wykorzystująca neuronową sieć Hamminga,** advisor Witold Pleskacz, excellent

[MSc16] Paweł Makówka, **Badanie wpływu lokalnej temp. w króćcu na koncentrację cząsteczek w komorze kalibracyjnej wzorów wys. próżni,** advisor Piotr Szwemin, good

[MSc17] Paweł Mirowski, **Opracowanie technologii wykonywania połączeń o dużej gęstości dla obwodów elastycznych przy zastosowaniu klejów anizotropowych w postaci folii,** advisor Zbigniew Szczepański, very good

[MSc18] Łukasz Młodziński, **Analiza wpływu kanału i bramki SiGe na charakterystyki elektryczne tranzystora MOS,** advisor Lidia Łukasiak, fairly good

[MSc19] Wojciech Moćko, **Automatyczne pomiary transformatorów małej mocy,** advisor Janusz Rogowski, very good

[MSc20] Tomasz Nazaruk, **Analiza generacji promieniowania w laserze F-P wykonanym na bazie 1D kryształu fotonowego,** advisor Agnieszka Mossakowska-Wyszyńska, very good

[MSc21] Artur Pająk, **Analiza numeryczna propagacji fali e-m w kryształach fotonowych jedno i dwuwymiarowych,** advisor Paweł Szczepański, good

[MSc22] Paweł Paszta, **Optymalizacja warunków pracy jonowego lasera argonowego w zakresie promieniowania ultrafioletowego,** advisor Jerzy Kęsik, good

[MSc23] Adam Rudziński, **Zagadnienie gęstości stanów pola elektromagnetycznego w dwuwymiarowych kryształach fotonowych,** advisor Paweł Szczepański, excellent

[MSc24] Marek Sałasiński, **Badanie strumienia wstecznego we wzorcu wysokich próżni metodą Monte Carlo,** advisor Piotr Szwemin, fairly good

[MSc25] Jakub Siwik, **Opracowanie scalonego układu odczytu danych z detektora promieniowania,** advisor Elżbieta Piwowarska, good

[MSc26] Jędrzej Stęszewski, **Modelowanie parametrów i charakerystyka statycznych tranzystorów MOS z SIO,** advisor Andrzej Jakubowski, very good

[MSc27] Tomasz Szklarz, **Zastosowanie morfologicznego algorytmu "wododziału" do rozwiązania problemu segmentacji obrazów cyfrowych,** advisor Grzegorz Kukiełka, fairly good

[MSc28] Rafał Tratkiewicz, **Światłowodowy mętnościomierz transmisyjno - rozproszeniowy,** advisor Maria Bebłowska, very good

[MSc29] Marek Wyrzykowski, **Analiza wpływu dekompozycji funkcjonalnej na parametry układów scalonych realizowanych w technice komórek standardowych,** advisor Witold Pleskacz, good

[MSc30] Bartłomiej Zieliński, **Geodezyjne metody morfologii matematycznej w przetwarzaniu obrazów cyfrowych,** advisor Jerzy Woźnicki, very good

[MSc31] Jarosław Żukowski, **Komórka ramanawska do lasera Nd:YAG,** advisor Michał Malinowski, very good

5.4. B.Sc. Degrees

[BSc1] Błażej Amanowicz, **Optymalizacja metody segmentacji konturowej dla obrazów barwnych,** advisor Grzegorz Kukiełka, good

[BSc2] Michał Arciszewski, **Ekstrakcja i obliczanie wartości indukcyjności spiralnych na podstawie topografii układu scalonego,** advisor Elżbieta Piwowarska, fairly good

[BSc3] Łukasz Bednarek, **Zagadnienia składowania i wyszukiwania informacji obrazowych w bazie danych ORACLE,** advisor Grzegorz Kukiełka, good

[BSc4] Paweł Bieliński, **Projekt stanowiska do pomiarów mechanicznych właściwości materiałów,** advisor Zbigniew Pióro, fairly good

[BSc5] Łukasz Bogucki, **Projekt programowalnego układu rozmywania sygnałów wejściowych sterownika rozmytego,** advisor Andrzej Wielgus, good

[BSc6] Tomasz Dąbrowski, **Analiza nieliniowości w światłowodach telekomunikacyjnych,** advisor Agnieszka Szymańska, good

[BSc7] Michał Hacia, **Projekt pętli fazowej dla mikro-nadajnika RF,** advisor Elżbieta Piwowarska, fairly good

[BSc8] Wojciech Jaczewski, **Analiza tranzystora MOS z uszkodzonym tlenkiem bramkowym,** advisor Andrzej Pfitzner, fairly good

[BSc9] Paweł Jędrzejewicz, **Zaprojektowanie długodystansowego łącza optycznego,** advisor Bogdan Galwas, good

[BSc10] Mariusz Kaczmarczyk, **Badanie wpływu domieszkowania węglem warstwy GaAg na szybkość ich wzrostu i stanu morfologii,** advisor Agata Jasik, good

[BSc11] Mateusz Kawałkiewicz, **Regulowany ogranicznik mocy na pasmo 40 - 900 MHz- projekt i realizacja,** advisor Jerzy Piotrowski, good

[BSc12] Ewa Klimowicz,**Ocena powtarzalności wykonania kontaktów podwyższonych miękkich i twardych technologii flip-chip,** advisor Zbigniew Szczepański, good

[BSc13] Emil Kończak, **Badanie i analiza właściwości najnowszych generatorów liczb pseudolosowych do modelowania zjawisk fizycznych w próżniowych układach technologicznych i pomiarowych,** advisor Piotr Szwemin, good

[BSc14] Karol Korszeń,**Nadajnik optyczny - projekt, wykonanie weryfikacja pomiarowa,** advisor Jerzy Piotrowski, good

[BSc15] Norbert Kwietniewski, **Charakteryzacja struktur metal - amorficzny węglik krzemu (a-SIC) - metal,** advisor Aleksander Werbowy, good

[BSc16] Marek Lesiak, **System do analizy cyfrowych analizy obrazów mikroskopowych w języku Java,** advisor Jerzy Woźnicki, good

[BSc17] Grzegorz Lewandowski, **Zdalne sterowanie przez sieć energetyczną,** advisor Zbigniew Pióro, good

[BSc18] Ścibor Łapieś, **Implementacja metody wododziału do segmentacji obrazów cyfrowych z gradacją poziomów jasności,** advisor Grzegorz Kukiełka, good

[BSc19] Grzegorz Maj, **Oprogramowanie głowicy światłowodowego czujnika zmiany obciążenia,** advisor Agata Jasik, fairly good

[BSc20] Dariusz Maj, **Badanie właściwości optyczne cienkich warstw dielektrycznych wytwarzanych metodami plazmowymi TiO_2, Al_2O_3, BN,** advisor Jan Szmidt, good

[BSc21] Andrzej Makarewicz, **Wizualizacja propagacji pola elektromagnetycznego w falowodach prostokątnych za pomocą narzędzi środowiska Java,** advisor Piotr Witoński, good

[BSc22] Magdalena Michalska, **Analiza dyspersji w światłowodach telekomunikacyjnych,** advisor Agnieszka Szymańska, good

[BSc23] Tomasz Nowak, **Badanie właściwości optycznych warstw diamento-podobnych,** advisor Jan Szmidt, good

[BSc24] Michał Pająk,**Struktury tunelowe z ultra cienkim tlenkiem,** advisor Bogdan Majkusiak, good

[BSc25] Sebastian Pawlak, **Algorytm segmentacji obszarowej przez programowanie dla obszarów barwnych,** advisor Jerzy Woźnicki, fairly good

[BSc26] Krzysztof Pierzchała, **Światłowodowy czujnik drgań: opracowanie konstrukcji i metody wykonania,** advisor Jerzy Kruszewski, good

[BSc27] Piotr Pływaczewski, **Opracowanie laboratoryjnego stanowiska do pomiarów statycznych charakterystyk,** advisor Jan Gibki, good

[BSc28] Albert Pniewski, **Dydaktyczne stanowisko laboratoryjne do nauki programowania procesów sygnałowych (DSP) ,** advisor Zbigniew Pióro, fairly good

[BSc29] Jacek Puła, **Stałe czasowe charakteryzujące zjawiska nierównowagowe w przyrządach półprzewodnikowych,** advisor Antoni Siennicki, good

[BSc30] Grzegorz Rek, **Projekt mikro-nadajnika RF,** advisor Elżbieta Piwowarska, good

[BSc31] Grzegorz Szudrowski, **Ocena przydatności klejów elektrycznie przewodzących do "metalizacji" nieprzelotowych mikro-otworów w płytkach drukowanych,** advisor Ryszard Kisiel, good

[BSc32] Piotr Wawrzyniak, **Mikro-mechaniczny przełącznik światłowodowy: opracowanie konstrukcji i metody wykonania,** advisor Jerzy Kruszewski, good

[BSc33] Grzegorz Wąchała, **Automatyczna generacja siatki dyskretyzacyjnej dla symulatora elementów układów scalonych,** advisor Andrzej Pfitzner, good

[BSc34] Grzegorz Wieremiejuk, **Opracowanie metody kompensacji temperatury dla czujnika ciśnienia opartego na przestrzennej strukturze krzemowej,** advisor Zbigniew Szczepański, very good

[BSc35] Grzegorz Władziński, **Adaptacja dwuwymiarowego modelu domieszkowania układów scalonych do symulatora statycznego,** advisor Andrzej Pfitzner, good

[BSc36] Paweł Wojtyra, **Studium zastosowania światłowodów polimerowych w łączach krótkiego zasięgu - projekt łącza z wykorzystaniem światłowodu polimerowego,** advisor Bogdan Galwas, very good

[BSc37] Michał Wyszomierski, **Opracowanie systemu rozproszonych baz danych dla systemów inżynierskich,** advisor Mikołaj Baszun, very good

[BSc38] Paweł Zaremba, **Urządzenie do obrazowania zachowania ogniw foto-woltaicznych,** advisor Stanisław Pietruszko,good

[BSc39] Karol Zieliński, **Opracowanie systemu akwizycji danych pomiarowych do wykorzystania w laboratorium spektroskopii materiałów laserowych,** advisor Ryszard Piramidowicz, good

[BSc40] Wojciech Żurawski, **Opracowanie i uruchomienie impulsowego lasera barwnikowego,** advisor Ryszard Piramidowicz, good

6. PUBLICATIONS

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

Number	Journal	Authors	Title	Volume	Pages
[Pub1]	Applied Soft Computing	A.Wojtasik, Z.Jaworski, W.Kuźmicz, A.Wielgus, A.Wałkanis, D.Sarna	Fuzzy logic controller for rate-adaptive heart pacemaker	4	259-270
[Pub2]	Diamond and Related Materials	M.Śmietana, J.Szmidt, M.Dudek, P.Niedzielski	Optical properties of diamond-like cladding for optical fibres	13	954-957
[Pub3]	Diamond and Related Materials	T.Guzdek, J.Szmidt, M.Dudek, P.Niedzielski	NCD film as an active gate layer in chemFET structures	13	1059-1061
[Pub4]	IEEE Transactions on Microwave Theory and Techniques	M.V.Jacob, J.G.Hartnett, J.Mazierska, V.Giordano, J.Krupka, M.E.Tobar	Temperature dependence of permittivity and loss tangent of lithium tantalate at microwave frequencies	52, No 2	536-541
[Pub5]	IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control	J.G.Hartnett, A.C.Fowler, M.E.Tobar, J.Krupka	The microwave characterization of single crystal lithium and calcium fluoride at cryogenic temperatures	51, No 4	380-386
[Pub6]	IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control	M.E.Tobar, J-M.Le Foch, D.Cros, J.Krupka, J.D.Anstie, J.G.Hartnett	Spherical Bragg Reflector Resonators	5, No 9	1054-1059
[Pub7]	IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control	V.Giordano, J.G.Hartnett, J.Krupka, Y.Kersale, P-Y.Bourgeois, M.E.Tobar	Whispering-Gallery Mode Technique Applied to the Measurement of the Dielectric Properties of Langasite Between 4 K and 300 K	51, No 5	484-490
[Pub8]	Journal of Alloys and Compounds	P.Hoffmann, D.Schmeisser, R.B.Beck, M.Cuch, M.Gidź, A.Jakubowski	Photoemission studies of very thin (<10 nm) silicon oxynitride (SiOxNy) layers formed by PECVD	382	228-233
[Pub9]	Journal of Alloys and Compunds	M.Kaczkan, M.Malinowski	Upconversion-induced ultraviolet emission in Ho^{3+} doped $SrLaGa_3O_7$ and $SrLaGaO_4$ crystals	380	201-204
[Pub10]	Journal of Alloys and Compunds	M.Kowalska, G.Klocek, R.Piramidowicz, M.Malinowski	Ultra-Violet emission in Ho:ZBLAN fiber	380	156-158
[Pub11]	Journal of Alloys and Compunds	W.Gryk, B.Kukliński, M.Grinberg, M.Malinowski	High pressure spectroscopy of Pr^{3+} in $LiNbO_3$	380	230-234
[Pub12]	Journal of Luminescence	M.Malinowski, M.Kaczkan, A.Wnuk, M.Szuflińska	Emission from the high lying excited states of Ho^{3+} ions in YAP and YAG crystals	106	269-279
[Pub13]	Journal of Phase Equilibra and Diffusion	W.Gąsior, J.Pstruś, K.Bukat, R.Kisiel, J.Sitek	(Sn-Ag)eut + Cu Solidering Materials, Part I: Wettability Studies	25, No 2	115-124
[Pub14]	Journal of Physics D: Applied Physics	J.Krupka, A.Abramowicz, K.Derzakowski	Magnetically tunable dielectric resonators operating at frequencies of about 2 GHz	37	379-384
[Pub15]	Measurement Science and Technology	J.G.Hartnett, M.E.Tobar, J.Krupka	The dependance of the permittivity of sapphire on thermal deformation ay cryogenic temperatures	15	203-210
[Pub16]	Microelectronics Engineering	B.Majkusiak	Comparison of resonant tunnelling currents in double gate MOS diodes with metal and poly-silicon gates	1	96-100

1 Institute for Scientific Information (Philadelphia, USA)

[Pub17]	Molecular Crystals and Liquid Crystals	J.Parka, M.Sutkowski, T.Grudniewski	Liquid crystal photosensitive cells as a medium for real-time digital projected holograms	413	451-460
[Pub18]	Molecular crystals and Liquid Crystals	T.Grudniewski, J.Parka, R.Dąbrowski, A.Miniewicz	Photorefractive effects in pure multicomponent isothiocyanate liquid crystals under low power illumination	413	443-450
[Pub19]	Optical Materials	M.Kaczkan, I.Pracka, M.Malinowski	Optical transitions of Ho^{3+} in $SrLaGa_3O_7$	25	345-352
[Pub20]	Optics Communications	M.Nakielska, A.Mossakowska-Wyszyńska, M.Malinowski, P.Szczepański	Nd:YAG microdisk laser generating in the fundamental mode	235	435-443
[Pub21]	Optoelectronics Review	J.Parka, T.Grudniewski, Yu.Kurioz, R.Dąbrowski	Optically addressed holographic gratings in LC cells with different layers and high optical anisotropy liquid crystals	12(3)	317-320
[Pub22]	Opto-Electronics Review	S.Pietruszko	Photovoltaics in the World	12, No 1	7-12
[Pub23]	Opto-Electronics Review	S.Pietruszko, M.Grądzki	1 kW grid-connected PV system after two years of monitoring	12, No 1	91-93
[Pub24]	Physica Status Solidi	M.Godlewski, J.Szmidt,A.Olszyna, A.Werbowy, E.Łusakowska, M.R.Philips, E.M.Goldys, A.Sokołowska	Luminescent properties of wide bangap materials at room temperature	1 (2)	213-218
[Pub25]	Superconductor Science and Technology	M.V.Jacob, J.Mazierska, J.Krupka	A cryogenic post dielectric resonator for precise microwave characterization of planar dielectric materials for superconducting circuits	17	358-362
[Pub26]	Thin Solid Films	A.Werbowy, A.Olszyna, K.Zdunek, A.Sokołowska, J.Szmidt, A.Barcz	Pecularities of thin film deposition by means of reactive impulse plasma assisted chemical vapor deposition (RIPACVD) method	459	160-164
[Pub27]	Thin Solid Films	M.Sochacki, J.Szmidt	Dielectric films fabricated in plasma as passivation of 4H-SiC Schottky diodes	446	106-110
[Pub28]	Transactions of the Materials Research Society of Japan	M.V.Jacob, J.Mazierska, J.Krupka	Microwave characterization of $(La,Sr)(Al.,Ta)O_3$ using TE_{011} mode dielectric resonator	29(4)	1093-1096
[Pub29]	Vacuum	M.Niewiński	Distributed Monte Carlo simulation of a dynamic expansion system	73	257-261
[Pub30]	Vacuum	P.Szwemin	The influence of the blocking plate diameter on the gas flux distribution in the calibration chamber	73	263-267
[Pub31]	Vacuum	P.Szwemin, K.Jousten, K.Szymański	The gas flux distribution in the XHV chamber of the vacuum primary standard developed by PTB	73	249-255

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

Number	Journal	Authors	Title	Volume	Pages
[Pub32]	Biuletyn Informacyjny ATR	J.Woźnicki	Kierunki zmian w systemie szkolnictwa wyższego w Polsce	9, no 3	6-9
[Pub33]	Czysta Energia	S.Pietruszko	Fotowoltaika w USA na tle światowym	13(29)	10-11
[Pub34]	Elektronika	A.Calcatelli, M.Niewiński, P.Szwemin	Porównanie wpływu strumienia wstecznego na generowaną koncentrację gazu w systemie wzorca IMGC, wyznaczonego na drodze pomiaru i symulacji Monte-Carlo	10	37-38
[Pub35]	Elektronika	A.Linkowski, L.Łukasiak, A.Jakubowski	Modelowanie wpływu parametrów tranzystora HBT z bazą SiGe na prędkość nośników w bazie przy użyciu symulatora APSYS 2000	10	24-25

[Pub36]	Elektronika	A.Mossakowska-Wyszyńska, A.Getka, P.Szczepański	Analiza numeryczna pracy lasera zbudowanego z dwuwymiarowego kryształu fotonowego	10	29-31
[Pub37]	Elektronika	G.Janczyk	Nowe aspekty zjawisk podłożowych w tranzystorach SOI-MOS	10	25-26
[Pub38]	Elektronika	L.Łukasiak, J.Grabowski, P.Nowek, K.Stankiewicz, R.B.Beck, A.Jakubowski	Sterownik do wieloetapowych procesów technologicznych	10	22-23
[Pub39]	Elektronika	M.Sochacki, R.Łukasiewicz, J.Szmidt, W.Rzodkiewicz, M.Leśko, M.Wiatroszak	Warstwy termicznego SiO_2 i Si_3N_4 na węgliku krzemu (4H-SiC) do przyrządów mocy MS i MIS	10	9-10
[Pub40]	Elektronika	R.Gronau, J.Szmidt, T.Gotszalk, A.Marendziak, P.Konarski, A.Rylski	Zastosowanie technik plazmowych do płytkiej implantacji jonów	10	11-12
[Pub41]	Elektronika	R.Kisiel	Wpływ temperatury lutowania na rozpływność lutów SnAg i SnAgCu na różnych podłożach	10	20 - 21
[Pub42]	Elektronika	T.Bieniek, R.Beck, A.Jakubowski, A.Kudła	Wytwarzanie ultracienkich warstw SiO_2 za pomocą niskotemperaturowego utleniania w plaźmie w.cz.	10	6-7
[Pub43]	Forum Akademickie	J.Woźnicki	Trzy w jednej	3	29-31
[Pub44]	Inżynier-pismo Politechniki Szczecińskiej	J.Woźnicki	Problemy konkurencyjności w polskim szkolnictwie wyższym	3	5-8
[Pub45]	Journal of Telecommunications and Inforation Technology	A.Linkowski, L.Łukasiak, A.Jakubowski	Modeling SiGe-base HBT using APSYS 2000 – a 2D simulator	1	36-38
[Pub46]	Journal of Telecommunications and Inforation Technology	J.Walczak, B.Majkusiak	Scattering mechanisms in MOS/SOI devices with ultrathin semiconductor layers	1	39-49
[Pub47]	Journal of Telecommunications and Inforation Technology	L.Łukasiak, A.Jakubowski, Z.Pióro	Silicon microelectronics: where we have come from and where we are heading	1	7-14
[Pub48]	Journal of Telecommunications and Inforation Technology	R.B.Beck, A.Jakubowski	Ultrathin oxynitride films for CMOS technology	1	62-69
[Pub49]	Nauka	J.Woźnicki	„Prawo o szkolnictwie wyższym jako odpowiedź na wyzwania europejskie”	1	123-126
[Pub50]	Polski Instalator	S.Pietruszko	Ogniwa i systemy fotowoltaiczne	5	34-36
[Pub51]	Przegląd Telekomunikacyjny	A.Jakubowski, L.Łukasiak, Z.Pióro	Półprzewodniki a techniki i technologie informacyjne	8-9	337-345
[Pub52]	Przegląd Telekomunikacyjny	A.Jakubowski, L.Łukasiak, Z.Pióro	Półprzewodniki a techniki i technologie informacyjne	8-9	337-345
[Pub53]	Przegląd Uniwersytecki	J.Woźnicki	Szanse polskiego szkolnictwa wyższego w kontekście Procesu Bolońskiego	10, no 7-8	22-24

6.3. Scientific and Technical Papers Published in Conference Proceedings

Number	Conference	Authors	Title	City, Country	Volume	Pages
[Pub54]	13th International PV Science & Engineering Conference, 25–30.01.2004	S.Pietruszko	Status of photovoltaics in the newly accession states to Euproean Union (invited)	Bangkok, Thailand		3-1

[Pub55]	13th International PV Science & Engineering Conference, 25–30.01.2004	S.Pietruszko, M.Grądzki	1-kW grid connected PV System after 2 years of monitoring	Bangkok, Thailand		1-2
[Pub56]	19th European Photovoltaic Solar Energy Conference, 7-11 June 2004	M.Fitzgerald, W.Parker, L.Zhu, S.M. Pietruszko	Lasting dolar programmes require quality training and workforce development	Paris, France	III	3269-3272
[Pub57]	19th European Photovoltaic Solar Energy Conference, 7-11 June 2004	S.M.Pietruszko, A.Mikołajuk et. al.	Status of Photovoltaics in the newly associated states	Paris, France	III	321-3214
[Pub58]	19th European Photovoltaic Solar Energy Conference, 7-11 June 2004	S.M.Pietruszko, M.Grądzki	1kW grid connected PV systems after 3 years of monitoring	Paris, France	III	3012-3015
[Pub59]	19th European Photovoltaic Solar Energy Conference, 7-11 June 2004	W.Hoffmann, S.M.Pietruszko, M.Viaud	Towards an effective european industrial policy for PV solar electricity	Paris, France	III	2711-2713
[Pub60]	8th International Conf. On Miniaturied Systems for Chemistry and Life Sciences, Proc. Of Micro Total Analysis System September 26–30, 2004	J.Weremczuk, M.Chudy, A.Dybko, R.B.Beck, Z.Brzózka, R.Jachowicz	Array of planar capacitive sensors as a media detector in microfluidic system	Malmö, Sweden	2	494-496
[Pub61]	9th Biennial Baltic Electronics Conference BEC'2004, 3-6 October 2004	A.Wielgus	Logic-level synthesis in cell-based design of analogue fuzzy hardware	Tallin, Estonia		137-140
[Pub62]	AIP Conference Proceedings: Microresonators as Building Blocks for VLSI Photonics: International School of Quantum Electronics, 39th Course, 18th-25th October 2003	B.Pura, I.Zadrożna, Z.Mączeński, A.Tadeusiak, G.Ratuszanik	Polymer-based Photonic Modulator	Erice, Sicily, Italy	709	397-402
[Pub63]	Conference on Precision Electromagnetic Measurements Digest, 27 June - 2 July 2004	J.Krupka, K.Derzakowski, M.D.Janezic, J.Baker-Jarvis	$The_{01\delta}$ dielectric-resonator technique for precise measurements of the complex permittivity of lossy liquids at frequencies below 1 GHZ	London, UK		469-470
[Pub64]	Emerging Technologies in Optical Sciences ETOS 2004, July 26-29, 2004	A.Mossakowska-Wyszyńska, T.Nazaruk, P.Szczepański	Nonlinear operation of 1D photonic crystal laser	Cork, Ireland		72
[Pub65]	Emerging Technologies in Optical Sciences ETOS 2004, July 26-29, 2004	P.Czuma, P.Szczepański	Semiclassical of light generation in 1-D photonic crystal laser with Fabry-Perrot resonator	Cork, Ireland		22

[Pub66]	European Congress on Computational Methods in Applied Sciences and Engineering ECCOMAS 2004, 24--28 July 2004	B.Czejdo, K.Messa, M.Vernace, J.Czejdo, M.Baszun	UML-Driven Text Annotation and Queries	Jyväskylä, Finland;		1-16
[Pub67]	NATO Advanced Research Workshop "Innovative Superhard Materials and Sustainable Coating	E.Staryga, A.Szczęsny, S.Mitura, J.Szmidt	The Surface Structure of Carbon Films Deposited by RF CVPD Method onto Silicon Substrate	Kyiv, Ukraine		88
[Pub68]	NATO Advanced Research Workshop "Innovative Superhard Materials and Sustainable Coating	M.Smietana, J.Szmidt, P.Niedzielski	Application of Diamond-Like Carbon Film in Optical Waveguide Sensing System K	Kyiv, Ukraine		44
[Pub69]	NATO Advanced Research Workshop "Innovative Superhard Materials and Sustainable Coating	M.Sochacki, R.Łukasiewicz, W.Rzodkiewicz, A.Werbowy, J.Szmidt	Thermal Oxynitridation of 4H-SiC Surface for Electronic Applications K	Kyiv, Ukraine		83
[Pub70]	NATO Advanced Research Workshop "Innovative Superhard Materials and Sustainable Coating	P.Firek, A.Werbowy, J.Szmidt, A.Olszyna	Influence of the Temperature on Electronic Prperties of Carbon-Rich Films Obtained from $(C_2H_5)_3$ K	Kyiv, Ukraine		89
[Pub71]	NATO Advanced Research Workshop "Innovative Superhard Materials and Sustainable Coating	P.Śniecikowski, M.Słapa, A.Werbowy, M.Dudek, J.Szmidt	Radiation sensitive nanocrystalline diamond films K - nie wpisywać do bazy b. krótki	Kyiv, Ukraine		82
[Pub72]	Polish-French-Israeli Symposium on Spectroscopy of Modern Materials in Physics and Biology, September 2004	R.Piramidowicz, P.Witoński, M.Klimczak, M.Malinowski	Analysis of upconverted UV fluorescence dynamics in Nd^{3+} doped ZBLAN glasses. komunikat	Będlewo, Poland		71
[Pub73]	Proc. International Microwave Symposium Workshop: Measurement Methods for the Broadband Characterization of Dielectric Substrates, 7 June, 2004	J.Krupka	Complex Permittivity measurements with split-post resonator	Fort-Worth, USA		p. 27
[Pub74]	Proc. International Microwave Symposium Workshop: Measurement Methods for the Broadband Characterization of Dielectric Substrates,	R.Geyer, J.Krupka	Use of dielectric resonator techniques for complex permeability characterization at microwave frequencies	Fort-Worth, USA		p. 54

	7 June, 2004					
[Pub75]	Proc. of Seminar Internet i techniki multimedialne w edukacji, 5 December 2003	B.Galwas	Techniki teleinformatyczne w edukacji	Warsaw, Poland		5-11
[Pub76]	Proceedings of the 11th International Conference Mixed Design of Integrated Circuits and Systems MIXDES'2004, 24 - 26 June 2004	A.Grodzicki, Z.Jaworski	Static RAM and diffusion programmable ROM layout compiler	Szczecin, Poland		263-268
[Pub77]	Proceedings of the 11th International Conference Mixed Design of Integrated Circuits and Systems MIXDES'2004, 24 - 26 June 2004	A.Jarosz, A.Pfitzner	Evaluation of parasitic capacitances for interconnection buses crossing in different layers	Szczecin, Poland		373-376
[Pub78]	Proceedings of the 11th International Conference Mixed Design of Integrated Circuits and Systems MIXDES'2004, 24 - 26 June 2004	A.W.Łuczyk, W.A.Pleskacz	VLSI implementation of image dilation and erosion operations	Szczecin, Poland		554-557
[Pub79]	Proceedings of the 11th International Conference Mixed Design of Integrated Circuits and Systems MIXDES'2004, 24 - 26 June 2004	G.Janczyk	Sectional origin if the body-potential dependent parameters in SOI-MOSFET transistors	Szczecin, Poland		421-426
[Pub80]	Proceedings of the 11th International Conference Mixed Design of Integrated Circuits and Systems MIXDES'2004, 24 - 26 June 2004	M.Muzal, Z.Jaworski	Hardware implementation of fuzzy logic based diagnostic algotrithm for implantable cardioverter defibrillator	Szczecin, Poland		579-584
[Pub81]	Proceedings of the 16th International Conference on System Research, Informatics and Cybertetics, July 29 - August 5 2004	C.Putonti, B.Czejdo, M.Baszun, J.Czejdo	Drill-Down Operator in Information Systems	Baden-Baden, Germany		81-94
[Pub82]	Proceedings of the 16th International Conference on System Research, Informatics and Cybertetics, July 29 - August 5 2004	M.Baszun, B.Czejdo, J.Czejdo, K.Messa	Working with Incomplete UML Diagrams	Baden-Baden, Germany		1-6
[Pub83]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Calcatelli, M.Niewiński, P.Szwemin	Comparison of measurements and DSMC computations of the effective pumping speed in the IMGC continous gas expansion vacuum standard	Stare Jabłonki, Poland		396-397

[Pub84]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Jakubowski, L.Łukasiak, Z.Pióro	On the synergy between microelectronics and telecommunications	Stare Jabłonki, Poland		27-28
[Pub85]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Jarosz, A.Pfitzner	Dependence of parasitic capacitances on interconnection buses configuration	Stare Jabłonki, Poland		212-213
[Pub86]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Jasik, W.Strupiński, M.Wesołowski, E.Dumiszewska, D.Lenkiewicz	The influence of technological parameters on performance of InGaAs quantum wells deposited on GaAs substrate	Stare Jabłonki, Poland		90-91
[Pub87]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Linkowski, L.Łukasiak, A.Jakubowski	Modeling the influence of SiGe-BASE HBT parameters on carrier velocity in the base using APSYS 2000 simulator	Stare Jabłonki, Poland		223-224
[Pub88]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Malinowski, A.Jakubowski	Modeling parameters and chracteristics of HBT devices based on A_{III}-N semiconductors	Stare Jabłonki, Poland		242-243
[Pub89]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Mossakowska-Wyszyńska, A.Getka, P.Szczepański	Numerical simulation of 2D photonic crystal laser operation	Stare Jabłonki, Poland		324-325
[Pub90]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Pfitzner	Two-dimensional hybrid modelling of doping for statistical simulation of integrated circuits	Stare Jabłonki, Poland		251
[Pub91]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Szczęsny, E.Kamińska, J.Szmidt	GaN - The material for high power microwave devices (HEMT) working in extreme conditions	Stare Jabłonki, Poland		146-147
[Pub92]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Zaręba, L.Łukasiak, A.Jakubowski	Modeling of energy band diagram and junction capacitance of HBT transistor with graded SiGe base.	Stare Jabłonki, Poland		279-280
[Pub93]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	A.Zaręba, L.Łukasiak, A.Jakubowski	The importance of the carrier velocity saturation in the base on the modeling of SiGe-BASE HBT	Stare Jabłonki, Poland		281-282
[Pub94]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	B.Majkusiak	Devices of single-electron electronics	Stare Jabłonki, Poland		191
[Pub95]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	B.Majkusiak, J.Walczak	Study of resonant tunneling of electrons in the silicon DG MOS transistor structure	Stare Jabłonki, Poland		240-241

[Pub96]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	B.Pura, Z.Mączeński, G.Ratusznik	Photonic modulation on polymer waveguides	Stare Jabłonki, Poland		322-323
[Pub97]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	E.Dumiszewska, D.Lenkiewicz, W.Strupiński, M.Wesołowski, A.Jasik	$In_xGa_{1-x}N$ layers high in mole fraction grown by MOCVD	Stare Jabłonki, Poland		69-70
[Pub98]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	E.Dusiński, R.Mroczyński, J.Szmidt, A.Werbowy, K.Zdunek, M.Elert	Titanium oxide films produced by impulse plasma deposition technology for MOS structures	Stare Jabłonki, Poland		71-72
[Pub99]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	E.Piwowarska	Timing problems in VLSI technologies	Stare Jabłonki, Poland		255-256
[Pub100]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	E.Piwowarska, A.Sidlarewicz	Automation of test-points insertion in digital circuit	Stare Jabłonki, Poland		261-262
[Pub101]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	G.Głuszko, L.Łukasiak, A.Jakubowski	Comparison of I-V Characteristics of Si and SiGe SOI MOSFETs	Stare Jabłonki, Poland		205-206
[Pub102]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	G.Janczyk	New look on SOI body effects	Stare Jabłonki, Poland		208-209
[Pub103]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	J.Gibki, L.Łukasiak, A.Jakubowski	SiGe transistor measurements at cryogenic temperatures	Stare Jabłonki, Poland		203-204
[Pub104]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	J.Stęszewski, A.Jakubowski	Comparison of I-V characteristics of 4H-SiC and 6H-SiC MOSFETs	Stare Jabłonki, Poland		263-264
[Pub105]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	J.Szmidt, T.Pisarkiewicz, M.Tłaczała	Non-silicon materials and technologies	Stare Jabłonki, Poland		49-50
[Pub106]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	J.Walczak, B.Majkusiak	Phonon-limited electron mobility in ultrathin double-gate strained-$Si/Si_{(1-x)}Ge_x$/strained-Si field effect transistor	Stare Jabłonki, Poland		283-284
[Pub107]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	J.Żelazko, J.Szmidt, W.Gębicki	Influence of technological parameters of plasma deposition on property of dielectric carbon layers	Stare Jabłonki, Poland		165-166

[Pub108]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	K.Leśniewska-Matys, P.Szczepański	A simple of gain saturation of planar waveguide laser manufactured on the base of photonic crystal with 2D photonic bandgap	Stare Jabłonki, Poland		351-352
[Pub109]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, A.Jakubowski	Investigation of the influence of SiGe channel parameters on the CV characteristics of a MOSFET.	Stare Jabłonki, Poland		229-230
[Pub110]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, A.Jakubowski	Modeling CV characteristic of a MOS structure with strained-Si channel	Stare Jabłonki, Poland		237-238
[Pub111]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, A.Jakubowski, D.Tomaszewski	Modeling I-V characteristics of a p-MOSFET with a SiGe channel	Stare Jabłonki, Poland		231-232
[Pub112]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, A.Jakubowski, D.Tomaszewski	Modeling MOS capactor with SiGe gate	Stare Jabłonki, Poland		233-234
[Pub113]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, A.Jakubowski, D.Tomaszewski	Modeling threshold voltage of a MOS structure with SiGe channel and gate	Stare Jabłonki, Poland		235-236
[Pub114]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, A.Jakubowski, R.B.Beck, Z.Pióro	Silicon-germanium in microelectronics	Stare Jabłonki, Poland		187-188
[Pub115]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	L.Łukasiak, J.Grabwski, P.Nowek, K.Stankiewicz, R.B.Beck, A.Jakubowski	Controller for multi-step technological processes	Stare Jabłonki, Poland		227-228
[Pub116]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Cuch, T.Bieniek, R.Mroczyński, R.B.Beck, A.Jakubowski, P.Hoffman, D.Schmeisser	Thermal stability of deposited by PECVD ultrathin oxynitride layers	Stare Jabłonki, Poland		199-200
[Pub117]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Jakubowska, J.Kalenik, R.Kisiel	Molybdenum oxide based resistors - low cost alternative for thick film technology	Stare Jabłonki, Poland		98-99
[Pub118]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Malinowski	Optically active dielectric microstructures	Stare Jabłonki, Poland		292
[Pub119]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Nakielska, A.Wnuk, J.Sarnecki, G.Gawlik	Pr:YAG channel waveguides fabricated by H^+ ion implantation	Stare Jabłonki, Poland		320-321

[Pub120]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Słapa, J.Szmidt, P.Śniecikowski, A.Szczęsny, W.Czarnacki, M.Dudek, M.Traczyk	Nanocrystalline diamond films for detector applications	Stare Jabłonki, Poland		152-153
[Pub121]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Śmietana, J.Szmidt, M.Dudek	Diamond-like carbon film as a sensitive area for fiber optic sensor	Stare Jabłonki, Poland		167-168
[Pub122]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	M.Sochacki, R.Łukasiewicz, J.Szmidt, W.Rzodkiewicz, M.Leśko, M.Wiatroszak	Thermal oxidation and nitridation of 4H-SiC for MS and MIS power devices	Stare Jabłonki, Poland		140-141
[Pub123]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	P.Czuma, P.Szczepański	Semiclassical theory of 1D photonic crystal laser	Stare Jabłonki, Poland		302-303
[Pub124]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	P.Firek, A.Werbowy, J.Szmidt, A.Olszyna	Electronic properties of nanocrystalline c-BN films at elevated temperatures	Stare Jabłonki, Poland		75
[Pub125]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	P.Szczepański, D.Pawlak	Photonic crystals - from theory to applications	Stare Jabłonki, Poland		56
[Pub126]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	P.Szwemin	Modification of the gas flux distribution in the calibration chamber by the blocking plate	Stare Jabłonki, Poland		411-412
[Pub127]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	P.Wrzosek, M.Borecki, J.Kruszewski	Functional spice model of fiber amplifier	Stare Jabłonki, Poland		360-361
[Pub128]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.B.Beck	New simple method of ultrathin oxynitride layer composition evaluation by means of I-V characteristics analysis	Stare Jabłonki, Poland		197-198
[Pub129]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.Beck, P.Grabiec, R.Paszkiewicz	Silicon and its compounds - non-classical applications	Stare Jabłonki, Poland		45-46
[Pub130]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.Gronau, J.Szmidt, T.Gotszalk, A.Marendziak	Applications of plasma technique for shallow ion implantation	Stare Jabłonki, Poland		84–85
[Pub131]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.Kisiel	Influence of solderiong temperature on a spread factor of SnAg and SnAgCu solders on different substrates	Stare Jabłonki, Poland		100-101

[Pub132]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.Kisiel, J.Felba	Ecological electronic equipment assembly - materials and technological aspects	Stare Jabłonki, Poland		53-54
[Pub133]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.Mroczyński, E.Dusiński, J.Szmidt, A.Werbowy, A.Olszyna	Tantalum oxide layers for microelectronics applications	Stare Jabłonki, Poland		125-126
[Pub134]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	R.Paszkiewicz, P.Szczepański	Semi-classical theory of circular-grating distributed-feedback laser	Stare Jabłonki, Poland		353
[Pub135]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	S.Szostak, L.Łukasiak, R.B.Beck, A.Jakubowski	Characterization of SiGe MOSFETS by means of charge pumping	Stare Jabłonki, Poland		265-266
[Pub136]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	S.Szostak, R.B.Beck, L.Łukasiak, A.Jakubowski	Sing charge pumping in the characterization of MIS structures with ultrathin Si_3N_4 layers	Stare Jabłonki, Poland		267-268
[Pub137]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	T.Bieniek, R.B.Beck, A.Jakubowski, A.Kudła	Formation of ultrathin oxide layers by low temperature oxidation in RF plasma	Stare Jabłonki, Poland		201-202
[Pub138]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	T.Bieniek, R.B.Beck, A.Jakubowski, A.Kudła	Study of extremely shallow nitrogen ions implantation in planar R.F. plasma reactors	Stare Jabłonki, Poland		61-62
[Pub139]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	T.Grudniewski, J.Parka	Photorefractive effects in cells with pure multicomponent isothiocyanate liquid crystals	Stare Jabłonki, Poland		305-306
[Pub140]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	T.Guzdek, J.Szmidt, M.Dudek, P.Niedzielski	NCD film as an active gate layer in chemFET structures	Stare Jabłonki, Poland		86-87
[Pub141]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	T.Łuba, E.Piwowarska, Z.Jaworski	Reconfigurable system-on-chip	Stare Jabłonki, Poland		193-194
[Pub142]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	T.M.Adamowicz, W.Kwaśniewski, K.Dzięciołowski	Diffusion of metal atoms in noble gases	Stare Jabłonki, Poland		299
[Pub143]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	W.Kamiński, J.Kęsik	Analysis a gas pumping effect in ion argon lasers	Stare Jabłonki, Poland		309-310

[Pub144]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	W.Kuźmicz	Microelectronics in implantable medical devices	Stare Jabłonki, Poland		185-186
[Pub145]	VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004	W.Strupiński, M.Wesołowski, A.Jasik, R.Jakieła, D.Lenkiewicz, E.Dumiszewska	Epitaxy MOCVD - a challenge or necessity in a modern electronics	Stare Jabłonki, Poland		47-48

6.4. Scientific and Technical Books

Number	Authors	Publisher	Title, volume, pages
[Pub146]	B.Galwas, A.Szymańska, J.Dawidczyk, P.Witoński, M.Pajer	Akademickie Podręczniki Multimedialne, Warszawa	Telekomunikacja optyczna
[Pub147]	M. Borecki	Oficyna Wydawnicza Politechniki Warszawskiej	Metody natężeniowe modelowania analizy i syntezy systemów światłowodowych, Prace Naukowe PW seria Elektronika, 159 p.
[Pub148]	A.Mossakowska-Wyszyńska, A.Pfitzner, P.Szwemin	CMYK Studio Poligrafii i Reklamy, Łódź	Book of extended abstracts - VIII Electron Technology Con ference ELTE'2004, p. 502

7. REPORTS

[Rep1] **Analysis of working conditions and investigation of dielectric micro-shere and micro-ring lasers** (Analiza warunków pracy i badanie dielektrycznych laserów z mikrorezonatorami o symetrii sferycznej), project leader: Michał Malinowski

[Rep2] **Analysis of working conditions and investigation of fiber laser structure for visible wavelengths** (Badanie i modelowanie warunków wzbudzenia promieniowania krótkofalowego we włóknowych laserach światłowodowych), project leader: Michał Malinowski

[Rep3] **Attempt to use multivalued mathematical morphology for the assessment of tumour-induced angiogenesis on an animal model** (Analiza procesu angiogenezy przy wykorzystaniu wielowartościowych metod morfologicznych), project leader: Grzegorz Kukiełka

[Rep4] **Development of a microscopic image analysis system for medical images** (Integracja systemu do analizy obrazów mikroskopowych), project leader: Hanna Górkiewicz-Galwas

[Rep5] **Elaboration of the methodology of characterisation of PV systems** (Charakteryzacja metod pomiarowych stosowanych w badaniach systemów fotowoltaicznych) project leader: Stanislaw M. Pietruszko

[Rep6] **ENERBUILD—Network Energy in the Built Environment** (Sieć Energia w Budownictwie), European Commission 5 Framework Programme on RTD (ERK6-CT-1999-20001), project leader: Stanisław M. Pietruszko

[Rep7] **Image and object parameters for visual information retrieval systems** (Wyszukiwanie parametrów obrazów i obiektów na obrazach dla potrzeb bazy danych fotografii cyfrowej), sub-project leader: Grzegorz Kukiełka

[Rep8] **Investigating of the influence of small hydrogen content on the transport parameters of charge carriers in amorphous silicon** (Badanie wpływu małych zawartości wodoru na parametry transportu krzemu amorficznego), project leader: Stanisław M. Pietruszko

[Rep9] **Investigation of planar waveguide Yb^{3+}:YAG/YAG laser** (Opracowanie i zbadanie planarnego lasera światłowodowego Yb^{3+}:YAG/YAG), project leader: Michał Malinowski

[Rep10] **Investigations of photorefractive properties o liquid crystal cells and their applications for dynamic holography** (Badanie właściwości fotorefracyjnych przetworników ciekłokrystalicznych i ich zastosowanie w holografii dynamicznej), project leader: Janusz Parka, co-worker: Tomasz Grudniewski

[Rep11] **Measurements of the complex permittivity of single crystal oxides and software development for automation of measurement of insertion loss vs. frequency dependence for SAW delay lines** (Badania zespolonej przenikalności elektrycznej monokryształów tlenkowych oraz opracowanie oprogramowania do automatycznych pomiarów charakterystyk częstotliwości linii opóźniających APF), sub-project leader: Jerzy Krupka

[Rep12] **Measuring system of liquid viscosity with using of piezoceramic ultrasonic transducers** (System pomiarowy lepkości cieczy z wykorzystaniem piezoceramicznych przetworników ultradźwiękowych) project leader: Jerzy Krupka, co-workers: Mikolaj Baszun, Jerzy Rudkowski, Mariusz Mróz, Paweł Popow

[Rep13] **Methods of testing of low frequency relaxation properties of bio-materials in liquid solutions** (Analiza metod badania niskoczęstotliwościowych właściwości relaksacyjnych biomateriałów w roztworach), project leader: Jerzy Krupka

[Rep14] **Modeling of MOS SOI transistors** (Modelowanie tranzystorów MOS SOI), project leader: Wiesław Kuźmicz

[Rep15] **Modeling of PIN photodetectors nonlinear parameters** (Modelowanie nieliniowych parametrów fotodetektorów PIN), project leader: Bogdan Galwas, co-worker: Jarosław Dawidczyk

[Rep16] **Modelling and investigation of physical phenomena in low-dimensional nanoelectronic MOS and MOS SOI structures** (Modelowanie i badanie zjawisk fizycznych w nanoelektronicznych strukturach niskowymiarowych MOS i MOS SOI) project leader: Bogdan Majkusiak

[Rep17] **Modelling and investigation of waveguide laser structures** (Modelowanie i badanie światłowodowych struktur laserowych), sub-project leader: Michał Malinowski

[Rep18] **Nanocrystalline boron nitride (BN) films for microelectronic applications – deposition and characterization** (Warstwy nanokrystalicznego azotku boru (BN) dla aplikacji mikroelektronicznych - wytwarzanie i charakteryzacja); project leader: Aleksander Werbowy

[Rep19] **Nanoelectronic test structures** (Struktury testowe dla nanoelektroniki), sub-project leader: Romuald B. Beck

[Rep20] **New active planar photonic band-gap structures** (Nowe aktywne struktury planarne z fotoniczne przerwą zabronioną), project leader: Paweł Szczepański

[Rep21] **New and improved methods of simulation od manufacturing processes in microelectronics and modeling of IC devices** (Nowe i ulepszone metody symulacji procesów produkcyjnych mikroelektroniki i elemrntów układów scalonych), sub-project leader: Wiesław Kuźmicz

[Rep22] **Novel dielectric layers for silicon carbide preserving their properties at elevated temperatures** (Nowe dielektryczne warstwy na węgliku krzemu zachowujące swoje właściwości w podwyższonych temperaturach), project leader: Jan Szmidt

[Rep23] **Operating conditions analysis of the transistor oscillator coupled with the photovaractor** (Analiza warunków pracy oscylatora tranzystorowego sprzężonego z fotowaraktorem), sub-project leader: Bogdan Galwas

[Rep24] **Optimization of construction and technology of ion argon laser discharge tube** (Optymalizacja konstrukcji i technologii wykonania ceramiczno-metalowej rury wyładowczej jonowego lasera argonowego), project leader: Jerzy Kęsik

[Rep25] **Plasma assisted etching (RIE) of dielectric films for application in advanced microelectronic and nanoelectronic technologies** (Trawienia wspomagane plazmą (RIE) warstw dielektrycznych na potrzeby zaawansowanych technologii mikroelektronicznych i nanoelektronicznych), project leader: Jan Szmidt

[Rep26] **Plasma deposited nanocrystalline boron nitride (BN) films for microelectronics – synthesis, characterization and applications** (Plazmowo wytwarzane warstwy nanokrystalicznego azotku boru (BN) dla zastosowań elektronicznych – synteza, charakteryzacja i aplikacje); project leader: Aleksander Werbowy

[Rep27] **PVNET - Photovoltaic Network** (Sieć fotowoltaiki SPUB-M.), project leader: Stanisław M. Pietruszko

[Rep28] **Researches on stability and long-life performance of metal ion UV laser generation in noble gas – copper halide mixtures** (Badania nad zwiększaniem stabilności generacji i długowieczności ultrafioletowego lasera jonowego na mieszaninie neonu i halidków metali), project leader:Tadeusz M. Adamowicz

[Rep29] **Semi-classical theory of operation of CG-DBR/DFB laser with saturable absorber** (Półklasyczna teoria generacji promieniowania w laserze CG-DBR/DFB z dodatkowym obszarem nieliniowego absorbera), project leader: Paweł Szczepański

[Rep30] **Silicon-germanium (SiGe) – material for new generation CMO devices** (Krzemogerman (SiGe) – materiał dla przyrządów CMOS następnej generacji), project leader: Małgorzata Jurczak

[Rep31] **Studies on monitoring procedures of autonomous PV systems** (Opracowanie procedur monitorowania autonomicznych systemów fotowoltaicznych), project leader: Stanislaw M. Pietruszko

[Rep32] **The analyse of dynamic vacuum standards properties based on "global" system model** (Analiza i porównanie wzorców wysokich próżni w oparciu o model globalny), project leader: Piotr Szwemin

[Rep33] **The analyse of high vacuum standards properties based on "global" system model** (Wyznaczanie parametrów stanu gazu w układzie wzorca próżni z dynamiczna ekspansją gazu, w oparciu o koncepcję globalnego współczynnika korekcyjnego), project leader: Piotr Szwemin, co-worker: Marek Niewiński

[Rep34] **The fiber optic intensity systems modeling simulation and design with computer aid** (Metody inżynierii komputerowej w modelowaniu, symulacji i projektowaniu natężeniowych systemów światłowodowych), project leader: Michał Borecki, co-workers: Jerzy Kruszewski, Paweł Wrzosek

[Rep35] **The implementation of the distributed Monte-Carlo computation shame to determination of the gas state parameters in the metrological systems** (Obliczenia rozproszone w zastosowaniu do wyznaczania parametrów układów metrologicznych metodą Monte-Carlo), sub-project leader: Piotr Szwemin, co-worker: Marek Niewiński

[Rep36] **The method development for projecting optoelectronics and photonics microsystem (**Rozwój metod projektowania konstrukcji i badania mikrosystemów optoelektronicznych oraz fotowoltaicznych), sub-project leader: Jerzy Kruszewski

[Rep37] **Ultrathin SiO2 and high-K dielectric layers for next generation ICs"** (Ultracienkie warstwy SiO2 oraz dielektryki o wysokiej przenikalności elektrycznej dla układów scalonych nowej generacji), project leader: Andrzej Jakubowski

8. CONFERENCES, SEMINARS AND MEETINGS

8.1. International Conferences

[Con1] **Conference NATO Advanced Research Workshop - Science and Technology of SOI Structures and Devices,** Ukraine, April 25-30
speaker: B. Majkusiak

[Con2] **Conference NATO ASI Nanostructured and Advanced Materials for Applications in Sensor, Optoelectronic and Photovoltaic Technology,** Bulgaria, September 11-16
speaker: S.Pietruszko
organizing committee member: S.Pietruszko

[Con3] **Conference on Precision Electromagnetic Measurements Digest**, London, United Kingdom, 27 June - 2 July
reporter: J.Krupka

[Con4] **Emerging Technologies in Optical Sciences ETOS 2004**, Cork, Ireland, July 26-29
reporters: A.Mossakowska-Wyszyńska, P.Szczepański, P.Czuma

[Con5] **EUA Conference and General Assembly,** Marselle, France, April 1-4
audience: J.Woźnicki

[Con6] **European Congress on Computational Methods in Applied Sciences and Engineering ECCOMAS 2004,** Jyväskylä, Finland, July 24-28
speaker: M.Baszun

[Con7] **European Microelectronics and Packaging Symposium,** Prague, Czech, June 15-18
speaker: R.Kisiel
reporter: R.Kisiel

[Con8] **IEEE LEOS 1st Int. Conference on Group IV Photonics,** Hong Kong, China, September 27 – October 3
reporters: A.Mossakowska-Wyszyńska, P.Szczepański

[Con9] **IEEE Workshop on Design and Diagnostics of Electronic Circuits and Systems** DDECS'2004, Stara Lesna Slovakia, April 17-21
speaker: W.Pleskacz

[Con10] **International Conference of IMAPS Poland Chapter,** Wroclaw,Poland; September 26-29
speakers: Z.Szczepański, R.Kisiel

[Con11] **International Conference on Fuzzy Systems FUZZ-IEEE 2004,** Budapest, Hungary, July 25-29
speaker: A.Wielgus

[Con12] **International Microwave Symposium,** Fort-Worth, USA, 7 June, 2004
reporter: J.Krupka

[Con13] **Polish-French-Israeli Symposium on Spectroscopy of Modern Materials in Physics and Biology,** Będlewo, Poland, September
speakers: R.Piramidowicz, M.Malinowski
audience: M.Kaczkan

[Con14] **Polytronic 2004,** Portland, Oregon, USA September 12-15
speaker: R.Kisiel

[Con15] **World Rewenable Energy Congress and Exhibition,** USA, August 27 - September 5
speaker: S.Pietruszko
session chairman: S.Pietruszko
organizing committee member: S.Pietruszko

[Con16] **4th International Conference on Advanced Optical Materials and Devices (AOMD-4),** Tallin, Tartu, Estonia, July 5-9
audience: S.Pietruszko

[Con17] **8th International Conf. On Miniaturied Systems for Chemistry and Life Sciences,** Malmö, Sweden, September 26–30
speaker: R.B.Beck

[Con18] **9th Biennial Baltic Electronics Conference BEC'2004**, Tallin, Estonia, 3-6 October
speakers: W.Pleskacz, A.Wielgus

[Con19] **11th International Conference Mixed Design of Integrated Circuits and Systems MIXDES'2004,** Szczecin, Poland, June 24-26
reporters: W.Kuźmicz, G.Janczyk, A.Pfitzner, A.Jarosz, Z.Jaworski, A.Łuczyk

[Con20] **13th International PV Science & Engineering Conference**, Bangkok, Thailand January 25-30
speaker: S.Pietruszko
session chairman: S.Pietruszko
organizing committee member: S.Pietruszko

[Con21] **16th International Conference on System Research, Informatics and Cybertetics,** Baden-Baden, Germany, July 29 - August 5
speaker: M.Baszun

[Con22] **19th European Photovoltaic Solar Energy Conferece and Exhibition,** Paris, France, June 5-11
speaker: S.Pietruszko

reporters: S.Pietruszko, M.Grądzki, A.Kozłowski, W.Pietnoczka
session chairman: S.Pietruszko
organizing committee member: S.Pietruszko
audience: A.Mikołajuk, M.Juźwik

8.2. Local Conferences

[Con23] **Krajowe Sympozjum Telekomunikacji KST'2004,** Bydgoszcz, Poland, September 7-9
speaker: Andrzej Jakubowski

[Con24] **VIII Krajowa Konferencjia Technologia Elektronowa ELTE'2004,** Stare Jabłonki, Poland, April 19-22
speakers: R.B.Beck, A.Jakubowski, L.Łukasiak, B.Majkusiak, A.Malinowski, J.Szmidt
reporters: T.M.Adamowicz, R.B.Beck, T.Bieniek, M.Borecki, P.Czuma, E.Dusiński, P.Firek, J.Gibki, R.Gronau, T.Guzdek, A.Jakubowski, G.Janczyk, A.Jarosz, A.Jasik, J.Kalenik, W.Kamiński, J.Kęsik, R.Kisiel, J.Kruszewski, K.Leśniewska-Matys, A.Linkowski, L.Łukasiak, A.Malinowski, A.Mossakowska-Wyszyńska, Z.Mączeński, R.Mroczyński, M.Nakielska, M.Niewiński, A.Olszyna, J.Parka, R.Paszkiewicz, A.Pfitzner, Z.Pióro, E.Piwowarska, A.Sidlarewicz, M.Sochacki, J.Stęszewski, P.Szczepański, A.Szczęsny, J.Szmidt, S.Szostak, P.Szwemin, M.Śmietana, P.Śniecikowski, D.Tomaszewski, M.Wesołowski, A.Werbowy, P.Wrzosek, A.Zaręba, J.Żelazko
organizing committee members: M.Niewiński, P.Szwemin, A.Mossakowska-Wyszyńska, R.B.Beck, J.Domański, Z.Jaworski, J.Kruszewski, J.Radzyńska, M.Trzaskowska
science committee members: P.Szwemin, A.Jakubowski, A.Pfitzner, A.Malinowski, J.Szmidt, W.Kuźmicz, B.Galwas, J.Woźnicki
session chairmans: P.Szwemin, A.Jakubowski, A.Pfitzner, J.Szmidt, W.Kuźmicz

8.3. Schools, Seminars and Meetings

[Con25] **International School of Quantum Electronics**, 39th Course, Erice, Sicily, Italy, 18-25 October 2003
speaker: Z.Mączeński

[Con26] **Institute seminar:** Półklasyczny model generacji promieniowania w laserach posiadających ośrodek aktywny w postaci kryształu fotonowego, February 19
speaker: P.Czuma
audience: P.Warda, M.Nakielska, A.Wnuk, M.Borecki, P.Wrzosek, W.Kamiński, P.Szwemin, P.Szczepański, A.Jakubowski, A.Mossakowska-Wyszyńska, P.Witoński, R.Piramidowicz, R.Paszkiewicz

[Con27] **Institute seminar:** Mikroskopia bliskich oddziaływań w pomiarach właściwości mikro- i nanosystemów, March 16
speaker: T.Gotszalk
audience: A.Pfitzner, R.Beck, J.Kruszewski, M.Leśko, P.Śniecikowski, T.Nowak, D.Maj, M.Śmietana, A.Szczęsny, A.Wrebowy, R.Gronau, P.Firek, R. Łukasiewicz, J.Szmidt

[Con28] **Institute seminar:** Modelowanie defektów o dowolnej topografii występujących w warstwie połączeń głęboko submikrometrowych układów scalonych, May 6
speaker: T.Gotszalk
audience: Z.Jaworski, A.Pfitzner, E.Piwowarska, D.Kasprowicz, A.Sidlarewicz, G. Wąchała, N.Kwietniewski, W.Kuźmicz, W.Pleskacz, P.Szwemin, J.Kruszewski

[Con29] **Institute seminar:** Analiza ilościowa wpływu rozrzutów produkcyjnych na clock skew cyfrowych układów scalonych CMOS June 17
speaker: D.Kasprowicz
audience: Z.Mączeński, P.Wołczański, A.Wojtasik, M.Borecki, E.Piwowarska, A.Pfitzner, W.Jońca, A.Sidlarewicz, G.Wąchała, W.Kuźmicz, M.Malinowski

[Con30] **IST-2000-30193 REASON Tutorial:** Advanced Methods of Testing Elecronic Systems, Technical University of Sofia, Bulgaria, May
tutorial lecturers: W. Pleskacz, E. Piwowarska

[Con31] **IST-2000-30193 REASON Tutorial:** Advanced Methods of Digital and Analog Test, Vladimir State University, Russia, September
tutorial lecturers: E. Piwowarska, W. Pleskacz

[Con32] **IST-2000-30193 REASON Tutorial:** Advanced Methods of Digital and Analog Test, Tomsk State University, Russia, September
tutorial lecturers: W. Kuźmicz, E. Piwowarska, W. Pleskacz

[Con33] **IST-2000-30193 REASON Tutorial:** Advanced Methods of Digital and Analog Test, Vladivostok State University, Russia, September
tutorial lecturers: W. Kuźmicz, E. Piwowarska, W. Pleskacz

[Con34] **Meeting: Inductances in CMOS technology – design techniques and parasitic effects** within the seminars: Design and characterisation of passive and active components in RF ICs; and RF IC packaging and interconnects, Sofia, Bulgaria, November
tutorial lecturer: E. Piwowarska

[Con35] **NATO Advanced Research Workshop Innovative Superhard Materials and Sustainable Coating,** Kyiv, Ukraine,
speaker: J.Szmidt
audience: A.Szczęsny, M.Smietana, M.Sochacki, A.Werbowy, P.Firek, A.Olszyna, P.Śniecikowski,

[Con36] **NEMO Kick-off meeting,** Brussels, Belgium, October 28-31
speakers: A.Mossakowska-Wyszyńska, P.Szczepański, A.Werbowy, R.Piramidowicz

[Con37] **Project meetings: PV-NAS-NET, PV-ERA-NET, PV-CATAPULT,** Paris, France, June 6-13
audience: A.Mikołajuk, M.Juźwik

[Con38] **REASON SOC 04,** Slovakia, September 20-26
speaker: W.Kuźmicz

[Con39] **REASON SOC 04,** Cracov, Poland, September 13-18
speakers: W.Kuźmicz, Z.Jaworski

[Con40] **REASON UE meeting,** Stara Lesna, Slovakia, April 17-21
audience: W.Pleskacz

[Con41] **Seminar Internet i techniki multimedialne w edukacji,** Warsaw, Poland, December 5
speaker: B.Galwas

[Con42] **Seminar of the Photovoltaics Support Mechanism,** Greece, May 6-10
speaker: S.Pietruszko
session chairman: S.Pietruszko
organizing committee member: S.Pietruszko

[Con43] **Seminar Ziemia Łódzka - region zielony,** Łódź, May 25
speaker: S.Pietruszko

[Con44] **SINANO meeting,** Belgium, September 19-25
speaker: B.Majkusiak

[Con45] **14th International Travelling Summer School on Microwaves & Lightwaves**, Brno, Czech, July 10-15
speaker: B.Galwas

9. PRIZES

[Prize1] Jerzy Woźnicki, **Minister`s of National Education and Sport Individual Prize,** (Nagroda Indywidualna Ministra Edukacji Narodowej i Sportu) 2004